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臺灣高中英文教科書學術性字彙選用之分析研究

A Study on Vocabulary Selection in Senior High School Textbooks in Taiwan from the Perspective of the Academic Word List

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中文摘要

本研究主要目的在於現行五個版本高中英語教科書中的學術性單字數量以及其分布進行分析比較，以期能瞭解現行高中英文教材在字彙學習方面如何協助學生發展其閱讀大學原文教科書之能力。學術性生字選用比較參照標準，乃以 Coxhead 學者於 2000 年所發表之學術用字詞彙表(the Academic Word List) 為主。同時，本研究亦找出未收錄於各版本之重要學術性詞彙，進而彙編成各版本相對應之補充字表，以供教師編製補充教材或學生進行自主學習使用。

生字選用分析對象為目前市面上廣受採用之五個版本高中英文教科書(A、B、C、D 及 E 版本)，共計三十冊。本研究分析之字彙聚焦於各版本基礎教材部分列於生字表之生字。所採用之研究分析工具為 Web VocaProfile Classic v.4 軟體,學術性單字詞彙量之分析單位為字族(word family)。

本研究的主要發現如下:

(一) 五套高中英文教科書中的學術性單字總量呈現顯著差異。C、D 及 E 三個版本含有 50%以上學術用字詞彙表之學術性生字，分別選用了 289 個，306 個以及 315 個學術性單字。A 及 B 兩版本含有 42%以及 45%學術用字詞彙表上的學術性生字，分別為 240 個及 256 個學術性單字。

(二) 從字頻角度來看各版本教科書學術性單字的選用時，各版本在高字頻學術性單字選用上並無顯著差異，但各版本在稍低字頻(less-frequent)學術性單字選用上呈現顯著差異。整體學術性單字總量的差異主要來自於稍低字頻學術性單字的選用。

(三) 各版本涵蓋最具學習價值來自最高字頻學術性單字字表(sublist 1)的數量及百分比分別為 D 版本(47 個，78%)、C 版本(45 個，75%)、A 版本(42 個，70%)，B 版本(41 個，68%)以及 E 版本(41 個，68%)。而各版本前 180 個高字頻學術性單字的涵蓋數量及百分比則為 C 版本(124 個，69%)，D 版本(118 個，66%)，A 版本(113 個，63%)，E 版本(111 個，62%)以及 B 版本(105 個，58%)。

(四) 至於學術性單字在各冊中的分布，學術性單字的數量並未如預期呈現隨冊數增加而不斷增加的趨勢，而是出現起伏的現象。大部分的版本在第四冊介紹最多的學術性單字，E 版本則是在高二上第三冊時，便呈現最大量的學術性單字。

本研究結果，希望能提供教師更多關於現行高中教科書中字彙選用之概況，以便能為不同程度之學生選擇適切之教材。教科書編寫者亦能重新評估是否調整其學術性單字的選用。同時，也希望藉由補充字表之彙編來協助學生學習重要學術性單字，以協助其能早日發展出理解大學原文書之能力。

關鍵字:字彙選用 、學術性字彙、教科書分析

ABSTRACT

This study aims to analyze and compare the sizes and distribution of academic words in the current five senior high school English textbook series following the 2010 Senior High School Curriculum Guidelines. The Academic Word List (Coxhead, 2000), acknowledged by experts to be beneficial in preparing students for higher education, is utilized as the reference point in this study. With the intent of assisting students to develop their academic vocabulary competence, this study also identified the academic words from the AWL being excluded from each textbook series to form complementary word lists which allow instructors to create supplementary teaching materials or serve as materials for students' autonomous learning.

Research data involves the vocabulary presented in the new word section in the five textbook series (A, B, C, D, & E). All of the vocabulary data in the textbooks were first lemmatized and then processed with lexical frequency analysis software, Web VocaProfile Classic v.4. The vocabulary data were then analyzed with the counting unit of "word family."

The major findings of this study are:

1. Significant differences were found in the sizes of academic words from the AWL among five textbook series. Three textbook series contains more than 50 percent of academic words from the AWL: textbook Series C with 315 word families, textbook series E with 306 word families and textbook series D with 289 word families. The A and B textbook series were found to include 42 percent and 45 percent of academic words from the AWL: textbook series B (256 word families) and textbook series A (240 word families).
2. In terms of distribution of academic words across sublists, statistical testing shows that the five textbook series do not differ in their strength in terms of selecting the most frequent academic words from the high-frequency academic word sublists (sublist 1 and the first three sublists). The differences of the amount of academic word selection among five textbook series mainly arise from the selection of academic words in the sublists which contain the less-frequent academic words (sublists 4-10).
3. The size and percentage of academic words selected from sublist 1 of the AWL in the five textbook series are as follows: 42 word families (70%) in textbook series A, 41 word families (68%) in textbook series B, 45 word families (75%) in textbook series C, 47word families (78%) in textbook series D and 41word families (68%) in textbook series E. The size and percentage of academic words selected from the first three sublists of the AWL are as follows: 105 word families (58%) in textbook series A, 113 word families (63%) in textbook series B, 124

word families (69%) in textbook series D, 118word families (66%) in textbook series C and 111word families (62%) in textbook series E.

4. As for the distribution of academic words across six volumes, most of the textbook series contain the largest amount of academic words in the fourth volume except that SM has the largest amount of academic words in the third volume. Dramatic increase or decline patterns for the amount of academic words presented in advanced volumes were identified.

Based on the findings, some pedagogical implications are provided for teachers, students and textbook writers. It is hoped that the results could facilitate students' academic vocabulary development and provide teachers more information when selecting textbooks. Textbook writers could also re-evaluate their academic vocabulary selection in the new textbook series.

Keywords: vocabulary selection, academic vocabulary, textbook analysis

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CHAPTER ONE

INTRODUCTION

Chapter one presents the background, motivation, purpose, and significance of this study. Research questions and definitions of terms are also provided for an overview of the present study.

Background and Motivation of the Study

Based on my teaching experience and interaction with students, reading textbooks in English seems to be a great challenge to many college students in Taiwan. Several of my former students mentioned the difficulties in reading English-medium textbooks in colleges and their constant needs of looking up unfamiliar words in the dictionaries in order to comprehend their reading assignments. Occasionally, students also requested me for help with their reading assignments in English texts. The requirements of reading English-medium textbooks in colleges do not just happen to my own students. It is, in fact, a prevalent phenomenon in the higher education setting in Taiwan. Earlier studies reveal that English-medium textbooks are frequently adopted in the higher education settings in Taiwan (Kong, 1996; Lin & Kong, 2000; Chen, et al., 2002). To be more specific, eighty percent of 72 instructors from National Taichung University of Science and Technology and Ming Chuan University participating in a survey were reported to use English-medium textbooks for specialized knowledge instructions (Kong, 1996). In the same study, up to 75% of the instructors in National Taiwan Universities of Science and Technology also stated that they utilized English-medium textbooks in class. More recently, Yu and Cheng (2010) surveyed 1,000 instructors and 1,000 students across 40 universities and colleges in Taiwan to explore textbook selection and use behaviors with investigation of the language of the textbooks included. About 63% of the instructors reported that

English-medium textbooks were adopted for teaching. Similarly, about 63% of the college students reported that they used English-medium textbooks in class. Hsu (2011) also acknowledged the common practice of using English-medium textbooks in higher education setting in Taiwan. With the statistical data released by the MOE (2013) on the percentage of senior high school graduates choosing to attend colleges averaging around 95% over the past five years, it is reasonable to argue that the majority of high school graduates need to read English for academic purposes when they pursue further studies in higher education settings in Taiwan.

The reading challenge that my students faced has also been a concern for many other college students in Taiwan. Huang (2004) conducted a research on college students' vocabulary knowledge, content knowledge, and their reading comprehension. Despite the rich knowledge in content area, 246 non-English major college students in Taiwan still found it difficult to read academic texts in English due to lack of vocabulary knowledge in academic words. More recently, the study of Tsou and Huang (2013) also suggested a gap between senior high school graduates' perceptive vocabulary knowledge and the required vocabulary threshold for adequate reading comprehension expected by instructors in the higher education setting.

My students' learning experience and the related studies shown above prompted my curiosity to investigate whether the vocabulary students have learned in high school English classes would fully prepare them for reading English-medium college textbooks.

One way to investigate this issue is to examine the vocabulary selection in the English textbooks of senior high school with the academic words on the Academic Word List (Coxhead, 2000) since the Academic Word List (AWL) is developed with the purpose of preparing students for higher education. Nation (2001) promotes the study of academic words on the AWL for students in the English for Academic

Purpose (EAP) track. Decarrico (2001) also reckons the importance of the Academic Word List (AWL) for academic English and suggests that students with the goal of university study need to learn the academic words on the AWL.

By the beginning of 2013, the new English textbook series following the 2010 curriculum guidelines for senior high school had just had their full volumes. In February 2013, the four major senior high English textbook publishing companies in Taiwan published their last volume, Book Six, of their latest senior high textbook series, which follow the 2010 curriculum guidelines. Therefore, it is also timely to examine the latest senior high school English textbook series in hope of shedding light on the selection of the language learning components in the current textbook series.

Purpose of the Study

This study aims to provide some objective and empirical evidence of vocabulary selection in the five[1] major senior high school English textbook series to high school teachers so that they can be better-informed about the vocabulary selection in each of the textbook series. In addition, this study also attempt to identify the academic words from the Academic Word List (AWL) that are not selected in each textbook series and compile these words to form some supplementary word lists complementary to each textbook series. These word lists could be utilized by senior high school teachers or instructors of English at the college level to develop teaching or learning materials for their students whose learning needs center around English for Academic Purposes (EAP). The compilation of the supplementary word lists also echoes the principle of differentiated instruction in the latest 12-year compulsory

[1] The Far East Book Company, Lung Teng Cultural Company, Nan I Enterprise Company, and San Min Book Company are the four publishers for senior high school English textbooks in Taiwan. Most publishers released one textbook series while the Far East Book Company published two textbook series: Chen et al.'s (2010-2013 edition) Far East English Reader for Senior High Schools (FEC) and Shih et al.'s (2010-2013 edition) Far East English Reader for Senior High Schools (FES).

education reform as the students who have fulfilled the basic vocabulary learning requirements will be able to further utilize the supplementary lists of words at a more advanced level, the academic vocabulary.

Research Questions

The 2010 curriculum guidelines for senior high school state that the objective of senior high school English curriculum aims to cultivate students' English competences to prepare the students for higher education or employment (MOE, 2009). As mentioned earlier, the recent government report (MOE, 2013) shows that about 95% of senior high school students choose to pursue higher education over the past five years in Taiwan. It is worth the effort examining to what extent the senior high school English curriculum has prepared students for further studies in colleges. More specifically, this study will analyze vocabulary selection in the five textbook series with the Academic Word List developed by Coxhead (2000). The Academic Word List, developed primarily to prepare learners for higher education, contains 570 word families that are most frequently encountered in academic texts. The 570 word families are divided into ten sublists based on the frequency of occurrence. The more frequent the words are on the AWL, the more likely the words would appear in the academic texts. Coxhead (2000) suggested that the academic words on the first three sublists occur with relatively high frequency and have the greatest value for learning. According to Coxhead (2000), the academic words from the 60 word families on Sublist 1 occur more frequently than any other academic words on other sublists. In fact, the academic words from the 60 word families on Sublist 1 accounts for about one third of the total coverage of the whole word list while the ones from Sublist 2 only provides half of the coverage of the first 60 word families on Sublist 1. Therefore, this study will adopt the Academic Word List to analyze vocabulary selection in the

five textbook series in terms of sizes, distribution across ten sublists and with a special focus on academic words falling on Sublist 1 and the first three sublists.

With the above-mentioned purposes of study and features of word lists, the research questions of this study are listed as follows:

1. What is the size and distribution of academic words from the Academic Word List (AWL) in each of the high school English textbook series? Are there significant differences among them?
2. What is the percentage of academic words from AWL Sublist 1 in each of the senior high school textbook series? What are these academic words?
3. What is the percentage of academic words from AWL Sublist 1 to Sublist 3 in each of the five senior high school textbook series? What are these academic words?

Significance of the Study

This study aims to examine the vocabulary selection among the five latest senior high school English textbook series in Taiwan from the perspectives of the Academic Word List. Sizes and distribution of academic words are revealed. Supplementary word lists for each textbook series are compiled. Previous vocabulary selection researches of senior high school English textbooks in Taiwan examined mostly two textbook series or six textbook series with a focus on one particular volume (Chang, 2002; Fan, 2004; Huang, 2008; Lin, 2006). The number of volumes for analysis often ranges from six to twelve. The present study attempts to provide a more comprehensive and thorough picture of vocabulary selection of all the current senior high school English textbook series. With the findings from empirical data from thirty volumes of textbooks, senior high school teachers can make better-informed decisions in textbook selection. Instructors in the higher education

setting can also develop a better understanding of how well the high school graduates might have been equipped with the academic words for university study. High school textbook writers can also benefit from the systematic examination of the vocabulary selection in each textbook series and take the findings into consideration when engaged in future textbook development projects. The curriculum guidelines for the 12-year compulsory education are expected to be announced to the public in early 2016 when the next new senior high school textbook writing projects will also be initiated (MOE, 2013). The findings of this study can provide textbook writers an opportunity for reflections and incorporation of corpus-based vocabulary selection analysis for new textbook series. In addition, the supplementary word lists for each textbook series can serve as useful materials for students who need to focus on English for Academic Purposes (EAP) and for instructors who plan to assist their students to further develop their academic vocabulary. High school teachers can use the supplementary word lists for differentiated instruction while instructors at higher education can design a more efficient lexical syllabus for their students on the EAP track.

Definition of Terms

As this study involves quantitative measure of vocabulary and different units of measuring vocabulary would lead to different results, it is important to state the measuring units used in conducting this vocabulary selection research.

1. *Tokens, types and lemmas:*

   Tokens refer to the number of running words in a text while *types* are the number of different words (Nation, 2001; Read, 2000; Schmitt, 2010). The example sentence, “Fat cats eat fat rats”, consists of five *tokens.* Yet, it contains only four *types* as the two occurrences of the token *fat* belong to the same *type. Tokens* are

sometimes called *running words* (Nation, 2001) while *types* are termed as *word forms*, also considered to be the basic psycholinguistic element (Schmitt, 2010). A *lemma*, on the other hand, is comprised of a base form of a word and only the most frequent and regular inflections (Milton, 2010; Nation, 2001; Schmitt, 2010). In English, a lemma would include regular plurals and possessives in nouns, regular inflections –s, -ed, -ing and –en past participles forms in verbs, and comparative and superlative –er and –est endings in adjectives (Bauer & Nation, 1993; Milton, 2010). The items included under a lemma usually belong to the same part of speech (Francis & Kucera, 1982). Therefore, if the textbook presents usages of the vocabulary item "result" as a noun and as a verb in the wordlist section, vocabulary load of this scenario would be counted as two lemmas.

The use of lemmas as the counting unit for words manifested the idea of learning burden (Swenson & West, 1934, as cited in Nation, 2001:7). *Types* could be an ideal measuring unit of vocabulary acquisition for learners at beginner level as each new word form could be a completely new word to them. Accordingly, *types* are often adopted as a measuring unit for textbook vocabulary input research, especially for the textbooks catering for the beginner level and featuring on reading text analysis (Alsaif & Milton, 2012; Konstantakis & Alexiou, 2012). As learners gradually develop their knowledge of the inflectional system of English, lemmas could be used to capture learners' vocabulary growth or knowledge. For example, vocabulary size tests such as Vocabulary Level Test (Nation, 1990& 2001) and XLex (Meara & Milton, 2003) draw on lexical frequency information where lemmatized word counts are employed. *Lemmas* can be an ideal measuring unit of vocabulary knowledge for senior high school students in Taiwan as most students have learned and are familiar with the most frequent and regular inflectional rules of English in junior high school. In addition, Schmitt (2010) also

proposes *lemmas* as a reasonable compromise for measuring both receptive and productive vocabulary use. This study, an examination of textbook vocabulary selection with the Academic Word List, utilized *lemmas* to be the basic quantifying unit for vocabulary data compilation from the textbooks as it could aid in revealing the size of the less-frequent words in the textbooks and to provide an overall picture of vocabulary selection in textbooks.

2. *Word families*

   A *word family* consists of word forms that are semantically related (Schmitt, 2010). A *word family* is made up of a base word, its inflected forms and some closely related derived forms (Bauer & Nation, 1993). Take the headword *"approach"* for example. The word family of "approach" includes the following six word forms: "approach", "approached", "approaches", "approaching", "approachable", and "unapproachable." As the Academic Word List is organized by *word families*, this study adopted *"word families"* as a main measuring unit to show the proportion of the academic words in textbooks against the 570-word-family AWL.

3. *Vocabulary items or lexical items*: "*Vocabulary items" or "lexical items"* are often used by vocabulary specialists or researchers to refer to words or vocabulary when a specific measuring unit is not assigned to them. For example, Schmitt (2011) utilized the term of "*lexical items*" frequently and extensively to talk about second language vocabulary acquisition and how to do research on vocabulary: "*…Vocabulary acquisition is incremental both in terms of acquiring an adequate vocabulary size and in terms of mastering individual lexical items….*" Read (2000) used "what does it mean to know a lexical item" when introducing the concept of vocabulary knowledge. Coxhead (2000) used the terms "*lexical item*" and "*vocabulary item*" interchangeably in the article that introduced the Academic

Word List: “ *…Instead, ,the AWL might be used to set vocabulary goal for EAP courses, construct relevant teaching materials, and help students focus on useful vocabulary items.*” This study used the term *“vocabulary items”* or “*lexical items*” in the same way as most researchers do when necessary.

CHAPTER TWO

LITERATURE REVIEW

The review of literature in chapter two centers around issues of vocabulary and textbook related to this study. It starts with the examination of the importance of vocabulary for second language learning, and then proceeds to explore second language (L2) learners' vocabulary size from the perspective of lexical threshold for L2 reading comprehension, specifically targeting on reading academic texts. The review of vocabulary selection literature subsequently follows with discussions on vocabulary selection principles for English for General Purposes (EGP) as well as English for Academic Purposes (EAP). Concepts and word lists used for discussion on vocabulary selection, such as high-frequency words, academic vocabulary, General Service List (GSL), Academic Word List (AWL), are also introduced along with vocabulary selection literatures. The next part targets on the vocabulary in textbooks, with literature review of suggested arrangement and evaluation criteria for vocabulary in textbooks. The final part of literature review focuses on vocabulary in senior high school textbooks in the context of Taiwan. Related studies on vocabulary selection in the senior high school textbooks in Taiwan were also elaborated.

The Importance of Vocabulary

Vocabulary is an important component of for both language use and language learning. Linguist David Wilkins (1972) stated that "…while without grammar very little can be conveyed, without vocabulary nothing can be conveyed…" (p.111). Laufer (1986) shared the same view and suggested that "without adequate lexis, there is no proper language competence or performance." Nation (1990) also pointed out that inadequate vocabulary knowledge had resulted in many difficulties for L2 students' both receptive and productive language use. Read (2000) indicated that

vocabulary knowledge is "a prerequisite for effective language use." Vocabulary knowledge has been recognized as a good predictor of reading comprehension (Laufer, 1992; Nation, 2001& 2006; Qian, 1999 & 2002).

Numerous researches have also provided empirical data and demonstrated the importance of vocabulary in language learning by showing high correlations between vocabulary knowledge and various measures of language proficiency (Albrechtsen, et al, 2008, Alderson, 2005; Laufer, 1992). Vocabulary size of L2 students in Israel was found to correlate with reading comprehension at .50-.70 (Laufer, 1992). More recently, Albrechtsen, Haastrup and Henriksen (2008) also revealed a high correlation of .73-.80 between L2 vocabulary size of Danish students and their L2 reading ability. Alderson (2005) explored the relationship between vocabulary knowledge and language proficiency systematically in the DIALANG, a diagnostic test development project. Two vocabulary tests showed that vocabulary knowledge correlated with reading at .64, listening at .61-.65, writing at .70-.79 and grammar at .64. Vocabulary is proved to have a strong relationship with various language skills. The importance of vocabulary can be concluded by statement of Alderson (2005) that "the size of one's vocabulary is relevant to one's performance on any language tests. In other words, language ability is to quite a large extent a function of vocabulary size." Since vocabulary knowledge or size plays such an important role in language learning, the questions that concerns most ESL/EFL teachers related to vocabulary learning would be: how many words does a learner need to know and what are the words that should be learn first?

Learners' Vocabulary Size and Lexical Thresholds

The amount of words that learners should learn depends to a great extent on learners' needs. Based on the logic of a communicative approach to vocabulary ability,

the discussion of vocabulary size of L2 learners would not be in an absolute sense, but in relation to particular contexts of use (Chappelle, 1994). For example, the questions raised would be how many words L2 learners need to know in order to read authentic novels or to read college textbooks in English. Since one of the objectives of the 2010 curriculum guidelines for senior high school in Taiwan is to cultivate students' competence for higher education (MOE, 2009), and from recent surveys, the majority of university students in Taiwan need to read English-medium textbooks (Chen, et al., 2002; Lin & Kong, 2000; Yu & Zheng, 2010), the vocabulary size that senior high school students should develop could be examined through the concept of "lexical threshold," the minimal vocabulary knowledge necessary for "adequate" reading comprehension (Alderson, 1984; Laufer, 1992 & 2010; Nation, 2006).

Lexical Thresholds for L2 Reading Comprehension

Reading in a foreign language involves not only content knowledge and reading skills as readers in L1 do but also L2 linguistic knowledge, which consists of both syntactic and lexical knowledge (Alderson, 1984; Laufer, 2010). Alderson (1984) raised the insightful question of reading in a foreign language: Is reading in a foreign language a reading problem or a language problem? To respond to the question, Alderson (1984) proposed "language threshold hypothesis," which suggested L2 learners need to possess a certain amount of linguistic knowledge in order to function well in L2 tasks, such as reading or listening. With multiple regression analysis, Bosser (1991) showed that L2 linguistic knowledge level predicted L2 reading abilities four times better than L1 reading abilities except for learners at advanced level group. As for which component of linguistic knowledge playing a much more significant role for reading in a foreign language, lexical knowledge was found to contribute more to L2 academic reading success than syntactic knowledge

(Saville-Troike, 1984; Laufer& Sim, 1985). Most of the researches exploring language threshold for reading comprehension have focused more on lexical knowledge instead of syntactic knowledge. Findings from lexical knowledge for reading comprehension studies on lexical threshold are useful for second or foreign language education because teachers and course designers can set up the vocabulary learning goals or design lexical syllabi accordingly.

Suggested Vocabulary Size for L2Learners from Lexical Threshold Studies

Ever since Alderson's (1984) call for investigation of "language thresholds" for L2 reading comprehension, several studies have been conducted to explore pedagogically usable thresholds (Laufer, 1989, 1992 & 2010; Laufer & Sim, 1985; Hsu, 2011; Hu & Nation, 2000; Nation, 2001& 2006). Opinions and findings of these lexical thresholds vary as a result of different operationalized definitions of what it means to be "adequate" L2 reading comprehension and research approaches. Different levels of reading comprehension might be required in different contexts, and subsequently result in different lexical thresholds. As for research approaches, the search for lexical thresholds for reading comprehension often proceeds in two complementary approaches: one is to examine the coverage that words of different frequency level provide to the texts; the other is to test learners on text comprehension and relate different reading scores to learners' vocabulary size (Cobb & Horst, 2001 a). In other words, the first approach places emphasis on the reading texts and the lexical coverage of the reading texts while the second approach involves the reader and search for the size of the readers' sight vocabulary. Sight vocabulary refers to the words that learners are so familiar that they can be recognized and decoded immediately without much cognitive effort when learners engage in a reading task (Laufer, 2010). The larger the size of sight vocabulary of a learner, the more lexical

coverage he or she has for the reading texts. The more lexical coverage the learner has for a text, the higher chances for the learner to have better reading comprehension of the text.

To tackle the issue of learners' vocabulary size for adequate comprehension, Laufer (1989) first investigated lexical coverage of academic texts for "adequate" reading comprehension, in which a score of 55% was set as the operationalized definition for "adequate" comprehension. The results showed that the learner group that scored 95% and above on lexical coverage had a significantly higher number of successful readers (scoring at least 55% or above on reading comprehension test) when compared to the 90% - 94% group. Some learners at different coverage level still received passing scores for their reading comprehension. This made Laufer (1989) conclude that the 95% text coverage is a lexical threshold of probabilistic nature. "Adequate" comprehension might happen when students possess a vocabulary size lower than 95% of lexical coverage of texts, but the chance or probability is low.

Using two comprehension tests and adopting the score that most learners in the 100% coverage group receives as the passing score for "adequate" comprehension (scoring 87.5%), Hu and Nation (2000) searched the lexical coverage for "adequate" reading comprehension on fiction texts. Four different lexical coverage groups (80%, 90%, 95%, and 100%) were created by replacing some words in the text with non-words. Results showed that none of the students could reach "adequate" comprehension at 80% of coverage while some students could at the 90% and 95% coverage groups. Ninety-eight percent of lexical coverage of text is concluded to be the probabilistic threshold for reading fiction texts adequately while 80% lexical coverage of text is believed to be the all-or-nothing threshold.

The two different lexical coverage suggestions vary due to different definition of "adequate" comprehension yet both 95% and 98% lexical coverage

suggestions are acknowledged depending on what level of "adequate" comprehension is expected. In terms of lexical coverage of text for "adequate" reading comprehension, it can be concluded by Nation's (2001) statement that "The probabilistic threshold is 98%. With this coverage, almost all learners have a chance of gaining adequate comprehension. If, instead of adequate comprehension, a standard of minimally acceptable comprehension is applied (as Laufer did in her study), then 95% coverage is likely to be the probabilistic threshold" (p. 147).

The lexical coverage of texts for "adequate" comprehension was identified, and the investigations on size of sight vocabulary for "adequate" comprehension followed subsequently from the two complimentary research approaches. To locate the threshold vocabulary level, Laufer (1992) took the reader approach in which the reading comprehension scores and the university students' vocabulary size were examined. With "adequate" comprehension score set at 56%, 3,000 word-family level was found to be the lexical threshold where there are more readers than non-readers. With "adequate" comprehension score at 63%, the vocabulary knowledge of 4,000 word families was needed while the vocabulary knowledge of 5,000 word families would be required for "adequate" comprehension score set at 70%. The vocabulary knowledge of 3,000 word families is concluded to be the minimal requirement for reading unsimplified texts. The findings of this study offered practical implications for syllabus designers to set vocabulary learning goals. On the other hand, Hirsh and Nation (2001) adopted the text coverage approach in which they used General Service List (West, 1957) for the first 2,000 word families and the old Thorndike and Lorge's teacher's word list (1944) for words beyond 2,000 word families to analyze the lexical coverage of unsimplified teenager novels. To reach the 97%-98% text coverage for "adequate" reading, the vocabulary size needed is suggested to be 5,000 word families. With the intent of more accurate estimates for the number of word families that

learners need for “adequate” comprehension with various genres of texts, Nation (2006) developed word family lists from British National Corpus (BNC) frequency list (Leech, et al., 2001) and searched for more precise vocabulary size that learners need to comprehend different genres of texts. The findings revealed that 3,000 word families and proper nouns would give 95% coverage of the spoken texts. To get 98% coverage for spoken texts, learners need to have a vocabulary size of 6,000-7,000 word families and the knowledge of proper nouns, which often accounts for about 4%-5% of text coverage. For written texts of newspapers or novels, learners need 3,000 word families and the knowledge of proper nouns to reach 95% of text coverage. However, to reach the 98% text coverage of written texts, learners would need a vocabulary size of 8,000-9,000 word families and the knowledge of proper nouns as required in Laufer (1989) and Hu and Nation (2000).

The two lines of lexical threshold investigations seem to find similar results when adopting the 95% text coverage as the probabilistic threshold despite different genres of written texts (Laufer focused mainly on academic texts while Nation aimed more at novels and newspapers): L2 learners need to have the vocabulary size of 3,000 word families and proper nouns to reach 95% of text coverage for “adequate” reading comprehension. The lexical threshold of 3,000 word families has been acknowledged and recommended by many researchers (Cobb & Horst, 2001a; Nation, 2000; Nation & Waring, 1997; Thornbury, 2002) to be an important vocabulary learning goals for L2 learners in order to provide initial access to authentic texts.

Vocabulary size for English for Academic Purposes

For L2 learners in the senior high school in Taiwan in preparation for university study, what concerns the instructors, textbook writers and syllabus designers more would be the lexical threshold for reading academic texts. Laufer

(2010) re-examined the lexical threshold for academic English with more rigorous research design and suggested two thresholds for reading academic texts in English: the optimum one, (vocabulary knowledge of 8,000 word families plus knowledge of proper nouns resulting in the 98% text coverage) and the minimal one (vocabulary knowledge of 4,000-5,000 word families and knowledge of proper nouns leading to the 95% coverage of texts). Using BNC frequency word list, Hsu (2011) investigated the vocabulary threshold of English-medium textbooks and research articles in the field of Business for EFL learners. Business textbooks were discovered to reach 98% text coverage at the 5,000 word-family level and to get to 95% text coverage at the 3,500 word-family level. Research articles in business discipline requires the vocabulary knowledge of 8,000 word families to provide a 98% text coverage and 5,000 word families to supply 98% coverage of texts. The results from these two lexical threshold studies for "adequate" comprehension of academic texts offer rich information for L2 learners and instructors to set up the vocabulary learning goals for academic studies.

Vocabulary Selection

While 3,000 word families are generally agreed to be a reasonable goal for L2 learners on the English for general purpose track and students in preparation for university studies should aim at around 3,500-8,000 word families depending on the language demands of different disciplines, L2 instructors, syllabus planners and students would have to deal with another important issue in vocabulary learning planning, that is, which 3,000 word families should be learned or what words should be learned first. This is the issue of vocabulary selection (Richards, 2001).

General Principles for Vocabulary Selection

The investigation of the issue of vocabulary selection can be traced back to

early works of Faucett, et al. (1936), Ogden (1930), Thorndike and Lorge (1940), and West (1957). Frequency of words counted from a large collection of texts plays an important role in the early works of vocabulary selection at the first half of the twentieth century (Richards, 1974 & 2001). Early lexicometrics specialists propose that word frequency counts offer the basis for a more scientific and objective approach to vocabulary selection (Richards, 1974). This "frequency" principle is still acknowledged by numerous researchers of these days as an important criterion for vocabulary selection (Coady, et al., 1993; Cobb, 2013; Gairns & Redman, 1986; Geothals, 2004; Nation, 2001& 2003; Nation & Waring, 1997; Richards, 1974 & 2001; Schmitt, 2000; Schmitt & Schmitt, 2012; Sinclair & Renouf, 1998). Word frequency refers to "how often the word occurs in normal use of the language" (Nation & Waring, 1997). High-frequency words tend to give a much greater return in opportunities for language use than low-frequency words do (Nation, 2003). Frequency of a word can be an indicator of its usefulness (Goethals, 2004; Nation & Waring, 1997) and its difficulty (Ryder & Hughes, 1985). Thus, the frequency of words is often regarded as an important criterion for vocabulary selection.

Word frequency count is acknowledged to be an essential component in planning word lists for language teaching yet, to ensure the usefulness of the selected words, the high-frequency words also have to occur across a wide range of different texts. "Range" of the words also plays an important role in the process of vocabulary selection. The selection of "range" would be determined based on learners' needs and learning goals. For students with learning English for general purposes, words appearing across a wide range of texts would be selected while learners of English of specific purposes, words from specific fields would be selected. Students' needs and proficiency level are also recognized as important criteria for vocabulary selection in a course or curriculum (Allen, 1983; Gairns & Redman, 1986). When taking students'

needs and background into consideration, cultural factors should also be taken into consideration in the process of vocabulary selection as learners might have special cultural interests in L2 that might be distinct from native speakers (Gairns & Redman, 1986). In addition to the four criteria mentioned above, Richards (2001) also points out five other criteria that are useful for vocabulary selection: (1) teachability: concrete vocabulary can be easily illustrated through pictures or by demonstration, (2) similarity: word items similar to words in learners' native language, (3) availability: less-frequent words yet are readily available when certain topics are presented, (4) coverage: words that cover the meaning of other words, and (5) defining power: words that are useful in defining other words. The act of vocabulary selection would involve different criteria depending on the objectives of the language curriculum or programs or the purposes of the wordlists.

Vocabulary Selection for Learners in Preparation for Academic Study

Allen (1983) pointed out that learners' needs should be the most important criteria for selecting words. For L2 learners in preparation for academic study, such as the senior high school students in Taiwan, several researchers and vocabulary specialists (Cobb & Horst, 2001a; Decarrico, 2001; Nation, 2001& 2003; Paquot, 2011; Schmitt, 2010; Thornbury, 2002) have recommended that L2 learners should be first equipped with a core vocabulary of 2,000 high-frequency words, then with study of academic words for higher education study.

High-frequency Words and General Service List

Nation (2001) categorized English vocabulary into four groups: high-frequency words, academic words, technical words, and low-frequency words. High-frequency words, also known as core words, or basic words (Paquot, 2010), provide a large amount of text coverage of both spoken and written texts and occur

highly frequently in all kinds of language uses. The best-known list of high-frequency words is the West's (1953) *General Service List of English Words* (GSL), which is created from a five-million word corpus of written texts and contains about 2,000 headwords considered suitable for foreign language teaching (Decarrico, 2001; Nation, 2001; Richards, 2001). The list was created with the incorporation of findings from a major vocabulary selection study of that time: *The Interim Report on Vocabulary Selection* (Faucett, Palmer, West, and Thorndike, 1936). The criteria for GSL compilation include: word frequency, structural value, universality, subject range, definition words, word-building capacity and style (Howatt, 2004). Information on frequency of different meanings of each word is also available to teachers. GSL has been quite useful in second or foreign language education as it provides a reference in making decisions about what words to use in L2 learning materials: course books and graded readers and which meaning of the words to be taught first. GSL also claims to provide about 80% coverage of most written texts, and thus become quite influential on L2 learning (Carter & McCarthy, 1988). On the other hand, GSL has also received some critiques, mainly on its out-datedness, lack of spoken data, utility, and availability (Richards, 1974 & 2001; Carter & McCarthy, 1998). Despite several disadvantages mentioned, GSL has continued to be useful as Nation and Hwang (1995) demonstrated quite large overlap between more recent frequency count and GSL. The GSL used in the study was a re-organized version of GSL, in which the original GSL was arranged in frequency order and concept of word families. Based on Nation and Bauer's (1995) criteria of determining word families, the re-organized GSL contains 1,965 word families and has been adopted for numerous lexical profiling and vocabulary selection studies (Coxhead, 1998 & 2000; Fan, 2004; Horst, 2005; Nation & Hwang, 1995; Nation & Wang, 1999). Nation and Hwang (1995) discovered that replacing some words in GSL with some other words in the top 2000 frequency band

only resulted in 1% coverage difference. The first 1,000 words of GSL was also found to provide about 77% of text coverage while the second 1,000 words offer about 5% in academic texts in Nation and Hwang's study. The finding was consistent with the earlier GSL claim of about the 80% text coverage that it could offer. The high-frequency words of about 2,000 word families are proven to be an essential part of vocabulary selection for L2 learners heading toward academic study.

Academic Words and Academic Word List

High-frequency words are indeed an important part of vocabulary selection for L2 students preparing for academic study. However, the lexical coverage of high-frequency words in academic texts often just average around 80%, which is far from the probabilistic threshold of 95% or 98%. To reach the 95% or 98% probabilistic threshold for "adequate" reading for academic texts, 3500 to 8000 word families were recommended (Laufer, 2010; Hsu, 2011). This prompted the teachers, students and syllabus designers to think what vocabulary items should be learned next. Nation (2001& 2003) suggests that learners who have learned the high-frequency words and are in pursuit of academic study should quickly familiarize themselves with general academic vocabulary, such as the words on Coxhead's (2000) Academic Word List (AWL) rather than the next 1,000 word families on the frequency list. The reason is that the academic words from AWL provide about 8.5% of text coverage yet the next 1,000 words on the frequency list often just provide about 4.3% of text coverage of the same corpus (Coxhead, 1998). Academic Word List (AWL) is also reckoned by Decarrico (2001) as target words to learn for students preparing for university studies. Learners on EAP track were suggested to learn a further one thousand high-frequency words beyond the 2000 base, plus the learning strategies to deal with low-frequency words. The further 1,000 word families were given priority

to academic vocabulary. Thornbury (2002) also recommended students preparing for academic study to work on specialized academic word lists, such as the AWL.

Academic words, also known as ‘sub-technical vocabulary’ (Cowan, 1974; Yang, 1986; Anderson, 1980), ‘semi-technical vocabulary’ (Farrell,1990) and ‘academic vocabulary’(Martin,1976; Coxhead,2000), refer to words such as *accumulate*, *achieve*, *analysis* and *proportion*, which are common in a wide range of academic texts but less frequent in general texts (Nation, 2001). Several attempts were made to investigate the vocabulary needed for academic studies in the 70s and four word lists were created for academic study from these researches (Champion & Elly, 1974; Ghadessy, 1979; Lynn, 1973; Praninskas, 1972). Considerable overlaps were found among the four lists by Nation & Xue (1984) and the four lists were combined into one list, the University Word List (UWL). UWL consists of 836 word families and provides 8.5% coverage of academic texts. The University Word List has been replaced by Coxhead’s (2000) the Academic Word List (AWL), which contains 570 word families. The academic words on AWL cover about 10% of the 3,500,000-token Academic Corpus of 414 academic texts across 28 subject areas of four major faculty sections: Art, Science, Commerce, and Law. The selection criteria were: range, frequency, and uniformity of frequency. In terms of “range,” word families have to occur across all four faculty sections and more than half of the 28 subject areas to be selected. This selection principle ensures the word families on AWL to be useful to students of all disciplines. As for the selection principle of “frequency,” word families have to occur over 100 times in the 3,500,000-token corpus to be included. This selection principle ensures that learners meet the word families a reasonable number of times when reading academic texts. The principle of “uniformity of frequency” rules that word families have to occur at least 10 times in each of the four faculty sections. This again ensures the usefulness of the AWL for learners studying various

disciplines. In addition, the word families that match the above-mentioned selection criteria yet appear on the General Service List were excluded to ensure the word families selected are of academic nature.

On the basis of frequency of occurrence, the 570-word-family AWL has been divided into 10 sublists with each sublist containing 60 word families except for Sublist 10, which has only 30 word families. The word families on Sublist 1 occur more frequently than the ones on the subsequent sublists. Sublist 2 has the next highest frequent words. The academic words from the 60 word families on Sublist 1 account for about one third of the total coverage (3.6% text coverage) of that of the AWL list provides (10% text coverage) while the academic words from Sublist 2 provide only half of the coverage of Sublist 1(1.8% text coverage). The word families in the first three sublists occur with relatively high frequency (of 6.6% text coverage) and have been suggested to have the highest value for learning (Coxhead, 2000).

Academic words are important learning goals for L2 learners in preparation for university study as these words were found to account for a substantial part of academic texts. The academic words from the AWL provide about 10% of the text coverage in the academic corpus of 3,500,000 running words (Coxhead, 2000). Several other researches have also reported on the text coverage of the academic words from AWL in a variety of disciplines. Cobb and Horst (2002) found the AWL provided text coverage of 11.6% in a self-compiled corpus of academic texts across several disciplines (e.g. linguistics, history, zoology, etc.). Text coverage of 10.07% offered by AWL was reported in the discipline of medicine (Chen & Ge, 2007). In the field of finance, Qian & Li (2010) demonstrated AWL text coverage of 10.46%. Vongpumivitch, et al. (2009) discovered 11.17% of text coverage of AWL in the Applied Linguistics discipline. These findings of the AWL text coverage from various disciplines are consistent with what Coxhead (2000) have reported and proved the

importance of studying the academic vocabulary compiled in the AWL for academic study. This study will examine the word selection in the senior high school English textbooks with the Academic Word List for its significant role in preparing students for further studies and focus on the examination of academic words from Sublist 1 and the first three sublists for the high text coverage they offer.

Vocabulary in Textbooks

The role of vocabulary in language textbooks received attention early in the 1930s when scholars like Faucette, Palmer, West and Thorndike (1936) worked on the principles for vocabulary selection for learning a foreign language. Despite the dominance of syntactic and phonological knowledge presented in the textbook in the 1960s and 70s, vocabulary has regained more researchers' attention since the 1980s (Zimmerman, 1997). With the positive evidence found in support of explicit vocabulary instruction along with reading in ESL context (Paribakht & Wesche, 1997; Zimmerman, 1994) and support for explicit vocabulary instruction on high-frequency words for L2 learners (Beck, McKeown, & Omanson, 1987; Coady, 1997; Nation, 2001), textbooks writers place more emphasis on vocabulary or incorporate relevant research findings into the presentation of the vocabulary component of the learning texts. For example, the recently published language textbook series, *Q: Skills for Success* (Bixby, et al., 2011) published by Oxford University Press, incorporates words from Academic Word List, practices of collocation, and strategies for learning vocabulary. Based on findings from researches and teaching, there are concrete principles and evaluation criteria of vocabulary arrangement in textbooks for teachers and textbook writers to determine whether the vocabulary arrangement could facilitate the optimum vocabulary learning for the learners.

Suggested Number of New Words

As the issues of vocabulary size goal for L2 learners, which words to teach or learn first and the importance of explicit vocabulary instruction on high-frequency words for L2 learners have been discussed, this then would bring out the question of how many new words should be introduced or taught per class period or over the duration of a course. Gairns & Redman (1986) suggest that the optimum load for teachers to introduce new words to students in a 60-minute class period averages 8 to 12 productive items. The reasonable amount of new words introduced would vary depending on the students' proficiency level and needs. Elementary students at beginner level could have fewer items while senior high school students at more advanced level could have a higher number of new words introduced. It is hoped that the lower level students would develop productive vocabulary knowledge of 1,000 items over 125 hours of study, which might help students acquire or learn the high-frequency words at a reasonable amount of time. However, Gairns & Redman (1986) also mentioned that the suggested number of new words cannot be equated to the learners' successful acquisition of L2 vocabulary. Several other factors, such as learners' motivation, aptitude, learning environment, learnability of the word, L1 interference, L2 exposure, would also influence learners' vocabulary acquisition. Milton & Meara (1995) found the normal pace of classroom acquisition for L2 learners averages around 550 words per year. It seems reasonable that teachers introduce more new words than what the learners actually acquire at the end as attrition could happen. Schmitt (2000) also pointed out that introducing about 10 new words in a one-hour class period would be reasonable load for L2 students. Nation and Stuart (2011) proposed that L2 learners should at least try to match the native speaker rate of learning vocabulary, which was estimated to be around 1,000 words of receptive knowledge a year. For L2 learners studying in 40-week school year, 25

words would be the learning goal for a week and this could average out around five words a day. This figure is close to the calculated result of earlier finding that at least 15 minutes needed to be spent on a word for it to reach a significant effect on language use (McKeown, et al., 1985). The optimum load of new words introduced in a class period or a course could vary depending on the dynamic of several factors in the teaching contexts: such as students' proficiency level, motivation, the learnability of the words, and even objectives of the class or course.

Suggested Sequence of Vocabulary Items

For the sequence of vocabulary items introduced in L2 learners' vocabulary development process, high-frequency words have been agreed to be the essential basis of all language use and to be given priority in language teaching materials (Nation, 2003& 2005; Schmitt, 2000). The high-frequency words of English (around 2,000 word families as selected in GSL) occur much more frequent in a wide range of language uses than other words. The first 1,000 word families on GSL typically provide the text coverage of 75% while the second 1,000 word families account for about 5% of the text (Nation & Macalister, 2010). And thus the high-frequency words of English, such as the 2,000 word families on GSL should be introduced first in the textbooks. When learners have learned these high-frequency words, the learning of general academic words, such as the 570 word families on AWL offering about 10% of the text coverage, can follow, especially for students in preparation for university study. The learning of technical words and low frequency words would then proceed when learners progress to a more advanced proficiency level (Nation, 2001& 2003; Nation & Macalister, 2010; Nation & Newton, 1997).

For courses of English for general purpose, especially at the lower level, Gower, Phillips &Walters (1995) suggest that "it is usual to introduce the easy words

before the difficult; the concrete before the abstract; the most frequent before the uncommon; the most generative, or all-purpose, before those that have a more restricted use" (p.145).

The Evaluation Criteria for Textbook Vocabulary

Based on research findings about vocabulary acquisition and learning, several criteria for vocabulary in the textbooks have been proposed among the evaluation criteria for textbooks in general. Daoud and Celce-Murcia (1979) considered vocabulary load, systematic gradation (from simple to complex), and word recycling to be three important evaluation criteria for vocabulary in the textbooks. Gairns and Redman (1986) pointed out three major evaluation dimensions with detailed criteria for vocabulary in textbooks: (1) selection (e.g. checking for usefulness and relevancy of words in the word list, cultural appropriateness, grouping of new words, sufficient amount of productive words introduced), (2) linguistic consideration (e.g. provision of phonemic transcriptions and part of speech, clarity of presenting new word's connotations, styles and usage), and (3) methodology (e.g. introduction of learning strategies, word building skills, inclusion of practices and testing activities, recycling of new words, consolidation activities for new words, visual material aids and provision of key vocabulary items for skills activities). In Skierso's (1991) textbook evaluation checklist, the evaluation criteria for determining whether vocabulary is presented well in textbooks consist of: (1) load suitability (2) appropriate contextualization (3) suitable sequence of progression (4) balanced distribution (5) recycling (6) accessibility. Shih (2006) provided a comprehensive evaluation checklist for vocabulary items in textbooks, in which six criteria were included: (1) selecting vocabulary on the basis of frequency and usefulness (2) offering an appropriate number of new words in each lesson (3) distinguishing between productive and

receptive vocabulary (4) using simple, natural and realistic example sentences (5) introducing vocabulary in meaningful and realistic contexts (6) providing information and/or activities for building word power. As for the evaluation criteria for vocabulary in senior high school textbooks in Taiwan, Yeh (2006) proposed the examination of appropriate amount of productive and receptive vocabulary in each unit. The specific criteria for evaluating vocabulary in textbooks might differ depending on the objectives of the language programs or students' learning needs. Since most of the senior high school graduates will be required to read English-medium textbooks when they proceed to undergraduate studies and the academic words on the AWL are acknowledged to facilitate students' academic reading, it is reasonable that the AWL is used as the specific criteria for evaluating the vocabulary selection in the senior high school textbooks.

Vocabulary in Senior High School English Textbooks in Taiwan

Vocabulary selection in senior high school English textbooks in Taiwan differs in conjunction with the curriculum developments in various periods of historical time. Before 1999, vocabulary in the centralized senior high school English textbook series published by National Institute of Compilation and Translation followed the *Senior High School Curriculum Standards* of its publishing time. The curriculum standards for senior high school in Taiwan had been re-adjusted and modified in conjunction with the socio-economic and political developments in the respective years: 1940, 1948, 1952, 1955, 1962, 1971, 1983, and 1995 (Fang & Chang, 2012). In 1999, the publishing of senior high school textbooks in Taiwan was open to various publishing companies. The vocabulary selection in different textbook series published between 1999 and 2005 still followed the *1995 High School Curriculum Standards* yet with the 7,390-word List (Chang, et al., 1998) or CEEC Six-level Word List (Jeng, et al., 2002)

as reference. The vocabulary in the senior high school textbooks published between 2006 and 2009 followed *the 2006 Temporary Curriculum Guidelines for Senior High School* (MOE, 2005) while the vocabulary in the senior high school textbooks published after 2010 mainly followed the latest *2010 Curriculum Guidelines for Senior High School* (MOE, 2009*)*. The brief overview of the development of senior high school curriculum standards or guidelines is intended to provide more information on the contexts of the textbook development in Taiwan. The following sections aim to give an account for current specifications on vocabulary in senior high school textbooks under the current curriculum guidelines and related vocabulary selection studies on senior high school textbooks in Taiwan.

Specifications on Vocabulary for Senior High School Textbooks in Taiwan

With the educational reforms implemented in the 1990s, the centralized senior high school textbooks published by National Institute of Compilation and Translation in Taiwan have been replaced by the ones from various publishers since 1999. The de-centralization allowed teachers and students greater freedom and offered more choices for their learning. However, the de-centralization also triggered the anxiety of some learners, teachers, and parents as a result of difficulty of setting up their language learning goals and consequently, the fear of failure at the high-stakes college entrance examination. To solve this challenge and provide a referent for English studying at senior high school level in preparation for university study and two different college entrance examinations, the General Scholastic Ability Test (GSAT) and Advanced Subjects Test (AST), the College Entrance Examination Center (CEEC) initiated the project of compiling a new word list for language learning and testing at the senior high school level. The project resulted in the CEEC Six-level Word List (Jeng, et al., 2002), which consists of 6,480 words distributed across six levels with

1,080 word at each level. The CEEC Six-level Word List was compiled from a more current and larger corpus, *Bank of English* (2000), consisting of 450 million words from both written and spoken texts of the 1990s whereas the original 7,390-word List (Chang, et al., 1998) was based on *the Brown Corpus* (1964), which contains about one million words from written texts in the 1960s. In addition, the original 7,390-word List did not differentiated the vocabulary for the General Scholastic Ability Test (GSAT) from that of the Advanced Subjects Test (AST), and thus the creation of the new word list, the CEEC Six-level Word List was thus needed. The CEEC Six-level Word list is intended to serve as a reference guide for teaching, testing, and textbook writing for senior high school English learning in Taiwan.

The current senior high school textbook series were developed with the reference of the 2010 senior high school curriculum guidelines, in which specifications about vocabulary items presented in the textbooks were clearly stated. It is recommended that the first two volumes and the "basic learning materials" of the later four volumes of the senior high school English textbook series adopt the most frequent 4,500 words on the CEEC Six-level Word List while the "advanced learning materials" of the last four volumes can incorporate a moderate amount of words from the most frequent 4,000-7,000 words on the CEEC Six-level Word List. As for the specifications for vocabulary size, the size of 600 new words is the upper limit of each volume for the first two volumes and the "basic learning materials" of the later four volumes. The last four volumes of the B version of senior high school English textbooks have a higher upper limit of 700 new words for each volume.

Recent Vocabulary Studies on Senior High School English Textbooks

Since the opening of the senior high school textbook markets to commercial publishers in 1999, numerous researches have been conducted in senior high school

English textbook evaluation or analysis (Chang, 2002; Chen, 2006; Chen, 2007; Chen, 2009; Chen, 2011; Cho, 2002; Fan, 2004; Huang, 2009; Huang, 2010; Hsiang, 2007; Lin, 2005; Lin, 2006; Liu, 2006; Lo, 2010; Kuo, 2009; Tsai, 2008;Yeh, 2003; Wang, 2006). Among these studies, four researches have focused on the vocabulary selection in the senior high school textbooks or comparison analysis of the difference of vocabulary selection between senior high school textbooks and vocational high school textbooks. Chang (2002) focused on the first volume of senior high school textbooks from six publishers at the time and investigated four major issues: (1) the consistency in vocabulary with the five Junior High School English Textbooks (JHSET), (2) the density of new words, (3) new word distribution on the 7,390 word list (Chang, 1998), and (4) the size of new words. Significant differences were found in word overlaps with junior high school English textbooks, the density of new words, selection of words by word frequency, and the number of new words among the first volume of the six senior high school English textbooks. The findings also showed that around 70% of the new words in the six different versions of textbooks were selected from the 7,390 Word List, which was later replaced by the CEEC Six-level Word List. Instead of focusing on the first volume, Fan (2004) explored new-word size, frequency distribution on GSL and UWL, and occurrence of affixation words in two sets of senior high school textbooks. About 88% of the high-frequency 2,000 words families of GSL were found to be included in the senior high school textbooks while 47% of 850 academic words from the UWL were reported to have been incorporated in the senior high school textbooks. The analysis also showed that about 64% of the new words in Far East word-for-production list are related to the GSL and the UWL and about 51% of the words in Lung Tung word-for-production list are related to the GSL and the UWL. With the intent of finding out the differences between senior high school and vocational high school textbooks, Lin (2006) compared the size of new

words, overlaps between new words in senior high school and junior high school textbooks, density of new words and new word recycling in the first volume of six different senior high school and vocational high school textbooks. It was concluded that junior high school English textbooks and vocational high school English textbooks did not integrate well. The size of new words might be too large for students. The density of new words was too high while the recycling rate of new words in the textbooks might need to be increased. Huang (2009) also compared the differences of vocabulary selection in senior and vocational high school English textbooks. Instead of just analyzing the first volume, the most popular set of senior high school and vocational high school English textbooks were first surveyed out for Hsinchu and Miaoli areas and become target of analysis. Size of new words, word frequency, and the percentage of new words from GSL and AWL were investigated. Findings showed that senior high school textbooks significantly differ from vocational high school textbooks in terms of size of new words and word frequency. Senior high school textbooks cover about 88.75% of the word on GSL while vocational high school textbooks cover only 74.13%. In terms of academic words, senior high school textbooks examined cover around 70.7% of the 570 word families of the AWL whereas vocational high school textbooks in the study only cover 43.16%. The textbooks analyzed in the studies of Chang (2002) and Fan (2004) followed the 1995 Senior High School Curriculum Standards in Taiwan whereas the senior high school textbooks investigated in the studies of Lin (2006) and Huang (2009) adopted the 2006 Senior High School Temporary Curriculum Guidelines.

With the recent high percentage of senior high school graduates pursuing academic study in the higher education in Taiwan (MOE, 2013), the need for college students to read English-medium textbooks (Chen, et al., 2002; Lin & Kong, 2000; Yu & Zheng, 2010), and the report of college students lacking academic words for

comprehending academic texts in English (Huang, 2004), it is necessary to examine what the latest senior high school English textbook series which adopt the 2010 senior high school curriculum guidelines have prepared the students for academic study in English. This study aims to examine the vocabulary selection of the latest senior high school textbook series with the AWL as AWL has been acknowledged as important vocabulary learning goals for L2 learners in preparation of university studies (Coxhead, 2000; Decarrico, 2001; Nation, 2001& 2003; Nation & Webb, 2010; Schmitt, 2000& 2010; Thornbury, 2002). Different from previous vocabulary selection studies on senior high school English textbooks, academic words that are on the AWL yet were not chosen to be in the textbook series are identified in this study. Complementary word lists of these academic words for each textbook series are created to serve as supplementary learning materials for L2 learners, instructors and even material developers.

CHAPTER THREE

METHOD

The major goal of this study is to examine the vocabulary selection of senior high school English textbooks from the perspective of the Academic Word List. This chapter provides detailed descriptions of the research design of this study and consists of three major sections: data collection, instruments, and procedures and data analysis.

Data Collection

The Selected Senior High School Textbooks for Analysis

The senior high school English textbooks under analysis in this study are five major senior high school English textbook series that follow the 2010 curriculum guidelines for senior high schools. As stated in the 2010 curriculum guidelines, English textbooks for Grade-11 and Grader-12 students would differ in two versions: the A version and the B version, in order to meet students' different learning needs resulting from different language proficiency (MOE, 2009). The A version textbooks include only the "basic learning materials," whereas the B version textbooks consist of both the "basic learning materials" and the "advanced learning materials." According to the curriculum guideline, the "basic learning materials" are the required learning materials for all senior high school students. Hence, the "basic learning materials" of the five textbook series are the focus of the analysis in this study.

The five different senior high school English textbook series published by four major English textbook publishers are in wide circulation in senior high schools in Taiwan. The five textbook series under analysis in this study are: Chen et al.'s (2010-2013 edition) Far East English Reader for Senior High Schools (FEC), Shih et al.'s (2010-2013 edition) Far East English Reader for Senior High Schools (FES), Chou et al.'s (2010-2013 edition) Lung Teng English Reader for Senior High Schools

(LT), Chen et al.'s (2010-2013 edition) Nan-I English Reader for Senior high Schools (NI), and Che's (2010-2013 edition) San Min English Reader for Senior High Schools (SM). Each textbook series is composed of six volumes, with the first four volumes often consisting of twelve lessons while the last two volumes containing only ten lessons with the exception of Che's (2010-2013 edition) San Min English Reader for Senior High Schools, which include 12 lessons in the fifth volume.

In addition, Chen's (2010-2013 edition) Nan-I English Reader also differ slightly in that the last four volumes (Books 3, 4, 5, 6) contain ten lessons as the "basic learning materials" with two extra reading lessons as the "advanced learning materials for the third, fourth and fifth volume and one extra reading lesson as the "advanced learning materials" for the last volume. Nevertheless, the "basic learning materials" of the B version of the five senior high school English textbook series share a similar core structure despite the fact that the "advanced learning materials" parts of the five textbook series differ greatly from each other. Chen's (2010-2013 edition) Far East English Readers for Senior High Schools include a reading text with glosses of vocabulary in each lesson across six volumes while Chen's (2010-2013 edition) Nan-I English Readers for senior high school designed two reading-focused lessons as the "advanced learning materials." Shi's (2010-2013 edition) Far East English Readers for Senior High Schools also have three reading-focused lessons as the "advanced learning materials." The "advanced learning materials" in Lung Teng series focus more on critical thinking development and training of productive knowledge of the language. The "advanced learning materials" in San Min series are presented in the form of more in-depth discussion questions that facilitate the cultivation of critical thinking skills, and project learning. No separate units or highlights on vocabulary were designed for the "advanced learning materials" in Lung Teng and San Min series. Table 1 shows the sizes of lessons in the "basic learning

materials" of the five textbook series whereas *Table 2* shows the sizes of lessons in the "advanced learning materials" of the five textbook series.

Table 1

The Size of Lessons of the Basic Learning Materials in Each Textbook Series

	FEC	FES	LT	NI	SM
Book 1	12 lessons	12 lessons	12 lessons	12 lessons	12 lessons
Book 2	12 lessons	12 lessons	12 lessons	12 lessons	12 lessons
Book 3	12 lessons	12 lessons	12 lessons	10 lessons	12 lessons
Book 4	12 lessons	12 lessons	12 lessons	10 lessons	12 lessons
Book 5	10 lessons	10 lessons	10 lessons	10 lessons	12 lessons
Book 6	10 lessons	10 lessons	10 lessons	10 lessons	10 lessons
Total	68 lessons	68 lessons	68 lessons	64 lessons	70 lessons

Table 2

The Size of Lessons with Vocabulary Marked for Advanced Learning Materials in Each Textbook Series

	FEC	FES	LT	NI	SM
Book 1	12	0	0	0	0
Book 2	12	0	0	0	0
Book 3	12	3	0	2	0
Book 4	12	3	0	2	0
Book 5	10	3	0	2	0
Book 6	10	3	0	1	0
Total	68	12	0	7	0

The "advanced learning materials" in five textbook series will not be included in this study as the five textbook series focused on different elements of language proficiency in their "advanced learning materials." The sizes of vocabulary and the presentation of the new words in these "advanced learning materials" also differ (See Table 2 above). Hence, the appropriateness of fair comparison could be in question. On the other hand, the "basic learning materials", as stated in the curriculum guidelines, are the required learning materials for all high school students and share similar structures across five textbook series. Therefore, it is more appropriate and

worthwhile to examine the vocabulary sections of the “basic learning materials” in this study.

The “basic learning materials” part in the five textbook series is organized in a similar structure, which includes a main reading text, post-reading questions and discussion, the vocabulary section, idioms and phrases section, sentence pattern section, and a writing section. The vocabulary section in the five textbook series is divided into two categories: words-for-production and words-for-recognition. New words listed in the “word-for-production” section are provided with phonemic transcription, definition in English, Chinese translation, and example sentences and are intended to facilitate students’ acquisition of these words to become the productive vocabulary. On the other hand, new words listed in the “word-for-recognition” section are simply provided with phonemic transcription, definition explained in English, and Chinese translation of the words and are intended to help students recognize the sound and meaning of the words with a view to enhance reading comprehension.

This study, the analysis of vocabulary selection of senior high school textbooks from the perspective of the Academic Word List, includes both words for production and words for recognition. The reason is that discussion of comprehending academic texts involves the receptive vocabulary knowledge. New words from “words-for-production” section can also facilitate the development of receptive vocabulary knowledge for reading comprehension. In addition, this study, which aims at identifying the academic words from the AWL in textbooks, does not involve the examination of different learning loads resulting from receptive and productive vocabulary. Therefore, new words from both the “words-for-production” section and “words-for recognition” section can be combined together and regarded as an integral body for the academic word analysis.

Instruments

To analyze the vocabulary selection in the five senior high school textbook series from the perspectives of the Academic Word List, Web VocabProfile classic v.4 (Cobb, 2013) is the instrument employed in this study.

1. Web VocabProfile Classic v.4 (Cobb, 2013)

To investigate the academic words from Academic Word List that also appear in senior high school textbooks, Web VocabProfile classic v.4 (Cobb, 2013) is adopted for the analysis in this study. Web VocabProfile classic v.4 is a lexical text analysis program, which is adapted by Tom Cobb from the off-line RANGE program (Nation, et al. 2002). The program of RANGE/VocabProfile has been validated by Laufer and Nation (1995) and has been employed in numerous studies (Cobb & Horst, 2001b; Hsu, 2011& 2014; Meara, Lightbown, & Halter, 1997; Schmitt & Schmitt, 2012).

The web version of RANGE, Web VocabProfile Classic v.4, allows users to view the input and output of the analyzed texts on the same page and provides an integral version of text with levels indicated by different colors rather than just lists of word token percentage across different levels. However, the web version of RANGE cannot process several texts at the same time and the size of input text file is limited to 30,000 characters. Similar to the idea of base word lists in RANGE, the latest Web version of RANGE, Web VP classic v.4, can identify the lexical frequency of the words in a text in four categories: (1) the most frequent 1,000 words of English (2) the second most frequent thousand words of English (3) the academic words from Academic Word List (4) the remainders that could not be found in previous three lists (Cobb, 2013).

The main reason for choosing Web VocabProfile Classic v.4 arises from the fact that the Web version of RANGE has already prepared 10 sublists of the AWL as

its base word lists for processing the data. RANGE32 only has the ready-made base word list of the whole Academic Word List but not the sublists. To identify the academic words of the AWL that also appear on the senior high school English textbooks and investigate the amount of academic words on Sublist 1 and the first three sublists that also appear in the senior high school English textbooks, Web VocabProfile Classic v.4 is thus selected to be the instrument to be employed in this study.

Procedures and Data Analysis

This study aims to investigate the vocabulary selection from the perspectives of the Academic Word List. The research procedures would first start with the compilation of vocabulary data. All of the vocabulary items in "words-for-production" and "words-for-recognition" sections in the five textbook series were typed in Excel with *lemmas* as the data selection criteria and then converted into text files with proofreading and double checks to ensure the validity of the analysis. However, proper nouns were not included in this analysis. Proper nouns are often classified as low-frequency words among the four types of vocabulary in a text: high-frequency words, academic words, technical words, and low-frequency words (Nation, 2001). The compilation of word lists often does not involve proper nouns in general. The AWL does not include proper nouns in its list. Hirsh and Nation (1992) also argued that proper nouns were words that did not demand previous learning for reading comprehension. They maintained that the meanings of proper nouns would automatically be revealed as the story progressed. For instance, when reading *Alice in Wonderland,* readers will gradually realize who Alice, White Rabbit, and Mad Hatter are as they continue reading the story. In addition, the initial capitalized letters in proper nouns often clearly signals the function of the words. That

is, they are names of a person, a place, or an institution. Furthermore, as Rayson and Garside (2000) point out the importance of the "homogeneity within the corpora" when conducting comparisons of corpora, this vocabulary selection analysis focuses on single words in English. Hence, the open-form compound words (e.g. basal tear, comic strip), which Francis and Kucera (1982) treated as series of two (or more) grammatical words, would not be included for the analysis. On the other hand, the closed-form compound words, which Francis and Kucera (1982) regarded as single words when compiling the Brown Corpus, were included in the analysis of this study. Hyphenated compound words were not be included in the analysis as the Academic Word List consists of mostly single words except for the word item "so-called" and Web VocaProfile Classic v.4 would automatically compute one hyphenated compound word as two component words. Therefore, the examination of the academic word item "so-called" was operated manually during the data compilation process. In the cases of the presentations of the open-form compound nouns, the component words are highlighted and introduced separately. For example, "field trip" is introduced in the "words-for-recognition" section in San Min textbook series and the component word "field" is introduced separately for its meaning. In cases like this, the highlighted component words were considered entries of single words and thus were included for vocabulary selection analysis. As for non-English words and non-words (e.g. suffixes as -related), they were excluded from this analysis.

Data analysis first began with the examination of size of vocabulary of academic words on the AWL in general and then target on the items from Sublist 1 and the first three sublists. Distributions of the academic words in the textbooks across volumes were then revealed. The academic words on the AWL yet not appearing in each textbook series were identified to make supplementary academic word lists complementary to each textbook series. In addition, the *Basic 1200-word*

List for junior high and elementary school students in Taiwan was also incorporated with each of the different set of textbook vocabulary data for vocabulary profile analysis in order to better understand to what extent the textbook series have prepared students for academic reading from the perspective of mastering the high-frequency 2000 words and academic words.

CHAPTER FOUR

RESULTS AND DISCUSSION

The present study aims to investigate the sizes and distribution of academic words from the AWL in the five current senior high school English textbook series with emphasis on learning the higher-frequency academic words from Sublist 1 and the first three sublists. The academic words on the AWL which do not appear in the textbook series were identified to form a complementary word list for each textbook series to assist students' academic vocabulary development. New words in textbooks were also analyzed with the frequency scheme of the GSL and the AWL to understand how many high-frequency words and academic words were introduced in each textbook series in order to assess the impacts that the textbooks might have on students' vocabulary knowledge to read academic texts in English. The words on the *1,200-word List* were also integrated with the new words of each textbook series to plot the optimal vocabulary sizes that students could develop through the K-12 English curriculum in Taiwan with the use of particular textbook series at the senior high school level.

Sizes of Academic Vocabulary in Textbooks

This section displays the statistical results of the academic word sizes in the five senior high school English textbook series. The latest 2010 senior high school curriculum guidelines do not specify the amount of academic vocabulary for English learning and the findings of this study are more of exploratory in nature. The sizes of academic words on the AWL in the new word section from five textbook series are illustrated in Table 3. "*Word family*" was employed as the counting unit to show the amount of academic words from the AWL in textbooks against the total amount of 570 academic word families on the Academic Word List.

The collected data shows that different textbook series contain different amount of academic words, which provides different choices for senior high school students with different English proficiency and diverse learning needs. Three textbook series contain more than 50% of the academic words from the AWL: textbook series C include the most of them with 315 word families, followed by textbook series E with 306 word families and textbook series D with 289 word families. In contrast, textbook series B and A were found to include less than 50% of the academic words from the AWL. Textbook series B and A contain 256 word families and 240 word families of academic words on the AWL respectively, which account for about 45% and 42% of the total amount of academic words of the AWL.

Table 3

Chi-square Test for the Amounts of Academic Words across Five Textbook Series

Textbooks	Academic Words	Percentage	χ^2	df	*p*	Post hoc
A	240	42.11%	14.761**	4	.005	C>B
B	256	44.91%				C>A
C	315	55.26%				E>B
D	289	50.70%				E>A
E	306	53.68%				B>A

Note. ** $p < .01$

A chi-square goodness-of-fit test indicates that there are significant differences in the amounts of academic words identified in the current five textbook series, χ^2 (4, n = 1406) = 14.761, $p < .01$. Post hoc analysis shows that five pairs out of ten significantly differ in the amounts of academic words identified across six volumes in the textbook series as illustrated in Table 3. Textbook series C and E show significant differences in terms of the amounts of academic words identified in the textbook series when compared with textbook series B and A. Textbook series D does show significant differences in its post-hoc chi-square test with textbook series A yet

does not show significant differences when compared with textbook series B. This suggests that textbook series A might have a significantly smaller learning load of academic words in terms of sizes when compared with textbook series C, E and D while the textbook series C and E would have a significantly higher learning load of academic words when compared with textbook series B and A.

The percentage of the academic words from the AWL included in the new word section in the current five textbook series ranges from 42% to 55%. This figure seems to correspond to Fan's (2004) earlier finding of academic words selected from the University Word List (UWL) in the previous senior high school textbook series following the *1995 High School Curriculum Standards.* About half of the academic words on the UWL were included in previous textbook series. Nonetheless, the percentage of the academic words from the AWL included in the current five textbook series were found to be significantly lower than that of a more recent finding of academic words selected from the AWL in the SM textbook series. Huang (2009) reported that textbook series E following the *2006 Senior High School Temporary Curriculum Guidelines* were found to include about 71% of academic words from the AWL. Current study shows that textbook series E following the *2010 Senior High School Curriculum Guideline* actually only selected about 54% of academic words from the AWL. Since majority of senior high school graduates are likely to be required to read English-medium textbooks in college, textbook writers should perhaps consider including more academic words from the AWL in their future textbook series to better prepare high school students for academic studies in English.

Worthington and Nation (1996) examined whether natural occurrence of academic vocabulary in texts was sufficient to provide coverage of the whole academic vocabulary on the UWL. They argued that if texts were used as a means of sequencing academic vocabulary learning, it would be possible to do this for only a

part of about 50%. It is claimed that an impossibly large number of texts would be needed to cover all of the academic vocabulary on the UWL. Nation (2001) pointed out that this might be less of the problem for the Academic Word List as the AWL contains a smaller size of words and it might require fewer texts to provide coverage of the whole list. Empirical research on how many texts are needed to cover the whole list of the AWL has not been reported yet. Nonetheless, it seems reasonable to expect that more than 50% of the academic words from the AWL could be covered by texts given that Worthington and Nation (1996) found it feasible for texts to cover half of the academic words from the 836-word-family UWL. Three of the textbook series examined in this research include more than 50% of academic words of the AWL. Indeed, a higher percentage of academic words from the AWL could perhaps be targeted in the future textbook series. Text adaptation or specially-prepared exercises targeting on certain academic words might be needed to introduce more academic words from the AWL in the senior high school textbook series.

According to the nine-year integrated curriculum guidelines (MOE, 2006), junior high school graduates are expected to be proficient in using the words on the *Basic 1200-word List for Elementary and Junior High School Students (1200-word List)*. A word frequency band analysis with Web VocabProfile Classic v.4 reveals that the *1200-word List* includes nine hundred word families of the GSL with 621 word families identified on the first thousand frequency band (K1) and 279 word families on the second thousand frequency band (K2). Nine academic words from the Academic Word List were also identified: compute, final, grade, link, medium, physical, tape, team, and uniform. The *1,200-word List* mainly consists of words for daily communication and thus only nine academic words were identified in the list.

Table 4

Chi-square Test for the Amounts of Academic Words in Five Textbook Series Plus 1200-word List

Textbooks +1200WL	Academic Words	Percentage	χ^2	df	*p*	Post hoc
A+1200	247	43.33%	14.493**	4	.006	C>B
B+1200	262	45.96%				C>A
C+1200	320	56.14%				E>B
D+1200	296	51.93%				E>A
E+1200	315	55.26%				D>A

Note. ** $p < .01$

As illustrated in Table 4, senior high school graduates who have successfully mastered the academic words from the curriculum are expected to have academic vocabulary sizes of 247 to 320 word families of the Academic Word List depending on which textbook series that the students have used. The amount of academic vocabulary senior high school graduates develop would consist of about 43% to 56% of the total amount of academic words on the AWL, which is not sufficient to help students to reach adequate reading comprehension of academic texts. To have better comprehension of academic texts, students would need to learn the remaining part of academic words on the AWL. If the inclusion of more academic words from the AWL into textbooks is feasible, textbook writers could perhaps try to select more academic words into their textbook series. Teachers and instructors could also introduce the remaining academic vocabulary from the AWL through adaptation of texts, learning from lists, specially-prepared exercises and encourage students to read extensively to facilitate the learning of academic vocabulary (Nation, 2001). The remaining academic words from the AWL of each textbook series were also identified in this study to form complementary word lists to help students develop their academic vocabulary knowledge. The complementary word lists would be presented after the

examination of the distribution of the academic words in textbook series.

Distribution of Academic Vocabulary in Textbooks

In the preceding part, the sizes of academic words from the AWL in textbook series were revealed. This section will present the distribution of academic words across the ten sublists of the AWL and then across the six volumes among the five textbook series.

Distribution of Academic Vocabulary across Sublists in Textbooks

The AWL consists of ten sublists based on frequency, range and text coverage, which provides a rationale for sequencing the learning. The 60 academic words on Sublist 1 provide text coverage of 3.6%, accounting for one-third of the coverage of the AWL for original academic corpus. The academic words on Sublist 1 on average occur once every 4.3 pages on the original corpus with each page averaging 400 words. The second sublist provides half of the coverage of that of the first sublist.

Table 5 illustrated the coverage of the academic corpus from each sublist of the AWL. Coxhead (2001) suggested that the academic words on the first three sublists occur with relatively high frequency and have great value for learning. Since the senior high school students have limited class hours and word frequency is the important criteria in vocabulary selection in textbook (Coady, et al., 1993; Cobb, 2013; Gairns & Redman, 1986; Geothals, 2004; Nation, 2001& 2003; Nation & Waring, 1997; Richards, 1974 & 2001; Schmitt, 2000; Schmitt & Schmitt, 2012; Sinclair & Renouf, 1998), more academic words from each of the first three sublists should be introduced than the academic words from each of the lower frequency sublists. Despite adding little to the whole AWL coverage, academic words from the rest of the sublists are still worth including in the teaching materials as Coxhead (2001) pointed out that these less frequent academic words occur in a wide range of texts and are less

likely to be learned incidentally from reading. The inclusion of these less frequent academic words in the lists for direct teaching or learning could facilitate students' development of academic vocabulary knowledge and subsequently aiding their comprehension of academic texts.

Table 5

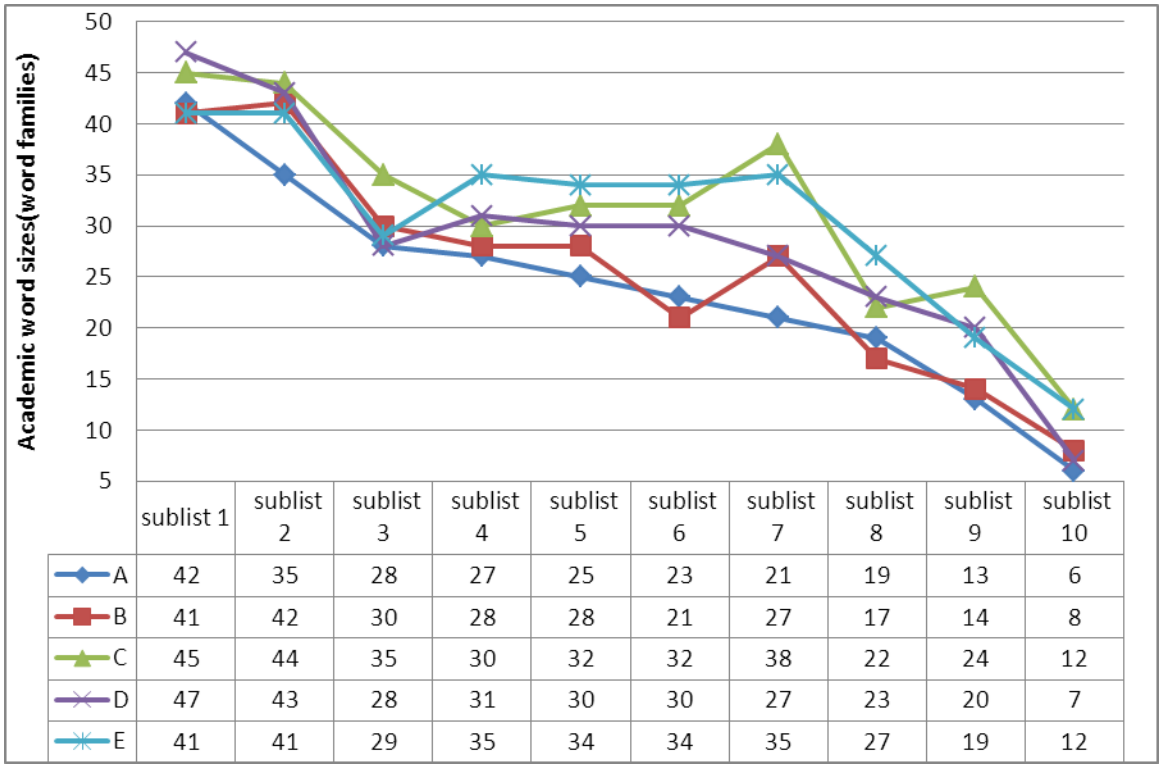
Text Coverage of Each Sublists of the AWL

	Items	Coverage of Academic Corpus	Cumulative Coverage	Pages per Occurrence in Academic Corpus
Sublist 1	60	3.6%	3.6%	4.3
Sublist 2	60	1.8%	5.4%	8.4
Sublist 3	60	1.2%	6.6%	12.3
Sublist 4	60	0.9%	7.5%	15.9
Sublist 5	60	0.8%	8.3%	19.4
Sublist 6	60	0.6%	8.9%	24.0
Sublist 7	60	0.5%	9.4%	30.8
Sublist 8	60	0.3%	9.7%	49.4
Sublist 9	60	0.2%	9.9%	67.3
Sublist 10	60	0.1%	10.0%	82.5

Note. From "A New Academic Word List," by A. Coxhead, 2000, *TESOL Quarterly,* 34, 228.

Figure 1 reveals the distribution of academic words across ten sublists of the five textbook series. As can been seen in Figure 1, textbook series A seems to have more ideal sequencing and gradation with more academic words introduced from the sublists with higher frequency academic vocabulary than from the sublists with lower frequency academic vocabulary. The amount of academic words included in textbook series A appears to decrease gradually with the progression of the sublists from the higher frequency to lower frequency. The other four textbook series appear to fluctuate slightly in the amount of academic words presented across the ten sublists. The other four textbook series do select more academic words from Sublist 1 and

Sublist 2 than from the lower frequency sublists. However, the academic words chosen from the lower frequency sublists sometimes outnumber the academic words chosen from the higher frequency sublists. For example, textbook series E includes 35 academic word families from Sublist 7 and only 29 word families from high-frequency Sublist 3.



	sublist 1	sublist 2	sublist 3	sublist 4	sublist 5	sublist 6	sublist 7	sublist 8	sublist 9	sublist 10
A	42	35	28	27	25	23	21	19	13	6
B	41	42	30	28	28	21	27	17	14	8
C	45	44	35	30	32	32	38	22	24	12
D	47	43	28	31	30	30	27	23	20	7
E	41	41	29	35	34	34	35	27	19	12

Figure 1. Line graph showing academic word distribution across ten sublists in five textbook series.

Table 6 presents the amount and percentage of academic words selected from Sublist 1 in the current five textbook series. Textbook series D appears to have the largest amount of academic words selected from Sublist 1 with 47 word families, which accounts for 78% of the academic words of Sublist 1 while textbook series B and E have the smallest amount of academic words selected from Sublist 1 with 41 word families, which accounts for 68% of the academic words of Sublist1. Textbook series C and A were found to include 45 and 42 word families from Sublist 1, which account for 75% and 70% of the academic words on Sublist 1. Yet, a chi-square

goodness-of-fit test indicates that there are no significant differences in the amount of academic words selected from Sublist 1 in the current five textbook series, $\chi^2(4, n = 219) = .521$, $p = .971$. Despite no significant differences in the amount of academic words selected from Sublist 1 of the AWL among the five textbook series, each textbook series introduces different academic words from Sublist 1. The exact academic word families from Sublist 1 selected by each textbook series are identified and compiled in Appendix A.

Table 6

Chi-square Test for the Amounts of Academic Words from Sublist 1 across Five Textbook Series

Textbooks	Academic Words	Percentage of Sublist1	χ^2	df	*p*
A	42	70.00%	.521	4	.971
B	41	68.33%			
C	45	75.00%			
D	47	78.33%			
E	41	68.33%			

Note. * $p < .05$

Table 7 displays the amount and percentage of academic words selected from the first three sublists among the five textbook series. Textbook series C contains the largest amount of academic word families from the first three sublists with 124 word families (69% of academic words from the first three sublists), followed by textbook series D with 118 word families (66% of academic words from the first three sublists), textbook series B with 113 word families (63% of academic words from the first three sublists), textbook series E with 111 word families (62% of academic words from the first three sublists) and textbook series A with 105 word families (58% of academic words from the first three sublists). A chi-square test nonetheless shows no significant

differences for the amounts of academic words selected from the first free sublists among the five textbook series, χ^2 (4, n = 571) = 1.811, p = .770. This statistical result implies that all of the five textbook series examined show similar strength in terms of selecting the higher-frequency academic words, which are recommended to be placed with high priority for academic word learning as they yield to a higher text coverage compared to the remaining academic words on the AWL. Despite no significant difference shown in terms of the amount of academic words selected from the first three sublists among the five textbook series, variation of selection of academic words can still be observed from the qualitative data of the exact academic words identified. The exact academic word families selected from the first three sublists in each textbook series can be accessed in Appendix B.

Table 7

Chi-square Test for the Amounts of Academic Words from the First Three Sublists across Five Textbook Series

Textbooks	Academic Words	Percentage of Sublist1-3	χ^2	df	*p*
A	105	58.33%	1.811	4	.770
B	113	62.78%			
C	124	68.89%			
D	118	65.56%			
E	111	61.67%			

Note. * p < .05

In terms of the distribution of academic words from Sublist 1 and the first three sublists across textbook series, the five textbook series examined in this study share a similar pattern. What made the textbook series distinct from each other in academic word selection might be the academic words selected from the sublists with the less frequent academic words (Sublist 4-Sublist 10).

Table 8

Chi-square Test for the Amount of Academic Words from Sublist 4 to Sublist 10 across Five Textbook Series

Textbooks	Academic Words	Percentage of Sublist 4-10	χ^2	df	*p*	Post hoc
A	135	34.62%	17.820*	4	.001	C>B
B	143	36.67%				C>A
C	191	48.97%				E>B
D	171	43.85%				E>A
E	195	50.00%				D>A

Note. * $p < .05$

Table 8 shows the amounts and percentage of academic words selected from Sublist 4 to Sublist 10 in the five textbook series. Textbook series E and C outnumber the other textbook series in the amount of academic words selected from Sublist 4 to Sublist 10 with 195 word families and 191 word families respectively followed by textbook series D with 171 academic word families selected from Sublist 4 to Sublist 10. Textbook series B and A contain relatively smaller amounts of academic words from Sublist 4 to Sublist 10 with 143 word families and 135 word families. A chi-square goodness-of-fit test does show significant differences in the amounts of academic words selected from Sublist 4 to Sublist 10 among the five textbook series, χ^2 (4, n = 835) = 17.820, p = .001. Post hoc analysis reveals five pairs out of ten show significant differences in terms of the amount of academic words selected from Sublist 4 to Sublist 10. Textbook series E and C show significant differences in terms of the amount of academic words selected from Sublist 4 to Sublist 10 when compared with textbook series B and A. Textbook series D show significant differences in its post-hoc Chi-square test with the B textbook series yet does not show significant differences when compared with textbook series A in terms of the amount of academic words selected from Sublist 4 to Sublist 10.

These results seem to correspond exactly to the results of the total amount of

the academic words included from the AWL among the five textbook series as discussed previously. Given that the five textbook series do not significantly differ in the amount of academic words from the first three sublists yet the total sizes of academic words significantly differ among the five textbook series, it seems reasonable to conclude that the significant differences of the amount of academic words from Sublist 4 to Sublist 10 might have contributed to the significant differences of the total sizes of academic words identified in the textbook series. In other words, the five textbook series do not differ in their strength in terms of selecting the most frequent academic words from the high-frequency sublists. The differences of the amount of academic word selection among five textbook series mainly arise from the selection of academic words in the less-frequent sublists (Sublist 4 to Sublist 10). The exact academic words selected by each textbook series are presented in Appendix C.

Distribution of Academic Vocabulary across Six Volumes in Textbooks

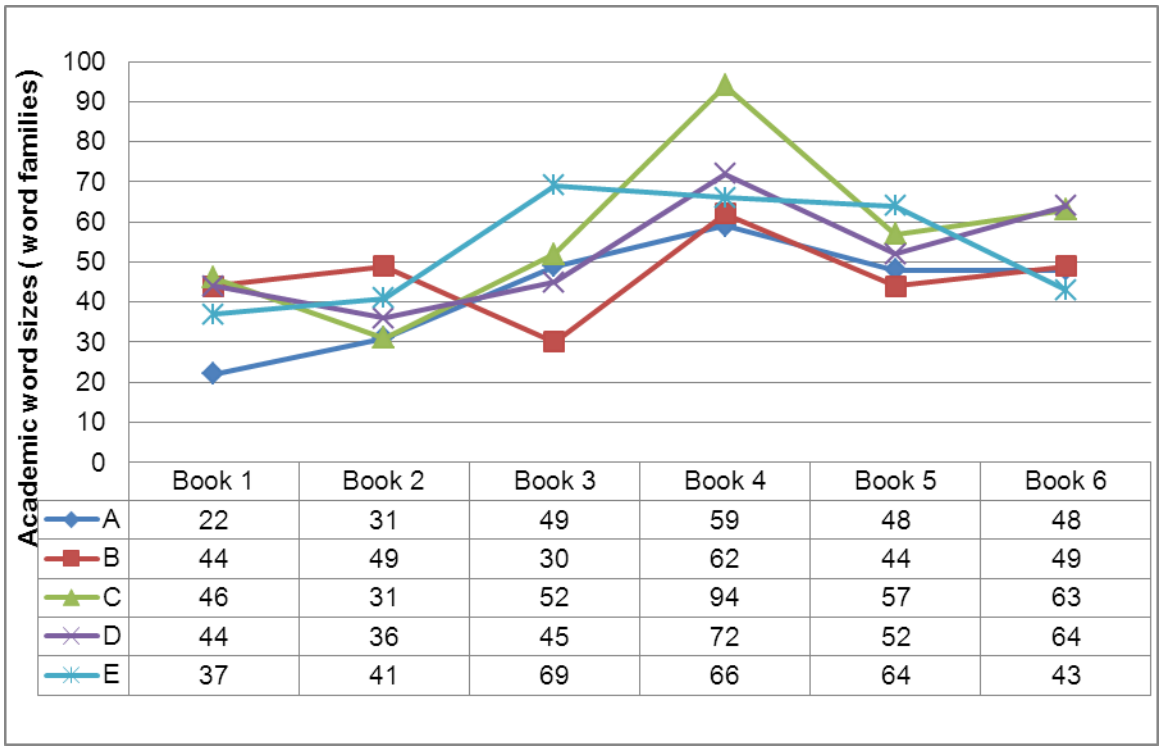
Nation (1990 & 2001) suggested that higher priorities be given to the learning of the 2,000 high-frequency GSL words than to the academic vocabulary for beginner and intermediate students. Learners who plan to do academic study in English can proceed to academic vocabulary learning after gaining control of the 2,000 high-frequency words. As the junior high school graduates in Taiwan might not have fully mastered the 2,000 high-frequency words, the senior high school English textbook series in Taiwan would still have to introduce the high-frequency 2, 000 words and gradually add some academic vocabulary in the more advanced volume.

Figure 2 illustrates the academic words distribution plot across the six volumes among the five textbook series. A chi-square test indicates that there are significant differences in the distribution of academic words identified across the six

volumes in the current five textbook series, χ^2 (20, n = 1511) = 39.357, p < .01. Despite the difference in academic words distribution across volumes, some similar patterns could still be observed among some textbook series. The fourth volumes (Book 4) of textbook series are often loaded with the maximum amount of academic words except for textbook series E. The more advanced volumes (Book 5 & Book 6) were found not to contain the largest amount of academic words. The reason might be that Taiwanese senior high school students need to take the college entrance examinations in the final year of their high school studies and textbook writers might have taken this factor into consideration and lower the learning load in the last two volumes of the textbook series.

As can be seen from Figure 2, textbook series E presents heavier load of academic words one semester ahead with its third volume containing 69 academic word families while other textbook series presenting smaller amounts of about fifty word families. Textbook series E might be more suitable for students who are more ready to learn academic vocabulary at an earlier stage (by the end of their first year high school studies). However, students who have not become proficient in the high-frequency 2,000 words by the end of their first year of high school studies might find textbook series E more challenging as the sudden increase of academic words from 41 academic word families to 69 academic word families per volume might pose a heavier learning demand. Textbook series E also has a different feature from the rest of the four series in that textbook series E includes similar amounts of academic words in its third, fourth and fifth volume, resulting in a level-off pattern on the line graph. The other four textbook series all increase their amounts of academic words in their fourth volumes with textbook series C having a more dramatic increase of academic vocabulary learning load. Textbook series C increases forty-two more academic word families in its fourth volume, making the fourth volume containing 94

word families. The increased average amount of academic words in each lesson almost doubled (from four academic words per lesson to eight academic words per lesson). The spike in academic words in the fourth volume is likely to make the learning more challenging for students with smaller vocabulary sizes.



	Book 1	Book 2	Book 3	Book 4	Book 5	Book 6
A	22	31	49	59	48	48
B	44	49	30	62	44	49
C	46	31	52	94	57	63
D	44	36	45	72	52	64
E	37	41	69	66	64	43

Figure 2. Line graph showing academic word distribution across six volumes in five textbook series.

Textbook series A, on the other hand, seems to have more ideal gradation in changing its amounts of academic words across volumes as the changes progressed at a more moderate rate than other textbook series as can be observed from the distribution plot presented in *Figure 2*. The amounts of academic words across volumes in textbook series A do not appear to soar or drop across the first four volumes. Textbook series A also presents a smaller amount of academic words in the first year of high school English studies with 53 word families in total while the other four textbook series targeted at around 80 word families. The first volume contains

only about 22 academic word families, which appears to be significantly smaller than the rest of the four textbook series, χ^2 (4, n = 193) = 10.135, p=*.038*. Students who are less ready for acquiring academic words might find textbook series A presenting optimal academic vocabulary learning load for their learning.

Textbook series A and B do not show significant differences with chi-square test in terms of the total amount of academic words included, χ^2(1, n = 496) = .561, p = .472. Yet, the distribution plots of academic words across six volumes in these two series present distinct patterns, especially in the first three volumes. As illustrated in *Figure 2*, the last three volumes (Book 4, Book 5 & Book 6) of textbook series A and B share similar size distribution yet textbook series B contain far more academic words in its first and second volumes than textbook series A with the amount of academic words in the first volume of textbook series A doubled the amount of that of textbook series B. The third volume of textbook series B show an obvious drop in the amount of academic words: from Book 2 with 49 academic word families to Book 3 with 30 academic word families. An in-depth analysis into the third volume found that the third volume of textbook series B features more narrative writing than expository writing, which might have caused the decline in the amount of academic words in Book 3.

The decline pattern in the amount of academic words across volumes in textbooks could also be observed in textbook series C and D. Textbook series C features 46 academic word families in the first volume yet the second volume presents a decreased amount of academic word families of 31. The drop is less obvious in textbook series D with the second volume presenting 36 academic word families, a drop from the first volume featuring 44 academic word families.

As the senior high school English curriculum in Taiwan is more oriented to English for General Purposes (EGP) rather than English for Academic Purposes

(EAP), textbook writers might aim for the development of other components in language proficiency instead of academic words. Some textbook series seem to include more literary and narrative texts than expository texts, which tend to have more academic words. Therefore, certain volumes of textbook series would appear to contain fewer the academic words due to focusing on other language learning components rather than academic English.

If textbook writers decide to give high priority to the learning of academic words and the gradation of academic words in textbooks, future revision of the senior high school English textbooks could perhaps consider adjusting the soaring increase and dramatic decline patterns in the amount of academic words in the first four volumes. For example, textbook series C could perhaps consider adding some academic words to the second volume while reducing the amount of academic words introduced in the fourth volume so that students might experience a smoother transition from the basic volumes to the more advanced volumes. Textbook series B could perhaps add some academic words in its third volume to optimize the amount of academic words that students could learn after using the whole series for three years.

Complementary Word Lists

As Gardener and Davies (2013) pointed out the importance of carrying out more explicit instruction of academic vocabulary, such as utilizing more focused lists of core academic vocabulary, pedagogical word lists are acknowledged to be beneficial in helping learners develop their academic vocabulary knowledge. Thus, this study attempts to uncover the AWL word items that are not included in each of the senior high school textbook series and five complementary word lists are compiled with the intent of assisting both college and high school learners to develop their academic vocabulary knowledge in more efficient manners. These

complementary lists could also be useful for both teachers and textbook writers to establish academic vocabulary learning goals, or to develop supplementary learning materials for differentiated instructions in mixed-level classes.

By carrying out this goal, the AWL word items that are excluded from each of the current five textbook series are presented in Appendix D. The complementary word lists for the current five textbook series consist of 330 word families for textbook series A, 314 word families for textbook series B, 255 word families for textbook series C, 281 word families for textbook series D, and 264 word families for textbook series E. The items marked in bold fonts in the complementary world list are the AWL items that are already included in the *Basic 1,200-word List*. Coxhead (2000) suggested that the academic words on the first three sublists have the highest value for learning as they provides a relatively higher text coverage of academic texts than the rest of the seven sublists (6.6% vs. 3.4%).Therefore, learners could start the learning of the academic words on the complementary word lists with the words on the first three sublists and progress to the more advanced sublists gradually.

In addition, the academic words from the AWL yet were not included in any of the five textbook series were also identified. Table 9 presents the academic word families from the AWL that were consistently excluded from the new word section in the five textbooks series. As the topics from the discipline of Law or Commerce were less frequently presented in the senior high school English textbook series, academic words that were more frequently used in these two disciplines, such as “commission,” “revenue,” “subsidy,” “amend,” and “levy,” might not be included in the new words section in the textbook series. Other than more discipline-specific academic words, several academic words not included in textbook series might seem to be words classified by Francis (1994) as mental process nouns in the metalinguistic label domain. Words, such as “hypothesis,” “thesis,” “analogy,” “bias,” and “summary,”

indeed all refer to cognitive processes or the result thereof. A large proportion of academic words not selected in the high school textbook series, such as “fluctuate,” “contradict,” “deviate,” “equate,” and “discrete,” might appear to be words for analysis or evaluation in research (Martin, 1976). These 84 academic words from the AWL missing from the textbook series unanimously would deserve more attention when learners try to build up their academic vocabulary competences.

Table 9

The 84 Academic Words not Selected in any of the Textbook Series

Sublists	Academic words not selected in any of the textbook series	Word families
Sublist 1	sector	1
Sublist 2	commission, equate	2
Sublist 3	coordinate, deduce, framework, partner, sequence, valid	6
Sublist 4	hypothesis, impose, job, output, parameter, prior, regime, summary	8
Sublist 5	amend, clause, discrete, entity, ratio, reject, revenue, transit	8
Sublist 6	aggregate, brief, domain, inhibit, initiate, presume, scope, subsidy, underlie	9
Sublist 7	differentiate, dispose, empirical, extract, hierarchy, ideology, mode, paradigm, thesis	9
Sublist 8	append, arbitrary, bias, conform, contradict, denote, deviate, fluctuate, guideline, implicit, infrastructure, offset, practitioner, random	14
Sublist 9	analogy, coherent, concurrent, distort, format, integral, intermediate, mediate, overlap, preliminary, protocol, qualitative, restrain, subordinate, unify	15
Sublist 10	adjacent, albeit, compile, forthcoming, integrity, intrinsic, invoke, levy, notwithstanding, ongoing, straightforward, whereby	12

The CEEC Six-level Word List, the reference guide for vocabulary teaching, testing, and textbook writing for senior high school English learning in Taiwan, has also been analyzed with Web VocaProfile Classic v.4 to see the amount of academic vocabulary and its distribution in the six levels of the word list. A total of 526 word

families of academic words from the AWL and 779 types of academic words from the AWL were identified on the CEEC Six-level Word List. Table 10 shows the amount of academic words and its distribution in the six levels of the CEEC Six-level Word List. As the first two volumes and the "basic learning materials" of the senior high school English textbooks are recommended to select the most frequent 4,500 words on the CEEC Six-level Word List, the total amount of academic words from the AWL from Level 1 to Level 4 were also calculated. A total of 340 word families from the AWL were identified, which account for 59.65% of the 570-word-family AWL. The size and percentage of the academic words from the AWL identified on the first four levels of the CEEC Six-level Word List could possibly shed some light on why the textbook series seem to include about 42% to 55% of academic words from the AWL, with the maximum percentage reaching about 55%. If the first two volumes and the "basic learning materials" are advised to select words from the first four levels of the CEEC Six-level Word List mainly and that the first four levels of the Six-level Word List contains 340 word families of the AWL, it's very likely that the textbook series would not contain more than 340 word families of the academic words from the AWL in general. The findings of the amount of academic words from the AWL on the CEEC Six-level Word List provide some background information to justify the findings of the amount of academic words identified in the five textbook series. The learning of the remaining academic words not selected in the textbook series could be mediated by utilizing adapted texts, specially-prepared exercises targeting on certain academic words or word list study as suggested by Nation (2001).

Table 10

The Amounts of Academic Words on Each Level of the CEEC Six-level Word List

Level	Academic Words (types)	Academic Words (word families)
1	5	5
2	74	72
3	133	119
4	255	189
5	110	105
6	215	177

As the words on the CEEC Six-level Word List were organized in graphic words rather than word families, both counting units of words, “types” and “word families”, are utilized to provide a more thorough picture of the academic words selected in the CEEC Six-level Word List. Appendix E and F present the exact academic words from the AWL selected in each level of the CEEC Six-level Word List in the counting unit of “types” and “word families.” Table 11 presents the 44 word families from the AWL that are not included in the CEEC Six-level Word List. At the senior high school level, teachers could first focus on the learning of the academic words on Sublist 1 to Sublist 3 as these 180 word families on the AWL have the highest learning value as they provide relatively high text coverage for academic texts. When the students have mastered the academic words from the first three sublists, they could gradually move on to the learning of the academic words on Sublist 4 to Sublist 10. The academic words that are not on the CEEC Six-level Word List could perhaps be learned at a more advanced stage as these words are more abstract in nature and appear more frequently in research articles. These academic words might be more suitable for learning when students become more familiar with academic texts or conducting research.

Table 11

The 44 Academic Words from the AWL not Selected in the CEEC Six-level Word List

Sublists	Academic words not selected in any of the textbook series	Word families
Sublist 1		0
Sublist 2	administration	1
Sublist 3	constrain, deduce	2
Sublist 4	attribute, hypothesis, parameter	3
Sublist 5	amend, discrete, entity,	3
Sublist 6	aggregate, domain, incorporate, inhibit, subsidy, underlie	6
Sublist 7	empirical, hierarchy, ideology, paradigm, simulate, thesis	6
Sublist 8	append, arbitrary, denote, deviate, fluctuate, infrastructure, offset, practitioner, predominant	9
Sublist 9	concurrent, integral, protocol, qualitative, scenario	5
Sublist 10	adjacent, albeit, intrinsic, invoke, levy, notwithstanding, ongoing, so-called, whereby	9

Frequency Scheme Analysis of New Words in Textbooks

Several studies have shown that the high-frequency words on the GSL have provided coverage of 78% to 92% of various genres of texts, averaging around 82% text coverage (Hirsh & Nation, 1992; Sutarsyah, Nation & Kennedy, 1994). In terms of reading academic texts, Nation and Hwang (1995) discovered that the first 1,000 words and the second 1,000 words on the GSL could provide about 77% and 5% text coverage respectively. Together with the 10% text coverage provided by the AWL, the words on the GSL and the AWL could provide text coverage of about 92%, which when added with the 4% text coverage of proper nouns and technical words would provide text coverage of about 96%, reaching the 95% vocabulary threshold for adequate comprehension of academic texts.

Since the high-frequency words of about 2,000 word families of GSL and academic words of the AWL have been proven to be an essential part of vocabulary

selection for L2 learners heading toward academic study and that junior high school graduates in Taiwan have not been introduced to all of these high-frequency words, it is worth examining the vocabulary profile of new words in textbooks with the GSL and AWL frequency scheme. This section will first examine the amounts of new words on the GSL and the AWL frequency scheme among the five textbook series in terms of their potential contribution to facilitate learners' development of reading academic texts. Then, the sizes of new words from the GSL and the distribution of the first 1,000 and second 1,000 words from the GSL among the textbook series would also be revealed. Vocabulary profile of new words in textbooks series would be presented in bar chart to show the distinct features of their vocabulary selection.

Sizes and Distribution of New Words on Frequency Scheme (GSL+AWL) in Textbooks

The sizes and distribution of new words on the frequency scheme of the GSL and the AWL among the five textbook series are illustrated in Table 12. As shown in Table 12, textbook series B appears to contain the largest amount of new words from the GSL and the AWL with 1,106 word families in total and is closely followed by textbook series D with 1,093 word families. Textbook series C also include more than 1,000 word families from the GSL and the AWL in its new word section with 1,059 word families ranking the third. Textbook series A and E select smaller amounts of words from the GSL and the AWL with 983 word families and 958 word families respectively.

A chi-square goodness-of-fit test indicates that there are significant differences in the total amount of new words selected from the GSL and the AWL in the current five textbook series, χ^2 (4, n = 5199) = 16.829, p < .01. Post hoc analysis shows that five pairs out of ten significantly differ in the amount of new words selected from the GSL and the AWL among the five textbook series as illustrated in Table 13.

Table 12

Sizes and Percentage of New Words on the GSL and the AWL Frequency Scheme among Textbook Series

			Publisher				
			A	B	C	D	E
Frequency Scheme	GSL K1	Count	382	428	373	423	300
		% of Total	38.9%	38.7%	35.2%	38.7%	31.3%
	GSL K2	Count	361	422	371	381	352
		% of Total	36.7%	38.2%	35.0%	34.9%	36.7%
	AWL	Count	240	256	315	289	306
		% of Total	24.4%	23.1%	29.7%	26.4%	31.9%
Total (GSL+AWL)		Count	983	1106	1059	1093	958
		% of Total	100.0%	100.0%	100.0%	100.0%	100.0%

Textbook series B and D were found to have significantly larger amount of new words selected from the GSL and the AWL than textbook series A and E. According to the chi-square test results, textbook series C does not include significantly different amount of new words from the GSL and the AWL when compared with textbook series A, B and D. Yet, the statistical result does show that textbook series C includes a significantly larger amount of new words from the GSL and the AWL when compared with that of textbook series E, χ^2 (1, n = 2017) = 5.058, p = .025.

Table 13

Chi-square Test for the Amount of New Words on the GSL and the AWL across Five Textbook Series

Textbooks	GSL+AWL	Percentage	χ^2	df	p	Post hoc
A	983	38.78%	16.829**	4	.002	B>A
B	1106	43.63%				B>E
C	1059	41.78%				D>A
D	1093	43.12%				D>E
E	958	37.79%				C>E

Note. ** p < .01

Sizes and Distribution of High Frequency Words from the GSL in Textbooks

To identify the distinct features of vocabulary selection of the five textbook series in facilitating students comprehend academic texts, the amounts and distribution of the new words selected from the GSL and its two frequency bands were also examined in this study. Table 14 presents the statistical results for the amount of new words selected from the GSL among the five textbook series.

Textbook series B appears to have the highest amount of new words selected from the GSL with the total amount of 850 word families. Textbook series D closely follows textbook series B with 804 word families. Textbook series C and A include very similar amounts of new words from the GSL with 744 word families for textbook series C and 743 word families for textbook series A. Textbook series E contains new words from the GSL with only 652 word families, which is 200 word families fewer than that of textbook series B.

A chi-square goodness- of- fit test indicates that there were indeed significant differences in the amount of high-frequency GSL words identified in the current five textbook series, $\chi^2(4, n = 3793) = 29.311$, $p=.000$. Post hoc analysis shows that four pairs out of ten significantly differ in the amount of new words selected from the GSL among the five textbook series as illustrated in Table 14. Textbook series B were proven to have a significantly larger amount of new words from the GSL than textbook series A, C and E. There were no significant differences shown between textbook series B and D in terms of the amount of new words selected from the GSL, $\chi^2 (1, n = 1654) = 1.279$, $p=.258$.Yet, textbook series D does contain a significantly larger amount of new words selected from the GSL when compared with textbook series E, $\chi^2 (1, n = 1456) =15.868$, $p=.000$.

Table 14

Chi-square Test for the Amounts of New Words from the GSL across Five Textbook Series

Textbooks	GSL	Percentage	χ^2	df	*p*	Post hoc
A	743	37.81%	29.311***	4	.000	B>C
B	850	43.26%				B>A
C	744	37.86%				B>E
D	804	40.92%				D>E
E	652	33.18%				

Note. *** $p < .001$

As illustrated in Tables 12 and 14, five textbook series examined in this study select different amounts of high-frequency words from the GSL. The GSL is composed of the first 1,000 high-frequency words and the second 1,000 high-frequency words (Nation, 2001; Paquot, 2010; West, 1953). The first 1,000 word families of the GSL have been proven to cover about 77% of academic texts while the second 1,000 word families provides an academic text coverage of about 5% (Nation & Hwang, 1995). Table 15 reveals the amount of new words selected from the first 1,000 words from the GSL among the five textbook series.

Table 15

Chi-square Test for the Amount of New Words on the first 1,000 words of the GSL across Five Textbook Series

Textbooks	GSL K1	Percentage	χ^2	df	*P*	Post hoc
A	382	39.10%	27.804***	4	.000	B>E
B	428	43.81%				A>E
C	373	38.18%				D>E
D	423	43.30%				C>E
E	300	30.71%				

Note. *** $p < .001$

Textbook series B and D were ranked the first and second with 428 word families and 423 word families selected from the first 1,000 word on the GSL. Textbook series A and C follow textbook series B and D with 382 word families and

373 word families chosen from the first 1,000 words on the GSL. Textbook series E appears to include the smallest amount of new words from the first 1,000 words on the GSL: 300 word families, which consist of about only 30% of the first 1,000 word families of the GSL.

A chi-square test indicates that there were indeed significant differences in the amount of new words selected from the first 1,000 words of the GSL among the current five textbook series, $\chi^2(4, n = 1906) = 27.804$, $p=.000$. Post hoc analysis shows that four pairs out of ten significantly differ in the amount of new words selected from the first 1,000 words from the GSL among the five textbook series as illustrated in Table 15. Textbook series E was found to have a significantly smaller amount of new words selected from the first 1,000 word families of the GSL. No significant differences were found among the amounts of new words selected from the first 1,000 words of the GSL in textbook series B, A, C, and D, $\chi^2(3, n = 1606) = 5.870$, $p=.118$.

Table 16 displays the amount of new words selected from the second 1,000 words of the GSL among the five textbook series. Textbook series B contains 422 word families of the second 1,000 words on the GSL, outnumbering the other four textbook series. Textbook series D includes 371 word families from the second 1,000 words on the GSL, ranking the second. Textbook series C and A have very similar amounts of new words selected from the second 1,000 word families on the GSL: 371 word families and 361 word families. Textbook series E again selects the smallest amount of words from the second 1,000 word families on the GSL with 352 word families. Nevertheless, with rigorous statistical testing, no significant difference were found in terms of the amounts of new words selected from the second 1,000 word families on the GSL among the five textbook series, $\chi^2(4, n = 1887) = 7.836$, $p=.098$.

Table 16

Chi-square Test for the Amounts of New Words on the second 1,000 words of the GSL across Five Textbook Series

Textbooks	GSL K2	Percentage	χ^2	df	*p*
A	361	36.54%	7.836	4	.098
B	422	42.71%			
C	371	37.55%			
D	381	38.56%			
E	352	35.63%			

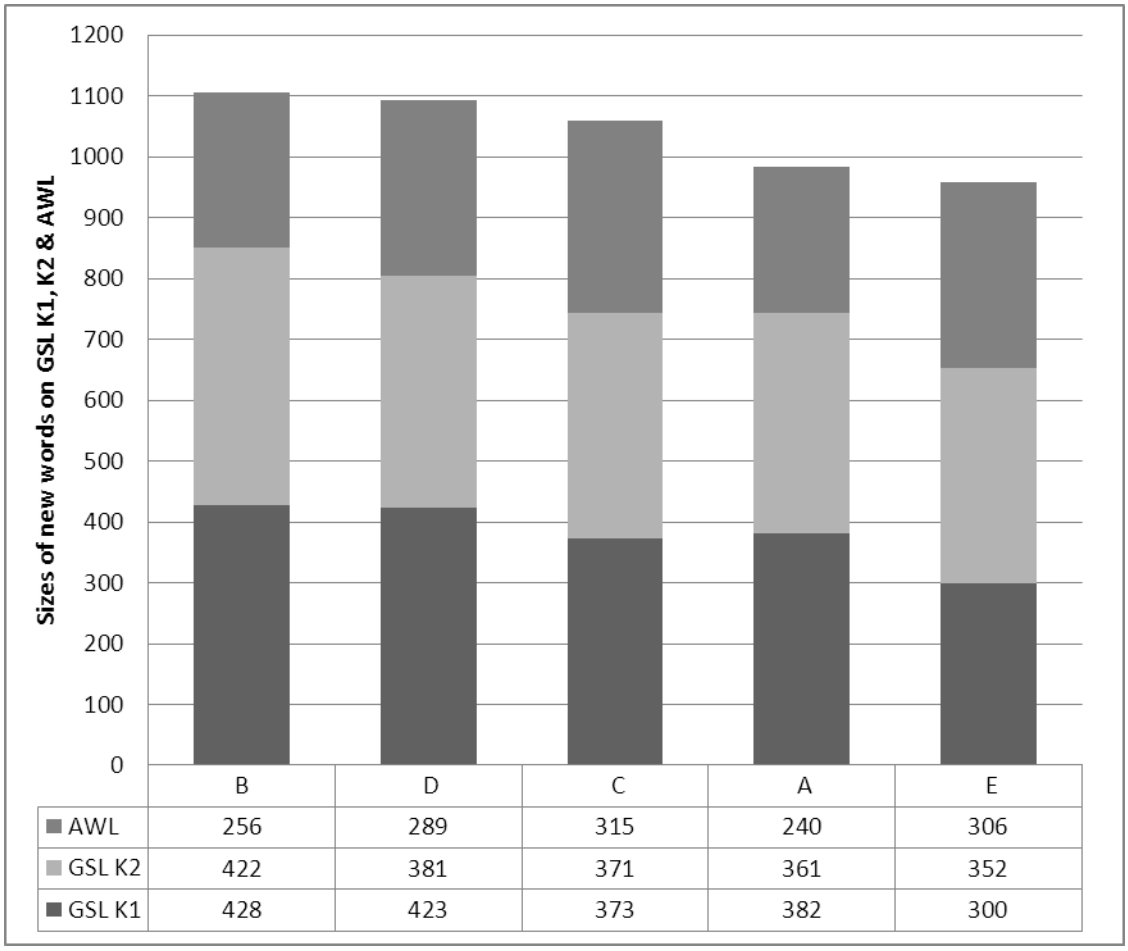
Distinct Vocabulary Selection Features of Textbook Series

With the in-depth frequency scheme analysis on the new words in textbooks, distinct vocabulary selection features could be identified. Figure 3 reveals the amounts and distribution of new words selected from the GSL K1, K2 and the AWL frequency scheme among five textbook series.

According to Figure 3, in terms of the amount of new words selected from the GSL and the AWL in the textbooks, textbook series B, D and C appear to have similar total amounts: textbook series B (1,106 word families), textbook series D (1093 word families), and textbook series C(1059 word families), $\chi^2(2, n = 3258) = 1.085$, *p=.581*. Textbook series B and D have similar distribution patterns on the GSL K1, K2 and the AWL frequency scheme analysis: textbook series B (428/422/256) and textbook series D (423/381/289). No significant differences were reported in the chi-square test of homogeneity in terms of the distribution of new words on the frequency scheme between textbook series B and D, $\chi^2(2, n = 2199) = 4.044$, *p=.132*. The slight differences between these two textbook series might lie in the selection of the second 1,000 words on the GSL and the academic words from the AWL. Textbook series B selects 41 more word families on the second 1,000 words on the GSL than textbook series D while textbook series D includes 33 more word families from the AWL. In

general, textbook series B and D provide the most opportunities for students to gain mastery on the high-frequency GSL words and to learn a moderate amount of academic words. Students who have smaller vocabulary sizes or who are less familiar with the high-frequency words on the GSL might find these two textbook series beneficial in assisting them develop their vocabulary knowledge at the most frequent 2,000 words level.

Textbook series C might appear to have similar total amounts of words selected from the GSL and the AWL with textbook series B: textbook series C (1059 word families), textbook series B (1106 word families). Nonetheless, the new words distribution patterns on the GSL K1, K2 and the AWL frequency scheme are distinctly different between textbook series C and B: textbook series C (373/371/315) and textbook series B (428/422/256). Significant differences were reported in terms of the distribution of new words on the GSL K1, K2 and the AWL frequency scheme between textbook series C and B, χ^2 (2, n = 2165) = 12.138, p=*.002*. Textbook series B appears to emphasize more on the learning of high-frequency GSL words when compared with textbook series C as it selects 106 more word families from the high-frequency GSL words. Textbook series C appears to focus more on the learning of academic words as it includes 59 more academic word families in its new words section than textbook series B does. Textbook series C appears to have the largest amount of academic words introduced and provide moderate amount of high-frequency word learning opportunities among the five textbook series with 744 word families from the GSL.



	B	D	C	A	E
AWL	256	289	315	240	306
GSL K2	422	381	371	361	352
GSL K1	428	423	373	382	300

Figure 3. Bar chart showing the amounts and distribution of new words selected from the GSL K1, K2 and the AWL frequency scheme among five textbook series

In contrast to the previous three textbook series, textbook series A and E fall into the other group of containing smaller amounts of new words selected from the GSL and the AWL in textbooks: textbook series A (983 word families) and textbook series E (958 word families). Despite having similar total amounts of new words selected from the GSL and the AWL, textbook series A and E demonstrate different distribution patterns of their vocabulary selection on the GSL K1, K2 and the AWL frequency scheme: textbook series A (382/361/240) and textbook series E (300/352/306). A chi-square test shows significant differences in terms of the distribution patterns on the GSL K1, K2 and the AWL frequency scheme between textbook series A and E, χ^2 (2, n = 1941) = 17.632, p=*.000*. Textbook series E contains 66 more academic word families than textbook series A. By contrast, textbook series

A includes 91 more high-frequency words from the GSL than textbook series E. Textbook series E could be suitable learning materials for students who have gained good mastery of the high-frequency words on the GSL and who are on the track of learning more academic words. Students with smaller vocabulary size of high-frequency GSL words might find textbook series E challenging as it features more academic word learning and less high-frequency GSL word learning when compared with the other four textbook series. Students with smaller vocabulary sizes using textbook series E might end up learning the less-frequent words first and missing out some high-frequency words. Textbook series A, on the other hand, provides moderate amount of the high-frequency words from the GSL and a smaller amount of academic words for the senior high school students. Students who are less ready to learn a large amount of vocabulary might find textbook series A presenting ideal vocabulary learning load to them.

Despite falling into the same group in terms of the total amount of academic words and high-frequency words introduced in textbooks between textbook series E and A, textbook series A shared a similar vocabulary selection feature with textbook series C as textbook series A actually includes almost the same amount of high-frequency words on the GSL as textbook series C: textbook series A (743 word families) and textbook series C (744 word families). The new words distributions on the GSL K1 and K2 frequency scheme between these two textbook series exhibit similar patterns: textbook series A (382/361) and textbook series C (373/371). The major difference in terms of the new words distribution on the GSL K1, K2 and the AWL frequency scheme between the two textbook series lies in the amounts of academic words introduced. Textbook series C contains the highest amount of academic words with 315 word families while textbook series A includes the lowest amount of academic words with 240 word families among the five textbook series.

Both textbook series A and C could provide students with moderate amount of high-frequency words learning opportunities with textbook series C featuring more learning opportunities for academic words.

Like textbook series C, textbook series E also provides students with relatively more opportunities for learning academic words. The major difference between textbook series C and E arises from the amount of high-frequency words on the GSL introduced in the textbooks: textbook series C (744 word families) & E (652 word families). Textbook series C places more emphasis on the learning of high-frequency words than textbook series E.

Among the five textbook series, the most distinct feature for the new words distribution on the GSL K1, K2 and the AWL frequency scheme might be the strong contrast between the GSL high-frequency word selection of textbook series B and E: textbook series B includes almost 200 more word families from the GSL than textbook series E. This implies that students who have not developed good mastery of the 2,000 high-frequency words might find textbook series B more beneficial in building up their vocabulary competences than textbook series E. Textbook series E is more suitable for students who have gain better control of the high-frequency GSL words and are ready to concentrate more on the learning of academic words.

It should be noted that this study has been primarily concerned with the vocabulary selection in assisting students to comprehend academic texts. Only new words on the GSL K1, K2 and the AWL are analyzed. New words falling out of the GSL K1, K2 and the AWL were not included for previous systematic discussion as the Web Vocaprofile Classic v.4 could not classify the off-list new word items into word families. To capture more specific details of vocabulary selection features of different textbook series, the off-list new word items could, however, be calculated by lemma in this study.

Table 17

Chi-square Test for the Amounts of New Words in Lemmas on the Less-frequent Word Category across Five Textbook Series

Textbooks	Less-frequent Words	χ^2	df	*P*	Post hoc
A	1221	47.470***	4	.000	A>D
B	1263				B>D
C	1246				C>D
D	975				E>D
E	1217				

Note. *** $p < .001$

Table 17 shows the amount of off-list words, or less-frequent words, identified in the five textbook series. As can be seen from Table 15, textbook series D appears to have far fewer off-list words than other textbook series with textbook series B outnumbering textbook series D by about 300 lemmas. No significant differences among textbook series A, B, C and E in term of new words selected from the less-frequent category, χ^2 (3, n = 4947) = 1.142, p=*.767*. Textbook series A, B, C and E include similar amount of less-frequent words. Nonetheless, textbook series D was found to contain significant smaller amount of less-frequent words than the other four textbook series as shown in Table 17. This implies that previous systematic discussion of the distinct features of news words selection of each textbook series would not be affected greatly by the analysis of the new words of the off-list categories except for textbook series D. The analysis of the new words on the off-list category reveals that textbook series D could be potentially ideal learning materials for students who need to concentrate on the learning of high-frequency GSL and academic words as it contains fewer less-frequent words and leave these less-frequent words for later stages of learning.

Frequency Scheme Analysis of New Words Introduced through the Curriculum

As the junior high school graduates in Taiwan are expected to be proficient

with words on the *1,200-word List*, the optimal vocabulary sizes of ideal learners through the K-12 curriculum could be calculated by analyzing the vocabulary profiles of the words on the *1,200-word List* and the new words from each textbook series. This section will examine the optimal vocabulary sizes on the frequency scheme of the GSL and the AWL that students could develop from the K-12 curriculum in Taiwan with words on the 1,200-word List and new words from the five senior high school textbook series.

Sizes of New Words on Frequency Scheme (GSL+AWL) through the Curriculum

Table 18 shows the optimal vocabulary sizes on the frequency scheme of the GSL and the AWL that students could develop through the K-12 curriculum in Taiwan with the use of different textbook series. Textbook series C appears to have the largest amounts of new words on the GSL and the AWL frequency scheme with 1,814 word families while textbook series A contains the smallest amount of new words on the GSL and the AWL frequency scheme with about 100 word families less than textbook series C.

Table 18

Sizes of New Words on the GSL and the AWL Frequency Scheme through K-12 Curriculum

		1,200-word List + Textbook Series				
		1200+A	1200+B	1200+C	1200+D	1200+E
Frequency Scheme	GSL K1	868	890	871	901	835
	GSL K2	603	650	623	598	601
	AWL	247	262	320	296	315
Total (GSL+AWL)		1718	1802	1814	1795	1751

Table 19

Chi-square Test for the Amount of New Words on GSL and AWL in Textbook Series Plus 1200-Word List

Textbooks+1200WL	GSL+AWL	χ^2	df	*p*
A+1200WL	1718	3.643	4	.456
B+1200WL	1802			
C+1200WL	1814			
D+1200WL	1795			
E+1200WL	1751			

Note. * $p < .05$

Yet, as shown in Table 19, a chi-square test indicates no significant differences among the five scenarios of learning through the curriculum in terms of the total amount of new words selected from the GSL and the AWL frequency scheme, χ^2 (4, n = 8880) = 3.643, $p=.456$. This implies that for junior high school graduates who have gained good control of the words on the *1,200-word List*, no matter which textbook series the students use in the senior high school level, students could potentially develop similar vocabulary sizes on the GSL and AWL frequency scheme for reading academic texts by the end of the K-12 curriculum. Nevertheless, the vocabulary learning experience could be quite different through utilizing different textbook series. Through an intersection analysis with Text Lex Compare v.3 (Cobb, 2013), shared words were identified between the new words of each of the textbook series and words from the *1,200-word List*. Textbook series B was found to contain the highest amount of shared lexical items with the *1,200-word List*: 173 shared types were identified as can be seen in Appendix G. Textbook series A and D also contain relatively higher amounts of shared lexical items with the *1,200-word List*: Textbook series D (139 types) and textbook series A (137 types) as can also be accessed in Appendix G. In contrast, textbook series C and E shared fewer words with the *1,200-word List*: textbook series C (68 types) and textbook series E (63 types). (Please

see Appendix G for details.)

It seems that textbook series A, B and D consider the learning of these shared lexical items to be of great importance and present these items again in their textbook series. It is also possible that the shared lexical items have polysemous features that different meanings of the same word form are introduced in the senior high school textbooks. Students who have not mastered the words on the *1,200-word List* are very likely to find textbook series A, B and D beneficial in facilitating their high-frequency vocabulary development. Students who have gained good control of the words on the 1,200-word List might benefit their academic vocabulary development through utilizing textbook series C and E as they focus more on introducing the new words in the academic word category than the review or consolidation of high-frequency vocabulary knowledge.

CHAPTER FIVE

CONCLUSIONS

This chapter concludes the current study by summarizing the major findings, providing pedagogical implications, pointing out the limitations of research, and suggesting future research directions.

Major Findings

To understand how well the senior high school English textbooks in Taiwan have prepared students for reading English-medium textbooks in college, this study has explored the sizes and distributions of academic words from the AWL in the five senior high school English textbook series. To assist students' academic vocabulary development, the academic words from the AWL that are not included in each textbook series are also identified and compiled into complementary word lists to serve as supplementary learning materials for students with diverse learning needs. The new words in the five textbook series were also analyzed with the GSL K1, K2 and the AWL frequency scheme to reveal the vocabulary profiles of new words of each textbook series. The information of vocabulary profile of new words in textbooks could potentially help teachers in choosing suitable learning materials for their students. The words on the *1,200-word List* were also combined with the data of new words of each textbook series for frequency scheme analysis so as to shed light on the optimal vocabulary sizes that students could develop through the K-12 curriculum with the use of different textbook series.

Academic Vocabulary Size

About 42% to 55% of the academic words on the AWL were found to be included in the current five textbook series. Significant differences were reported in

terms of the sizes of academic words from the AWL in the textbook series. Three textbook series contains more than 50% of the academic words from the AWL in the new word section: textbook series C includes the most of them with 315 word families across six volumes, followed by textbook series E with 306 word families and textbook series D with 289 word families. The other two textbook series, textbook series B and A, were found to include less than 50% of the academic words from the AWL in their new word section: textbook series B and A contain 256 word families and 240 word families of academic words on the AWL respectively, accounting for about 45% and 42% of the 570-word-family AWL. Statistical testing results reveal that textbook series A selects a significantly smaller amount of academic words in its new word section when compared with textbook series C, E and D while the textbook series C and E include significantly larger amount of academic words when compared with textbook series B and A.

Academic Vocabulary Distribution

In terms of the distribution of academic words across ten sublists of the AWL, no significant differences were identified in the amounts of academic words from Sublist1 and the first three sublists among the five textbook series. The academic words selected from Sublist 1 of the AWL in the five textbook series range from 41 word families to 47 word families. The academic words selected from the first three sublists also show a slight variation with textbook series E including the maximum amount of 124 word families while textbook series B including the minimum amount of 105 word families. Despite no significant differences shown in the amounts of academic vocabulary selected in Sublist 1 and the first three sublists, significant differences do exist in the amounts of academic words selected from Sublist 4 to Sublist 10 among five textbook series. That is, the five textbook series examined in

current study shared similar strength in the academic vocabulary selection of the first three sublists, which provides a high percentage of academic text coverage. Yet, the five textbook series vary in terms of the amount of academic vocabulary selected from the remaining seven sublists with textbook series C and E including far more academic words from these sublists than textbook series B and A.

As for the academic words distribution across the six volumes of each textbook series, four textbook series present the largest amount of academic words in the fourth volume except that textbook series E introduced the largest amount of academic words in the third volume, which allows students to expose to more academic words one semester early than the other textbook series. Textbook series A presented noticeable smaller amount of academic words in its first volume when compared with the rest of the four textbook series and increased the amount of academic words gradually in its first four volumes. Dramatic increase or decline patterns for the amounts of academic words presented in advanced volumes were spotted in textbook series C and B. Textbook series D also shows a slight decline in the amount of academic words when it progressed from the first volume to the second volume.

Complementary Word Lists

As each textbook series contains about 42% to 55% of academic words on the AWL, the remaining academic words on the AWL were also identified for each textbook series in this study. Five complementary word lists were compiled to facilitate students' academic vocabulary learning. Teachers could utilize these word lists to create supplementary learning materials while textbook writers could consider adding some of the academic words on the complementary lists to their future new versions of textbooks if adding the academic words is feasible without lower too

much of the readability of the reading texts in the textbooks. Students could learn from the lists or use the lists to set up their academic vocabulary learning goals.

Frequency Scheme Analysis of New Words in Textbooks

As the high-frequency words on the GSL and the academic words on the AWL could provide about 92% coverage of academic texts, the new word in the textbook series were also analyzed with the frequency scheme of the GSL and the AWL. Significant differences do exist in the total amounts of words selected from the GSL and the AWL among the five textbook series. Textbook series B and D were found to include significantly larger amount of words from the GSL and the AWL than textbook series A and E. Textbook series C does contain far more words from the GSL and the AWL when compared with textbook series E yet no significant difference were reported when compared with the rest of textbook series.

Textbook series B was found to have the largest amount of words selected from the GSL and the AWL with a stronger focus on the high-frequency words of the GSL, the first 1,000 words in particular. Textbook series E was found to contain the smallest amount of words selected from the GSL and the AWL with a noticeable smaller amount of words selected from the first 1,000 words in GSL though it contains relatively higher amount of the academic words. Textbook series D was found to have a similar amount of words selected from the GSL and the AWL to textbook series B. Textbook series D contains 40 more word families from the second 1,000 word on the GSL yet 30 more word families from the AWL than textbook series B. Textbook series C has a moderate amount of words selected from the GSL and the AWL with more focus on the academic words and including moderate amount of high-frequency GSL words. Textbook series C contains about 100 less word families from the GSL than textbook series B yet include about 60 more word families from

the AWL than textbook series B. When compared with textbook series C, textbook series A selects a similar amount of high-frequency words from the GSL yet includes 75 less word families from the AWL.

Frequency Scheme Analysis of New Words Introduced through the Curriculum

The frequency scheme analysis of new words introduced through the curriculum shows that students could reach a vocabulary size of about 75% of the GSL and 45% to 55% of the AWL after mastering the 1,200-word List and new words from any of the textbook series through the K-12 curriculum in Taiwan. No significant differences were reported in the optimal vocabulary sizes students could develop on the GSL and the AWL frequency scheme with the use of different textbook series through the K-12 curriculum. Distinct features of re-introducing the lexical items from the 1,200-word List of textbook series were identified to explain the different results when compared with the textbook-only analysis. Textbook series A, B and D shared more new words with the *1,200-word Lis*t than textbook series C and E.

Pedagogical Implications

Based on the research findings of this study and literature review, some pedagogical implications are proposed to facilitate students' development of the ability to read academic texts.

This study has found that the five senior high school textbook series include significantly different amounts of academic words from the AWL and high-frequency words from the GSL. The distributions of the academic words in the textbook series also differ from each other. The disparity of the amounts of new words selected from the AWL and the GSL and the different distribution patterns of these new words would create different difficulty level of the textbook series, which would provide

many different choices for students with diverse language proficiencies and learning needs. Cunningworth (1995) pointed out the importance of selecting the appropriate textbooks that fits students' proficiency level and learning abilities to optimize students' learning. To facilitate students' optimal vocabulary development, teachers could first find out students' current vocabulary level and choose a textbook series that meets their learning needs. Students could be tested to see if they have gained good control of the words on the*1,200-word List* or the high-frequency words to decide which textbook series might better suit them. Nation (2008) argued that it's important for the teachers to find out whether the learners need to be focusing on high-frequency vocabulary, academic vocabulary, technical vocabulary or low-frequency vocabulary when planning the vocabulary component of a language course. Senior high school teachers and instructors in university could also use *The Vocabulary Levels Test* (Nation, 1990; Schmitt, et al, 2001) to identify the learning needs of their students and set appropriate academic vocabulary learning goals for the students.

In terms of the academic vocabulary selection of the five textbook series, this study also reveals that only 42% to 55% of the academic words from the AWL are included in the current five textbook series. When considering the academic words that students are likely to learn in the K-12 curriculum, the percentage rises to 43% to 56%. This implies that if students would like to comprehend English-medium textbooks at university, they would still have to learn the remaining 44% to 57% of academic words from the AWL. Textbook writers could consider including more academic words from the AWL into their future textbook series if they decide to emphasize the learning of academic words. Weir (2009) pointed out that the academic vocabulary on the AWL was adopted as an indicator for lexical difficulty in the

analysis of Cambridge Main Suite Reading examinations. As adding more academic words in the reading texts is likely to increase the text difficulty for learners, textbook writers should evaluate the increase of text difficulty when adding more academic words into the reading texts. More academic words from the first three sublists from the AWL could be included first as these academic words provide a much larger coverage for academic texts and are recommended to be learned first (Coxhead, 2000). Pilot studies with regards to the text difficulty or readability level shifts could be conducted to identify the optimal amount of academic words that could be integrated into the reading texts of new textbook series. Textbook writers should also try to avoid dramatic increase or sharp decline of academic words when the volumes progress to more advanced levels. The reason is that dramatic increase or sharp decline of academic words would pose more challenges for students' vocabulary development. Furthermore, to enhance students' vocabulary knowledge development, textbook writers could consider labeling the register of words, such as indicating the academic vocabulary with abbreviation of "AWL" or illustrating high-frequency words with a symbol of a key or abbreviation of "GSL." The information provided with the label would correspond to what Nation (2001) proposed as providing the information on constraints of use in the form-meaning-use framework of knowing a word. As the senior high school English curriculum in Taiwan is more oriented to English for General Purpose (EGP), adding the register information of words, such as words for academic uses, could raise learners' awareness of the particular use of words in certain domains so that they develop the knowledge of word register. Since words of high-frequency vocabulary, academic vocabulary and less-frequent vocabulary were all introduced in the new words section in the senior high school textbooks, the labels of word register information could also help students to decide which words to focus first and to set up their own vocabulary learning goals.

As the selection of textbooks often involves many factors and teachers in Taiwan very often would have mixed-level classes, it is very likely students of different vocabulary sizes end up using the same textbook series in class. In this case, differentiated instructions could be implemented to optimize students' learning. For senior high school students who have a larger vocabulary size and good control of high-frequency words, teachers could utilize the complementary lists as compiled from this study to create supplementary learning materials to assist students' academic vocabulary development. Learning from the lists and developing word part analysis skills could also be encouraged for learning academic vocabulary as suggested by Nation (2001). Senior high school students with a smaller vocabulary size should first focus on develop good mastery of the high-frequency words and then gradually progress to the learning of academic words, especially the ones falling on the first three sublists with the highest learning value. Instructors at college level could check whether the students at college level need to work on the academic words on the AWL through the *Vocabulary Levels Test* as it contains a section built upon the AWL. Nation (2001) suggested that students are required to reach at least a score of 25 out of 30 in order to do academic studies in English. Students who score less than 25 could study the items on the AWL to develop their academic vocabulary knowledge. Instructors could also utilize the complementary lists compiled in this study to help students identify the academic words that they need to work on. It is very likely that college students in freshman year might not be familiar with the academic words that were not introduced in the senior high school textbook series. The complementary lists for each textbook series could be of potential use for college students who need to work on the learning of academic words.

Limitations of Research

This study aims at examining the sizes and distribution of academic words among the five current senior high school English textbook series and identifying the academic words on the AWL that are not selected in the textbook series to form complementary lists to serve as supplementary materials for students' learning. It should be noted that the findings of the research are limited to the learning materials examined in this study. That is, only the new words included in the basic learning materials of the textbook series are investigated in this research for fair quantitative comparison. The new words in the advanced learning materials of the textbook series were not included. Therefore, the described vocabulary selection features of textbook series are only limited to the basic learning materials of each textbook series.

In addition, the features of vocabulary selection of textbook series were identified through the frequency framework of the GSL and the AWL to reveal to what extent each textbook series might have prepared students for reading English-medium college textbooks. The vocabulary selection features of textbook series identified are limited to this scope as the new words in the textbooks falling into the off-list (less-frequent word) category were not able to be classified into word families through Web VocaProfile classic v.4 for systematic discussion. The new words in the off-list category in the textbook series were examined with the counting unit of lemma to provide some extra information with regards to the vocabulary selection with this particular type of words in this five textbook series.

Moreover, the finding of this study is also limited to the current corpus linguistic tools available. As highly accurate computer programs for tagging lexemes (word forms and their distinct meanings) are still to be developed (Gardner & Davies, 2014), the findings of this study are simply the results of word form comparison rather than word form plus word meaning comparison. Sixty AWL word families

containing homographs were identified by Wang and Nation (2004), yet the meaning distinctions could not be examined with the instrument available in this study. It is likely that students might not have fully mastered the academic words that appear in the high school textbooks, especially the one with polysemy features. Teachers should raise students' awareness in differentiating the usages of these polysemous academic words when students' academic vocabulary learning progress to a more advanced level. The most frequent meanings of the polysemous academic words should be introduced and followed by the less frequent meanings.

Last but not the least, the findings of this research on the academic vocabulary selection in textbooks is also limited to the academic word list adopted. The AWL was built on the assumption that the frequency of academic words would come after that of the GSL words. Researchers pointed out that the AWL does not contain words of academic nature which at the same time falls into the high-frequency GSL word category (Nagy & Townsend, 2012; Neufeld, et al, 2011). Some GSL words, such as *interest*, *account*, and *rate*, were not identified as academic words on the AWL despite the fact that they do have academic meanings and appear frequently in academic texts. Many attempts of making new academic word lists have been made recently (Browne, et al., 2013; Gardner & Davies, 2014). This research still utilize the AWL for analysis of academic words as many other researchers have proven that the AWL could provide text coverage of about 10% of academic texts in various disciplines while there haven't been as many established results about the text coverage of academic texts provided by these two relatively new academic word lists .

Suggestions for Future Research

This study analyzed the academic vocabulary introduced at the new word section in textbooks as Cobb (1995) and Schmitt and Schmitt (2012) did for wordlists

comparison aiming at examining words for intentional vocabulary learning. To reveal the vocabulary input in the textbooks, future research could include the reading texts for examination of vocabulary recycling from the perspective of incidental vocabulary learning.

As Browne, Culligan and Phillips (2013) recently develop the New General Service List (NGSL) and New Academic Word List (NAWL), which claims to provide higher text coverage than the original GSL and the AWL, future research could adopt the new frequency scheme of NGSL and NAWL to examine the vocabulary selection in textbook series. The NGSL and NAWL frequency scheme has recently been integrated into the Web Vocabprofile VP COMPLEAT (Cobb, 2014) interface as Neoclassic option, making the analysis tool available for future studies.

Based on more than 120 million words of academic texts in the Corpus of Contemporary American English (COCA), Gardner and Davies (2014) develop the 3000-lemma Academic Vocabulary List (AVL), which claims that its top 570 word families provide almost twice as much text coverage for academic texts in COCA and in BNC as the 570 word families of the AWL. Future research could examine the academic vocabulary selection in textbook series with this more recent academic word list. A text analysis program featuring identifying academic words of different frequency bands was also developed in the AVL project, making the analysis of reading texts possible for future research.

With more and more lexical threshold research revealing the adequate vocabulary size for comprehending academic texts in different disciplines using BNC frequency list or BNC/ COCA combined frequency list (Hsu, 2011& 2014), future research could examine the frequency of vocabulary in textbooks with these two pedagogical frequency lists. Utilizing these two frequency schemes could reveal the sizes of less-frequent words in textbooks through the counting unit of word families

whereas the classic frequency scheme of the GSL and the AWL could only compute the less-frequent words in the counting unit of “type”, “token,” or “lemma.” The counting unit alignment issue of “off-list words”, or less-frequent words, could be greatly improved through employing these two frequency schemes. In addition, as Schmitt and Schmitt (2012) call for the importance of learning the mid-frequency words for better comprehension of academic texts in English, future research could also adopt the BNC frequency scheme to examine the vocabulary input in high school textbooks to see how many new words introduced in the textbooks might fall into this mid-frequency word category, the 3,000 word families to 9,000 word families on the BNC frequency scheme. The use of BNC frequency list or BNC-COCA combined frequency list in analyzing the frequency of new words in textbooks could reveal the vocabulary selection in textbooks in a more refined manner compared with the current classic GSL and AWL framework.

To understand how a textbook series has prepared high school students for academic studies in English, qualitative research into how the academic vocabulary is introduced in textbooks could also be conducted especially with the ones with the polysemous feature. As formulaic languages also play an important role in academic reading, formulaic languages in textbooks, such as phrases and collocations, could also be investigated with corresponding phrase lists, such as the Academic Formula List (Simpson-Vlach & Ellis, 2010) and the PHRASE List (Martinez & Schmitt, 2012). The results of these future researches would also potentially help learners and instructors to have a better understanding of how learners can plan for their English learning goals, especially in the English for Academic Purposes dimension.

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APPENDIX A

The Academic Word Families from Sublist 1 Selected by the Five Textbook Series

1. The Academic Word Families from Sublist 1 Selected by Textbook Series A

Academic words from Sublist 1	Total
analyse, approach, area, assume, available, benefit, constitute, contract, create, data, define, derive, distribute, environment, establish, estimate, evident, formula, indicate, individual, interpret, involve, legal, method, occur, percent, period, principle, proceed, process, require, research, respond, role, section, significant, similar, source, specific, structure, theory, vary	42 word families

2. The Academic Word Families from Sublist 1 Selected by Textbook Series B

Academic words from Sublist 1	Total
analyse, approach, area, available, benefit, concept, consist, constitute, context, contract, create, data, distribute, economy, environment, estimate, evident, factor, function, identify, indicate, individual, involve, issue, legal, major, method, occur, percent, period, principle, process, require, research, respond, section, similar, source, specific, theory, vary	41 word families

3. The Academic Word Families from Sublist 1 Selected by Textbook Series C

Academic words from Sublist 1	Total
analyse, approach, area, assume, available, benefit, concept, consist, context, create, define, distribute, economy, environment, establish, estimate, evident, factor, finance, function, identify,	45 word families

income, indicate, individual, interpret, involve, issue, labour, legal, major, occur, percent, principle, proceed, process, require, research, respond, role, significant, similar, specific, structure, theory, vary	

4. The Academic Word Families from Sublist 1 Selected by Textbook Series D

Academic words from Sublist 1	Total
analyse, approach, area, assume, authority, available, benefit, concept, consist, create, data, define, derive, distribute, environment, establish, estimate, evident, export, factor, finance, function, identify, income. indicate, individual, interpret, involve, issue, legal, major, method, occur, percent, period, policy, proceed, process, require, research, respond, role, significant, similar, source, specific, vary	47 word families

5. The Academic Word Families from Sublist 1 Selected by Textbook Series E

Academic words from Sublist 1	Total
analyse, approach, assess, assume, authority, available, benefit, concept, consist, contract, create, derive, distribute, economy, environment, establish, estimate, evident, factor, finance, identify, indicate, involve, issue, legislate, major, method, percent, policy, principle, require, research, respond, role, significant, similar, source, specific, structure, theory, vary	41 word families

APPENDIX B

The Academic Words from First Three Sublists in the Five Textbook Series

1. The Academic Words from First Three Sublists in Textbook Series A

Sublists	Academic words families	Subtotal
Sublist 1	analyse, approach, area, assume, available, benefit, constitute, contract, create, data, define, derive, distribute, environment, establish, estimate, evident, formula, indicate, individual, interpret, involve, legal, method, occur, percent, period, principle, proceed, process, require, research, respond, role, section, significant, similar, source, specific, structure, theory, vary	42 word families
Sublist 2	achieve, acquire, affect, appropriate, assist, category, chapter, complex, consequent, construct, consume, credit, culture, design, distinct, element, feature, focus, injure, maintain, normal, perceive, positive, previous, primary, purchase, range, resource, secure, seek, select, site, strategy, survey, transfer	35 word families
Sublist 3	alternative, comment, compensate, contribute, correspond, demonstrate, emphasis, ensure, exclude, fund, illustrate, imply, initial, interact, layer, link, minor, negate, philosophy, physical, publish, register, remove, scheme, specify, sufficient, task, technique	28 word families
Total		105 word families

2. The Academic Words from First Three Sublists in Textbook Series B

Sublists	Academic words	Total
Sublist 1	analyse, approach, area, available, benefit, concept, consist, constitute, context, contract, create, data, distribute, economy, environment, estimate, evident, factor, function, identify, indicate, individual, involve, issue, legal, major, method, occur, percent, period, principle, process, require, research, respond, section, similar, source, specific, theory, vary	41 word families

Sublist 2	achieve, acquire, administer, affect, appropriate, aspect, category, community, complex, conclude, conduct, consequent, construct, consume, credit, culture, design, feature, focus, impact, injure, invest, item, journal, maintain, normal, participate, perceive, positive, potential, previous, range, region, regulate, reside, resource, secure, seek, select, site, survey, tradition	42 word families
Sublist 3	circumstance, consent, constant, contribute, core, corporate, correspond, demonstrate, emphasis, fund, immigrate, imply, link, locate, minor, negate, outcome, philosophy, physical, publish, react, rely, remove, specify, sufficient, task, technical, technique, technology, volume	30 word families
Total		113 word families

3. The Academic Words from First Three Sublists in Textbook Series C

Sublists	Academic words	Subtotal
Sublist 1	analyse, approach, area, assume, available, benefit, concept, consist, context, create, define, distribute, economy, environment, establish, estimate, evident, factor, finance, function, identify, income, indicate, individual, interpret, involve, issue, labour, legal, major, occur, percent, principle, proceed, process, require, research, respond, role, significant, similar, specific, structure, theory, vary	45 word families
Sublist 2	achieve, acquire, affect, appropriate, aspect, assist, category, chapter, complex, conclude, conduct, consequent, construct, consume, culture, design, distinct, element, feature, focus, impact, institute, item, normal, obtain, participate, perceive, positive, potential, previous, primary, range, region, regulate, relevant, reside, resource, secure, seek, site, strategy, survey, text, tradition	44 word families
Sublist 3	circumstance, comment, component, consent, constant, constrain, contribute, convene, core, criteria, demonstrate, document, dominate, emphasis, ensure, exclude, illustrate, immigrate, initial, instance, justify, layer, link, locate, maximize, physical, publish, react, rely, shift, specify, sufficient, task, technique, technology	35 word families

Total	124 word families

4. The Academic Words from First Three Sublists in Textbook Series D

Sublists	Academic words	Subtotal
Sublist 1	analyse, approach, area, assume, authority, available, benefit, concept, consist, create, data, define, derive, distribute, environment, establish, estimate, evident, export, factor, finance, function, identify, income. indicate, individual, interpret, involve, issue, legal, major, method, occur, percent, period, policy, proceed, process, require, research, respond, role, significant, similar, source, specific, vary	47word families
Sublist 2	achieve, acquire, affect, appropriate, aspect, assist, category, commission, community, complex, conclude, conduct, consequent, construct, consume, culture, design, distinct, evaluate, feature, focus, impact, injure, invest, item, journal, maintain, normal, perceive, positive, potential, primary, region, reside, resource, restrict, secure, seek, select, site, strategy, survey, tradition	43 word families
Sublist 3	alternative, comment, compensate, considerable, constant, contribute, corporate, correspond, criteria, dominate, emphasis, ensure, fund, imply, instance, interact, justify, locate, negate, outcome, physical, publish, react, remove, shift, task, technology, volume	28 word families
Total		118 word families

5. The Academic Words from First Three Sublists in Textbook Series E

Sublists	Academic words	Subtotal
Sublist 1	analyse, approach, assess, assume, authority, available, benefit, concept, consist, contract, create, derive, distribute, economy, environment, establish, estimate, evident, factor, finance, identify, indicate, involve, issue, legislate, major, method, percent, policy, principle, require, research, respond, role, significant, similar, source, specific, structure, theory, vary	41 word families

Sublist 2	achieve, acquire, affect, appropriate, aspect, assist, category, community, complex, conduct, consequent, construct, consume, culture, design, distinct, element, feature, focus, impact, institute, maintain, normal, obtain, participate, perceive, positive, potential, previous, purchase, range, region, regulate, reside, resource, restrict, secure, select, site, strategy, tradition	41 word families
Sublist 3	alternative, circumstance, comment, component, considerable, constant, contribute, correspond, demonstrate, dominate, emphasis, exclude, fund, illustrate, immigrate, imply, initial, locate, minor, negate, philosophy, physical, proportion, publish, react, rely, sex, sufficient, technology	29 word families
Total		111 word families

APPENDIX C

The Academic Words Selected by Each Textbook Series

1. The Academic Word Families Included in Textbook Series A

Sublist 1	analyse, approach, area, assume, available, benefit, constitute, contract, create, data, define, derive, distribute, environment, establish, estimate, evident, formula, indicate, individual, interpret, involve, legal, method, occur, percent, period, principle, proceed, process, require, research, respond, role, section, significant, similar, source, specific, structure, theory, vary	42 word families
Sublist 2	achieve, acquire, affect, appropriate, assist, category, chapter, complex, consequent, construct, consume, credit, culture, design, distinct, element, feature, focus, injure, maintain, normal, perceive, positive, previous, primary, purchase, range, resource, secure, seek, select, site, strategy, survey, transfer	35 word families
Sublist 3	alternative, comment, compensate, contribute, correspond, demonstrate, emphasis, ensure, exclude, fund, illustrate, imply, initial, interact, layer, link, minor, negate, philosophy, physical, publish, register, remove, scheme, specify, sufficient, task, technique	28 word families
Sublist 4	access, annual, apparent, attitude, communicate, concentrate, contrast, cycle, despite, emerge, error, goal, grant, implicate, obvious, occupy, option, parallel, predict, professional, project, promote, series, status, stress, subsequent, undertake	27 word families
Sublist 5	alter, aware, challenge, conflict, contact, energy, evolve, expand, expose, image, liberal, logic, medical, mental, network, orient, precise, psychology, pursue, stable, style, symbol, target, trend, whereas	25 word families
Sublist 6	abstract, accurate, acknowledge, attach, author, discriminate, display, edit, enhance, expert, federal, fee, flexible, incidence, index, instruct, intelligence, motive, rational, recover, reveal, transform, transport	23 word families
Sublist 7	adult, aid, channel, chemical, classic, comprise, eliminate, file, foundation, globe, guarantee, media, priority, publication, release, sole, somewhat, survive, transmit, unique, visible	21 word families
Sublist 8	abandon, accompany, accumulate, appreciate, complement, crucial,	19

	detect, displace, drama, eventual, inevitable, intense, manipulate, reinforce, restore, schedule, tense, theme, virtual	word families
Sublist 9	bulk, cease, controversy, device, devote, insight, manual, military, relax, sphere, suspend, temporary, trigger	13 word families
Sublist 10	collapse, colleague, convince, enormous, odd, persist, so-called	7 word families

2. The Academic Word Families Included in Textbook Series B

Sublist 1	analyse, approach, area, available, benefit, concept, consist, constitute, context, contract, create, data, distribute, economy, environment, estimate, evident, factor, function, identify, indicate, individual, involve, issue, legal, major, method, occur, percent, period, principle, process, require, research, respond, section, similar, source, specific, theory, vary	41 word families
Sublist 2	achieve, acquire, administer, affect, appropriate, aspect, category, community, complex, conclude, conduct, consequent, construct, consume, credit, culture, design, feature, focus, impact, injure, invest, item, journal, maintain, normal, participate, perceive, positive, potential, previous, range, region, regulate, reside, resource, secure, seek, select, site, survey, tradition	42 word families
Sublist 3	circumstance, consent, constant, contribute, core, corporate, correspond, demonstrate, emphasis, fund, immigrate, imply, link, locate, minor, negate, outcome, philosophy, physical, publish, react, rely, remove, specify, sufficient, task, technical, technique, technology, volume	30 word families
Sublist 4	access, adequate, annual, apparent, attitude, commit, communicate, concentrate, confer, debate, despite, dimension, emerge, error, goal, hence, internal, mechanism, occupy, predict, professional, project, promote, resolve, retain, series ,statistic, stress	28 word families
Sublist 5	adjust, alter, aware, challenge, compound, conflict, contact, decline, enable, energy, enforce, equivalent, expand, expose, facilitate, generation, image, medical, mental, modify, monitor, pursue, stable, sustain, symbol, target, trend, version	28 word families
Sublist 6	accurate, assign, attach, capable, display, diverse, edit, enhance,	21

	expert, furthermore, gender, incidence, intelligence, lecture, migrate, neutral, nevertheless, recover, reveal, transform, transport	word families
Sublist 7	adapt, adult, advocate, aid, chemical, classic, definite, deny, equip, file, finite, foundation, globe, grade, guarantee, identical, insert, media, phenomenon, priority, publication, quote, release, sole, topic, transmit, voluntary	27 word families
Sublist 8	abandon, accumulate, appreciate, automate, detect, drama, eventual, exhibit, highlight, inevitable, predominant, radical, schedule, theme, vehicle, via, visual	17 word families
Sublist 9	anticipate, assure, attain, confine, device, insight, mature, portion, refine, revolution, scenario, sphere, supplement, violate	14 word families
Sublist 10	assemble, convince, depress, enormous, panel, pose, reluctance, undergo	8 word families

3. The Academic Word Families Included in Textbook Series C

Sublist 1	analyse, approach, area, assume, available, benefit, concept, consist, context, create, define, distribute, economy, environment, establish, estimate, evident, factor, finance, function, identify, income, indicate, individual, interpret, involve, issue, labour, legal, major, occur, percent, principle, proceed, process, require, research, respond, role, significant, similar, specific, structure, theory, vary	45 word families
Sublist 2	achieve, acquire, affect, appropriate, aspect, assist, category, chapter, complex, conclude, conduct, consequent, construct, consume, culture, design, distinct, element, feature, focus, impact, institute, item, normal, obtain, participate, perceive, positive, potential, previous, primary, range, region, regulate, relevant, reside, resource, secure, seek, site, strategy, survey, text, tradition	44 word families
Sublist 3	circumstance, comment, component, consent, constant, constrain, contribute, convene, core, criteria, demonstrate, document, dominate, emphasis, ensure, exclude, illustrate, immigrate, initial, instance, justify, layer, link, locate, maximize, physical, publish, react, rely, shift, specify, sufficient, task, technique, technology	35 word families
Sublist 4	access, adequate, annual, apparent, approximate, civil, code,	30

	commit, communicate, concentrate, cycle, debate, despite, dimension, emerge, ethnic, goal, hence, mechanism, obvious, occupy, phase, predict, professional, project, promote, series, status, stress, sum	word families
Sublist 5	academy, adjust, alter, aware, challenge, conflict, consult, decline, draft, enable, energy, expand, external, facilitate, fundamental, generate, generation, image, liberal, margin, network, objective, precise, psychology, pursue, stable, sustain, symbol, target, trend, version, whereas	32 word families
Sublist 6	abstract, accurate, allocate, assign, attach, author, bond, capable, display, diverse, estate, exceed, expert, flexible, furthermore, gender, ignorant, incidence, incorporate, instruct, intelligence, interval, lecture, migrate, motive, nevertheless, precede, recover, reveal, trace, transform, transport	32 word families
Sublist 7	adult, aid, channel, chemical, classic, comprehensive, confirm, contrary, convert, couple, decade, definite, deny, dynamic, equip, finite, foundation, globe, grade, guarantee, identical, innovate, isolate, media, phenomenon, priority, quote, release, reverse, simulate, sole, submit, successor, survive, ultimate, unique, visible, voluntary	38 word families
Sublist 8	accompany, accumulate, appreciate, automate, chart, clarify, contemporary, crucial, detect, displace, drama, eventual, exhibit, highlight, intense, paragraph, prospect, radical, theme, virtual, visual, widespread	22 word families
Sublist 9	assure, attain, coincide, commence, compatible, controversy, converse, device, devote, duration, ethic, founded, inherent, mature, medium, military, mutual, passive, portion, refine, revolution, rigid, route, vision	24 word families
Sublist 10	assemble, colleague, convince, depress, encounter, enormous, likewise, panel, persist, pose, reluctance, undergo, so-called	13 word families

4. The Academic Word Families Included in Textbook Series D

Sublist 1	analyse, approach, area, assume, authority, available, benefit, concept, consist, create, data, define, derive, distribute, environment, establish, estimate, evident, export, factor, finance, function, identify, income. indicate, individual, interpret, involve, issue, legal, major, method, occur, percent, period, policy, proceed, process, require, research, respond,	47 word families

	role, significant, similar, source, specific, vary	
Sublist 2	achieve, acquire, affect, appropriate, aspect, assist, category, commission, community, complex, conclude, conduct, consequent, construct, consume, culture, design, distinct, evaluate, feature, focus, impact, injure, invest, item, journal, maintain, normal, perceive, positive, potential, primary, region, reside, resource, restrict, secure, seek, select, site, strategy, survey, tradition	43 word families
Sublist 3	alternative, comment, compensate, considerable, constant, contribute, corporate, correspond, criteria, dominate, emphasis, ensure, fund, imply, instance, interact, justify, locate, negate, outcome, physical, publish, react, remove, shift, task, technology, volume	28 word families
Sublist 4	access, apparent, attitude, attribute, commit, communicate, concentrate, contrast, cycle, debate, despite, emerge, ethnic, goal, grant, implicate, integrate, investigate, label, mechanism, obvious, option, overall, professional, project, promote, resolve, series, status, stress, sum	31 word families
Sublist 5	academy, alter, aware, capacity, challenge, conflict, enable, energy, equivalent, evolve, expose, facilitate, generate, generation, image, licence, logic, margin, medical, mental, modify, monitor, perspective, psychology, pursue, stable, substitute, sustain, symbol, target, trend, version, welfare	33 word families
Sublist 6	assign, attach, bond, capable, cite, cooperate, display, diverse, edit, enhance, explicit, fee, flexible, furthermore, gender, ignorant, incentive, incidence, lecture, migrate, minimum, ministry, motive, overseas, rational, recover, reveal, trace, transform, transport	30 word families
Sublist 7	adapt, adult, chemical, classic, comprise, decade, definite, deny, eliminate, equip, file, foundation, globe, identical, innovate, intervene, media, phenomenon, publication, release, somewhat, submit, survive, topic, unique, visible, voluntary	27 word families
Sublist 8	abandon, accompany, appreciate, automate, chart, commodity, contemporary, currency, detect, drama, eventual, exploit, induce, inevitable, intense, minimize, schedule, tense, terminate, theme, vehicle, virtual, widespread	23 word families
Sublist 9	assure, behalf, coincide, confine, controversy, device, devote, diminish, erode, founded, insight, mature, medium, military, minimal, norm, relax, revolution, scenario, vision	20 word families

Sublist 10	assemble, colleague, convince, depress, encounter, incline, odd	7 word families

5. The Academic Word Families Included in Textbook Series E

Sublist 1	analyse, approach, assess, assume, authority, available, benefit, concept, consist, contract, create, derive, distribute, economy, environment, establish, estimate, evident, factor, finance, identify, indicate, involve, issue, legislate, major, method, percent, policy, principle, require, research, respond, role, significant, similar, source, specific, structure, theory, vary	41 word families
Sublist 2	achieve, acquire, affect, appropriate, aspect, assist, category, community, complex, conduct, consequent, construct, consume, culture, design, distinct, element, feature, focus, impact, institute, maintain, normal, obtain, participate, perceive, positive, potential, previous, purchase, range, region, regulate, reside, resource, restrict, secure, select, site, strategy, tradition	41 word families
Sublist 3	alternative, circumstance, comment, component, considerable, constant, contribute, correspond, demonstrate, dominate, emphasis, exclude, fund, illustrate, immigrate, imply, initial, locate, minor, negate, philosophy, physical, proportion, publish, react, rely, sex, sufficient, technology	29 word families
Sublist 4	access, adequate, annual, apparent, attitude, civil, commit, communicate, concentrate, debate, despite, dimension, domestic, emerge, goal, hence, implement, implicate, investigate, label, obvious, occupy, option, phase, predict, principal, professional, project, promote, resolve, series, statistic, status, stress, undertake	35 word families
Sublist 5	academy, adjust, alter, aware, capacity, challenge, conflict, contact, decline, energy, enforce, evolve, expand, expose, facilitate, generate, generation, image, logic, mental, notion, objective, orient, perspective, precise, prime, psychology, pursue, stable, substitute, sustain, symbol, whereas	33 word families
Sublist 6	accurate, acknowledge, assign, attach, bond, capable, cooperate, discriminate, display, diverse, edit, enhance, exceed, expert, furthermore, gender, ignorant, incentive, incidence, input, instruct, lecture, ministry, motive, nevertheless, overseas, precede, rational, recover, reveal, trace, transform, transport, utilise	34 word families

Sublist 7	adapt, adult, advocate, aid, channel, chemical, classic, contrary, convert, decade, definite, deny, dynamic, equip, finite, foundation, globe, guarantee, infer, innovate, insert, isolate, phenomenon, priority, prohibit, quote, release, sole, submit, survive, topic, ultimate, unique, visible, voluntary	35 word families
Sublist 8	abandon, accompany, accumulate, ambiguous, appreciate, automate, commodity, contemporary, crucial, detect, drama, eventual, exhibit, highlight, inevitable, inspect, nuclear, plus, prospect, restore, revise, tense, theme, thereby ,via, virtual, visual	27 word families
Sublist 9	accommodate, anticipate, attain, bulk, cease, coincide, confine, device, diminish, founded, insight, mature, military, mutual, passive, relax, route, supplement, violate	18 word families
Sublist 10	collapse, conceive, convince, depress, encounter, likewise, nonetheless, odd, panel, pose, reluctance, undergo	12 word families

APPENDIX D

Complementary Word Lists for Five Textbook Series

1. Complementary Word List for textbook series A (330 word families)

Sublist 1	assess, authority, concept, consist, context, economy, export, factor, finance, function, identify, income, issue, labour, legislate, major, policy, sector,	18 word families
Sublist 2	administration, aspect, commission, community, **compute**, conclude, conduct, equate, evaluate, **final**, impact, institute, invest, item, journal, obtain, participate, potential, region, regulate, relevant, reside, restrict, text, tradition	25 word families
Sublist 3	circumstance, component, consent, considerable, constant, constrain, convene, coordinate, core, corporate, criteria, deduce, document, dominate, framework, immigrate, instance, justify, locate, maximize, outcome, partner, proportion, react, rely, sequence, sex, shift, technical, technology, valid, volume	32 word families
Sublist 4	adequate, approximate, attribute, civil, code, commit, confer, debate, dimension, domestic, ethnic, hence, hypothesis, implement, impose, integrate, internal, investigate, job, label, mechanism, output, overall, parameter, phrase, principal, prior, regime, resolve, retain, statistic, sum, summary	33 word families
Sublist 5	academy, adjust, amend, capacity, clause, compound, consult, decline, discrete, draft, enable, enforce, entity, equivalent, external, facilitate, fundamental, generate, generation, licence, margin, modify, monitor, notion, objective, perspective, prime, ratio, reject, revenue, substitute, sustain, transit, version, welfare	35 word families
Sublist 6	aggregate, allocate, assign, bond, brief, capable, cite, cooperate, diverse, domain, estate, exceed, explicit, furthermore, gender, ignorant, incentive, incorporate, inhibit, initiate, input, interval, lecture, migrate, minimum, ministry, neutral, nevertheless, overseas, precede, presume, scope, subsidy, **tape**, trace, underlie, utilize	37 word families
Sublist 7	adapt, advocate, comprehensive, confirm, contrary, convert, couple, decade, definite, deny, differentiate, dispose, dynamic, empirical, equip, extract, finite, **grade**, hierarchy, identical, ideology, infer, innovate, insert, intervene, isolate, mode, paradigm, phenomenon, prohibit, quote, reverse, simulate, submit,	39 word families

	successor, thesis, topic, ultimate, voluntary	
Sublist 8	ambiguous, append, arbitrary, automate, bias, chart, clarify, commodity, conform, contemporary, contradict, currency, denote, deviate, exhibit, exploit, fluctuate, guideline, highlight, implicit, induce, infrastructure, inspect, minimize, nuclear, offset, paragraph, plus, practitioner, predominant, prospect, radical, random, revise, terminate, thereby, **uniform**, vehicle, via, visual, widespread	41 word families
Sublist 9	accommodate, analogy, anticipate, assure, attain, behalf, coherent, coincide, commence, compatible, concurrent, confine, converse, diminish, distort, duration, erode, ethic, format, found, inherent, integral, intermediate, mature, mediate, **medium**, minimal, mutual, norm, overlap, passive, portion, preliminary, protocol, qualitative, refine, restrain, revolution, rigid, route, scenario, subordinate, supplement, **team**, unify, violate, vision	47 word families
Sublist 10	adjacent, albeit, assemble, compile, conceive, depress, encounter, forthcoming, incline, integrity, intrinsic, invoke, levy, likewise, nonetheless, notwithstanding, ongoing, panel, pose, reluctance, straightforward, undergo, whereby	23 word families

2. Complementary Word List for textbook series B (314 word families)

Sublist 1	assess, assume, authority, define, derive, establish, export, finance, formula, income, interpret, labour, legislate, policy, proceed, role, sector, significant, structure	19 word families
Sublist 2	assist, chapter, commission, **compute**, distinct, element, equate, evaluate, **final**, institute, obtain, primary, purchase, relevant, restrict, strategy, text, transfer	18 word families
Sublist 3	alternative, comment, compensate, component, considerable, constrain, convene, coordinate, criteria, deduce, document, dominate, ensure, exclude, framework, illustrate, initial, instance, interact, justify, layer, maximize, partner, proportion, register, scheme, sequence, sex, shift, valid	30 word families
Sublist 4	approximate, attribute, civil, code, contrast, cycle, domestic, ethnic, grant, hypothesis, implement, implicate, impose, integrate, investigate, job, label, obvious, option, output, overall, parallel, parameter, phase, principal, prior, regime, status, subsequent, sum, summary, undertake	32 word families
Sublist 5	academy, amend, capacity, clause, consult, discrete, draft, entity,	32

	evolve, external, fundamental, generate, liberal, licence, logic, margin, network, notion, objective, orient, perspective, precise, prime, psychology, ratio, reject, revenue, style, substitute, transit, welfare, whereas	word families
Sublist 6	abstract, acknowledge, aggregate, allocate, author, bond, brief, cite, cooperate, discriminate, domain, estate, exceed, explicit, federal, fee, flexible, ignorant, incentive, incorporate, index, inhibit, initiate, input, instruct, interval, minimum, ministry, motive, overseas, precede, presume, rational, scope, subsidy, **tape**, trace, underlie, utilize	39 word families
Sublist 7	channel, comprehensive, comprise, confirm, contrary, convert, couple, decade, differentiate, dispose, dynamic, eliminate, empirical, extract, hierarchy, ideology, infer, innovate, intervene, isolate, mode, paradigm, prohibit, reverse, simulate, somewhat, submit, successor, survive, thesis, ultimate, unique, visible	33 word families
Sublist 8	accompany, ambiguous, append, arbitrary, bias, chart, clarify, commodity, complement, conform, contemporary, contradict, crucial, currency, denote, deviate, displace, exploit, fluctuate, guideline, implicit, induce, infrastructure, inspect, intense, manipulate, minimize, nuclear, offset, paragraph, plus, practitioner, prospect, random, reinforce, restore, revise, tense, terminate, thereby, **uniform**, virtual, widespread	43 word families
Sublist 9	accommodate, analogy, behalf, bulk, cease, coherent, coincide, commence, compatible, concurrent, controversy, converse, devote, diminish, distort, duration, erode, ethic, format, found, inherent, integral, intermediate, manual, mediate, **medium**, military, minimal, mutual, norm, overlap, passive, preliminary, protocol, qualitative, relax, restrain, rigid, route, subordinate, suspend, **team**, temporary, trigger, unify, vision	46 word families
Sublist 10	adjacent, albeit, collapse, colleague, compile, conceive, encounter, forthcoming, incline, integrity, intrinsic, invoke, levy, likewise, nonetheless, notwithstanding, odd, ongoing, persist, so-called, straightforward, whereby	22 word families

3. Complementary Word List for textbook series C (255 word families)

Sublist 1	assess, authority, constitute, contract, data, derive, export, formula, legislate, method, period, policy, section, sector, source	15 word families
Sublist 2	administration, commission, community, **compute**, credit, equate,	16

	evaluate, **final**, injure, invest, journal, maintain, purchase, restrict, select, transfer	word families
Sublist 3	alternative, compensate, considerable, coordinate, corporate, correspond, deduce, framework, fund, imply, interact, minor, negate, outcome, partner, philosophy, proportion, register, remove, scheme, sequence, sex, technical, valid, volume	25 word families
Sublist 4	attitude, attribute, confer, contrast, domestic, error, grant, hypothesis, implement, implicate, impose, integrate, internal, investigate, job, label, option, output, overall, parallel, parameter, principal, prior, regime, resolve, retain, statistic, subsequent, summary, undertake	30 word families
Sublist 5	amend, capacity, clause, compound, contact, discrete, enforce, entity, equivalent, evolve, expose, licence, logic, medical, mental, modify, monitor, notion, orient, perspective, prime, ratio, reject, revenue, style, substitute, transit, welfare	28 word families
Sublist 6	acknowledge, aggregate, brief, cite, cooperate, discriminate, domain, edit, enhance, explicit, federal, fee, incentive, index, inhibit, initiate, input, minimum, ministry, neutral, overseas, presume, rational, scope, subsidy, **tape**, underlie, utilise	28 word families
Sublist 7	adapt, advocate, comprise, differentiate, dispose, eliminate, empirical, extract, file, hierarchy, ideology, infer, insert, intervene, mode, paradigm, prohibit, publication, somewhat, thesis, topic, transmit	22 word families
Sublist 8	abandon, ambiguous, append, arbitrary, bias, commodity, complement, conform, contradict, currency, denote, deviate, exploit, fluctuate, guideline, implicit, induce, inevitable, infrastructure, inspect, manipulate, minimize, nuclear, offset, plus, practitioner, predominant, random, reinforce, restore, revise, schedule, tense, terminate, thereby, **uniform**, vehicle, via	38 word families
Sublist 9	accommodate, analogy, anticipate, behalf, bulk, cease, coherent, concurrent, confine, diminish, distort, erode, format, insight, integral, intermediate, manual, mediate, minimal, norm, overlap, preliminary, protocol, qualitative, relax, restrain, scenario, sphere, subordinate, supplement, suspend, **team**, temporary, trigger, unify, violate	36 word families
Sublist 10	adjacent, albeit, collapse, compile, conceive, forthcoming, incline, integrity, intrinsic, invoke, levy, nonetheless, notwithstanding, odd, ongoing, straightforward, whereby	17 word families

4. Complementary Word List for textbook series D (281 word families)

Sublist 1	assess, constitute, context, contract, economy, formula, labour, legislate, principle, section, sector, structure, theory	13 word families
Sublist 2	administration, chapter, commission, **compute**, credit, element, equate, **final**, institute, obtain, participate, previous, purchase, regulate, relevant, text, transfer	17 word families
Sublist 3	circumstance, component, consent, constrain, convene, coordinate, core, deduce, demonstrate, document, exclude, framework, illustrate, immigrate, initial, layer, **link**, maximize, minor, partner, philosophy, proportion, register, reply, scheme, sequence, sex, specify, sufficient, technical, technique, valid	32 word families
Sublist 4	adequate, annual, approximate, civil, code, confer, dimension, domestic, error, hence, hypothesis, implement, impose, internal, job, occupy, output, parallel, parameter, phrase, predict, principal, prior, regime, retain, statistic, subsequent, summary, undertake	29 word families
Sublist 5	adjust, amend, clause, compound, consult, contact, decline, discrete, draft, enforce, entity, expand, external, fundamental, liberal, network, notion, objective, orient, precise, prime, ratio, reject, revenue, style, transit, whereas	27 word families
Sublist 6	abstract, accurate, acknowledge, aggregate, allocate, author, brief, discriminate, domain, estate, exceed, expert, federal, incorporate, index, inhibit, initiate, input, instruct, intelligent, interval, neutral, nevertheless, precede, presume, scope, subsidy, **tape**, underlie, utilize	30 word families
Sublist 7	advocate, aid, channel, comprehensive, confirm, contrary, convert, couple, differentiate, dispose, dynamic, empirical, extract, finite, **grade**, guarantee, hierarchy, ideology, infer, insert, isolate, mode, paradigm, priority, prohibit, quote, reverse, simulate, sole, successor, thesis, transmit, ultimate	33 word families
Sublist 8	accumulate, ambiguous, append, arbitrary, bias, clarify, complement, conform, contradict, crucial, denote, deviate, displace, exhibit, fluctuate, guideline, highlight, implicit, infrastructure, inspect, manipulate, nuclear, offset, paragraph, plus, practitioner, predominant, prospect, radical, random, reinforce, restore, revise, thereby, **uniform**, via, visual	37 word families
Sublist 9	accommodate, analogy, anticipate, attain, bulk, cease, coherent, commence, compatible, concurrent, converse, distort, duration,	40 word

	ethic, format, inherent, integral, intermediate, manual, mediate, mutual, overlap, passive, portion, preliminary, protocol, qualitative, refine, restrain, rigid, route, sphere, subordinate, supplement, suspend, **team**, temporary, trigger, unify, violate	families
Sublist 10	adjacent, albeit, collapse, compile, conceive, enormous, forthcoming, integrity, intrinsic, invoke, levy, likewise, nonetheless, notwithstanding, ongoing, panel, persist, pose, reluctance, so-called, straightforward, undergo, whereby	23 word families

5. Complementary Word List for textbook series E (264 word families)

Sublist 1	area, constitute, context, data, define, export, formula, function, income, individual, interpret, labour, legal, occur, period, proceed, process, section, sector	19 word families
Sublist 2	administration, chapter, commission, **compute**, conclude, credit, equate, evaluate, **final**, injuries, invest, item, primary, relevant, seek, survey, text, transfer	18 word families
Sublist 3	compensate, consent, constrain, convene, coordinate, core, corporate, criteria, deduce, document, ensure, framework, instance, interact, justify, layer, **link**, maximize, outcome, partner, register, remove, scheme, sequence, shift, specify, task, technical, technique, valid, volume	31 word families
Sublist 4	approximate, attribute, code, confer, contrast, cycle, error, ethnic, grant, hypothesis, impose, integrate, internal, job, mechanism, output, overall, parallel, parameter, prior, regime, retain, subsequent, sum, summary	25 word families
Sublist 5	amend, clause, compound, consult, discrete, draft, enable, entity, equivalent, external, fundamental, liberal, licence, margin, medical, modify, monitor, network, ratio, reject, revenue, style, target, transit, trend, version, welfare	27 word families
Sublist 6	abstract, aggregate, allocate, author, brief, cite, domain, estate, explicit, federal, fee, flexible, incorporate, index, inhibit, initiate, intelligent, interval, migrate, minimum, neutral, presume, scope, subsidy, **tape**, underlie	26 word families
Sublist 7	comprehensive, comprise, confirm, couple, differentiate, dispose, eliminate, empirical, extract, file, **grade**, hierarchy, identical, ideology, intervene, media, mode, paradigm, publication, reverse, simulate, somewhat, successor, thesis, transmit	25 word families
Sublist 8	append, arbitrary, bias, chart, clarify, complement, conform,	33

	contradict, currency, denote, deviate, displace, exploit, fluctuate, guideline, implicit, induce, infrastructure, intense, manipulate, minimize, offset, paragraph, practitioner, predominant, radical, random, reinforce, schedule, terminate, **uniform**, vehicle, widespread	word families
Sublist 9	analogy, assure, behalf, coherent, commence, compatible, concurrent, controversy, converse, devote, distort, duration, erode, ethic, format, inherent, integral, intermediate, manual, mediate, **medium**, minimal, mutual, norm, overlap, portion, preliminary, protocol, qualitative, refine, restrain, revolution, rigid, scenario, sphere, subordinate, suspend, **team**, temporary, trigger, unify, vision	42 word families
Sublist 10	adjacent, albeit, assemble, colleague, compile, enormous, forthcoming, incline, integrity, intrinsic, invoke, levy, notwithstanding, ongoing, persist, so-called, straightforward, whereby	18 word families

APPENDIX E

The Academic Words from the AWL that were selected in Level 1-6 of the CEEC Six-level Word List (Types)

1. The Academic Words from the AWL that were selected in Level 1 of the CEEC Six-level Word List (types)

Sublist 1	area	1 type
Sublist 2	final	1 type
Sublist 4	job	1 type
Sublist 7	adult	1 type
Sublist 8	chart	1 type
Total		5 types

2. The Academic Words from the AWL that were selected in Level 2 of the CEEC Six-level Word List (types)

Sublist 1	create, data, environment, function, income, indicate, legal, method, occur, period, policy, principle, require, role, section, similar, source	17 types
Sublist 2	assistant, computer, culture, design, element, focus, item, maintain, positive, range, region, select, selection, tradition, traditional	15 types
Sublist 3	instance, link, locate, negative, partner, task	6 types
Sublist 4	debate, error, goal, principal, project, stress	6 types
Sublist 5	conflict, contact, energy, reject, symbol, target, transit	7 types
Sublist 6	brief, display, expert, fee, ignore, overseas, tape	7 types
Sublist 7	aid, chemical, classic, confirm, couple, deny, grade, survive, topic	9 types
Sublist 8	detect, drama, plus, uniform	4 types
Sublist 9	military, team	2 types
Sublist 10	pose	1 type
Total		74 types

3. The Academic Words from the AWL that were selected in Level 3 of the CEEC Six-level Word List (types)

Sublist 1	approach, available, benefit, contract, creative, creator, define, definition, environmental, export, factor, identity, individual, major, majority, process, respond, response, significant, similarity, specific, structure, theory, vary	24 types
Sublist 2	achieve, affect, assist, chapter, complex, conclude, conclusion, credit, cultural, designer, feature, injure, injury, journal, normal, participate, previous, primary, regional, resource, restrict, security, seek, strategy, survey, text	26 types
Sublist 3	considerable, constant, emphasize, fund, minor, minority, react, reaction, reliable, rely, remove, sex, sexual, sufficient, technical, technique, technology, volume	18 types
Sublist 4	apparent, attitude, civil, communicate, cycle, domestic, internal, investigate, label, obvious, promote, sum, summary	13 types
Sublist 5	aware, challenge, enable, energetic, image, liberal, medical, mental, network, pursue, stable, style, trend	13 types
Sublist 6	accurate, author, capable, edit, edition, editor, ignorance, instruction, recover, reveal, trace, transport	12 types
Sublist 7	channel, classical, decade, file, global, media, quote, release, somewhat, survival, survivor, visible	12 types
Sublist 8	appreciate, automatic, dramatic, exhibition, inspect, inspector, schedule, vehicle	8 types
Sublist 9	mature, medium, portion, relax, temporary, vision	6 types
Sublist 10	odd	1 type
Total		133 types

4. The Academic Words from the AWL that were selected in Level 4 of the CEEC Six-level Word List (types)

Sublist 1	analysis, analyze, assume, authority, concept, consist, consistent, constitute, constitution, context, creation, creativity, distribute, distribution, economic, economical, economics, economist, economy, establish, estimate, evidence, evident, finance, financial, formula, functional, identification, identify, indication, interpret, involve, labor, percent, percentage, procedure, proceed, research, researcher, significance	40 types
Sublist 2	acquire, acquired, appropriate, aspect, assistance, community, consequence, consequent, construct, construction, constructive, consume, consumer, distinct, evaluate, evaluation, impact, invest, obtain, participation, regulate, regulation, restriction, site, transfer	25 types
Sublist 3	circumstance, comment, contribute, contribution, convention, conventional, correspond, demonstrate, demonstration, dominant, dominate, emphasis, illustrate, illustration, immigrant, immigrate, immigration, imply, initial, interact, interaction, location, maximum, outcome, partnership, philosopher, philosophical, philosophy, physical, publish, publisher, register, registration, shift, technological	35 types
Sublist 4	access, adequate, annual, code, commit, communication, concentrate, concentration, conference, contrast, despite, emerge, investigation, occupation, occupy, predict, professional, promotion, resolution, resolve, retain, status, summarize	23 types
Sublist 5	academic, adjust, capacity, consult, consultant, draft, enforce, expand, expansion, expose, exposure, facility, fundamental, generation, license, logic, logical, margin, monitor, objective, precise, prime, psychological, psychologist, psychology, pursuit, rejection, welfare	28 types
Sublist 6	abstract, accuracy, assign, attach, bond, cooperate, cooperation, cooperative, flexible, furthermore, ignorant, incident, input, instruct, instructor, intelligence, intelligent, lecture, lecturer, minimum, ministry, motivate, motivation, nevertheless, recovery, transform, transportation	27 types
Sublist 7	adapt, aids, contrary, definite, dynamic, eliminate, equip, foundation, globe, guarantee, identical, insert, isolate, isolation, phenomenon, publication, quotation, unique, voluntary, volunteer	20 types

Sublist 8	abandon, accompany, appreciation, automatic, clarify, detective, eventual, exhibit, inspection, intense, intensify, intensity, intensive, nuclear, paragraph, restore, revise, revision, tense, tension, theme, visual	22 types
Sublist 9	assurance, assure, cease, confine, converse, device, devote, founder, intermediate, manual, maturity, mutual, passive, relaxation, revolution, revolutionary, route, violate, violation	19 types
Sublist 10	assemble, assembly, collapse, convince, depress, depression, encounter, enormous, nonetheless, panel, reluctant	11 types
Total		250 types

5. The Academic Words from the AWL that were selected in Level 5 of Six-level Word List (types)

Sublist 1	beneficial, constitutional, interpretation, issue, legislation, occurrence, structural	7 types
Sublist 2	category, commission, compute, conduct, distinction, distinctive, equate, institute, maintenance, participant, perceive, potential, purchase, reside, residence, resident, secure	17 types
Sublist 3	commentator, consent, corporation, correspondence, document, ensure, exclude, framework, justify, layer, proportion, scheme	12 types
Sublist 4	code, grant, hence, impose, output, overall, parallel, prior, series, statistic, statistical	11 types
Sublist 5	academy, alter, alternate, clause, compound, external, marginal, modify, notion, orient, ratio, stylish, substitute, sustain, whereas	15 types
Sublist 6	acknowledge, cite, discriminate, estate, exceed, federal, gender, index, initiate, intelligence, migrant, motive	12 types
Sublist 7	adulthood, convert, denial, dispose, infinite, mode, priority, reverse, sole, submit	10 types
Sublist 8	commodity, contemporary, currency, guideline, induce, prospect, terminal, via, widespread	9 types
Sublist 9	behalf, bulk, devotion, duration, ethic, format, mediate, minimal, restrain, rigid, suspend	11 types
Sublist 10	colleague, conceive, nonetheless, odds, persist, straightforward	6 types
Total		110 types

6. The Academic Words from the AWL that were selected in Level 6 of the CEEC Six-level Word List (types)

Sublist 1	analyst, analytical, assess, assumption, conception, constituent, contractor, derive, formulate, legislative, legislator, legislature, sector, signify, theoretical, underestimate, variable, variation	18 types
Sublist 2	abnormal, acquisition, administrate, administration, administrative, administrator, assistant, complexity, consumption, equation, institution, perception, relevant, residential, selective, strategic	16 types
Sublist 3	alternative, commentary, compensate, compensation, component, consensus, coordinate, core, corporate, criterion, emphatic, exclusive, reliance, removal, sequence, specify, valid, validity	18 types
Sublist 4	accessible, approximate, commitment, communicative, confer, dimension, ethnic, implement, implication, imposing, integrate, integration, investigator, mechanism, option, optional, phase, prediction, projection, regime, subsequent, undertake	22 types
Sublist 5	consultation, decline, equivalent, evolution, evolve, facilitate, generate, liberate, liberation, mentality, modified, perspective, precision, revenue, stability, stabilize, substitution, symbolic, symbolize, transit, transition, version	22 types
Sublist 6	abstraction, allocate, capability, discrimination, display, diverse, diversify, diversity, editorial, enhance, expertise, explicit, federation, incentive, initiative, intelligence, intelligence, interval, migrate, migration, neutral, precede, precedent, presume, rational, revelation, scope, transformation, utility, utilize	30 types
Sublist 7	adaptation, advocate, comprehensive, comprise, differentiate, disposable, disposal, extract, finite, infer, inference, innovation, innovative, intervene, intervention, prohibit, prohibition, succession, successive, successor, transmission, transmit, ultimate	23 types
Sublist 8	accumulate, accumulation, ambiguity, ambiguous, bias, clarity, complement, conform, contradict, contradiction, crucial, displace, exploit, highlight, implicit, inevitable, manipulate, minimize, prospective, radical, random, reinforce, restoration, terminate, thereby, virtual, visualize	27 types
Sublist 9	accommodate, accommodation, analogy, anticipate, anticipation, attain, bulky, coherent, coincide, coincidence, commence,	31 types

	compatible, controversial, controversy, diminish, distort, erode, ethical, inherent, insight, norm, overlap, preliminary, refine, restraint, sphere, subordinate, supplement, suspension, trigger, unify	
Sublist 10	compile, forthcoming, incline, integrity, likewise, persistence, persistent, undergo	8 types
Total		215 types

APPENDIX F

The Academic Words from the AWL that were selected in Level 1-6 of the CEEC Six-level Word List (Word Families)

1. The Academic Words from the AWL that were selected in Level 1 of the CEEC Six-level Word List (word families)

Sublist 1	area	1 word family
Sublist 2	final	1 word family
Sublist 4	job	1 word family
Sublist 7	adult	1 word family
Sublist 8	chart	1 word family
Total		5 word families

2. The Academic Words from the AWL that were selected in Level 2 of the CEEC Six-level Word List (word families)

Sublist 1	create, data, environment, function, income, indicate, legal, method, occur, period, policy, principle, require, role, section, similar, source	17 word families
Sublist 2	assist, compute, culture, design, element, focus, item, maintain, positive, range, region, select, tradition	13word families
Sublist 3	instance, link, locate, negate, partner, task	6 word families
Sublist 4	debate, error, goal, principal, project, stress	6 word families
Sublist 5	conflict, contact, energy, reject, symbol, target, transit	7 word families
Sublist 6	brief, display, expert, fee, ignorant, overseas, tape	7 word families
Sublist 7	aid, chemical, classic, confirm, couple, deny, grade, survive, topic	9 word families
Sublist 8	detect, drama, plus, uniform	4 word families
Sublist 9	military, team	2 word families
Sublist 10	pose	1 word family
Total		72 word families

3. The Academic Words from the AWL that were selected in Level 3 of the CEEC Six-level Word List (word families)

Sublist 1	approach, available, benefit, contract, create, define, environment, export, factor, identify, individual, major, process, respond, significant, similar, specific, structure, theory, vary	20 word families
Sublist 2	achieve, affect, assist, chapter, complex, conclude, credit, culture, design, feature, injure, journal, normal, participate, previous, primary, region, resource, restrict, secure, seek, strategy, survey, text	24 word families
Sublist 3	considerable, constant, emphasis, fund, minor, react, rely, remove, sex, sufficient, technical, technique, technology, volume	14 word families
Sublist 4	apparent, attitude, civil, communicate, cycle, domestic, internal, investigate, label, obvious, promote, sum, summary	13 word families
Sublist 5	aware, challenge, enable, energy, image, liberal, medical, mental, network, pursue, stable, style, trend	13 word families
Sublist 6	accurate, author, capable, edit, ignorant, instruct, recover, reveal, trace, transport	10 word families
Sublist 7	channel, classic, decade, file, globe, media, quote, release, somewhat, survive, visible	11 word families
Sublist 8	appreciate, automate, drama, exhibit, inspect, schedule, vehicle	7 word families
Sublist 9	mature, medium, portion, relax, temporary, vision	6word families
Sublist 10	odd	1 word family
Total		119 word families

4. The Academic Words from the AWL that were selected in Level 4 of the CEEC Six-level Word List (word families)

Sublist 1	analyse, assume, authority, concept, consist, constitute, context, create, distribute, economy, establish, estimate, evident, finance, formula, function, identify, indicate, interpret, involve, labour, percent, proceed, research, significant	25 word families
Sublist 2	acquire, appropriate, aspect, assist, community, consequent,	18 word

	construct, consume, distinct, evaluate, impact, invest, obtain, participate, regulate, restrict, site, transfer	families
Sublist 3	circumstance, comment, contribute, convene, correspond, demonstrate, dominate, emphasis, illustrate, immigrate, imply, initial, interact, locate, maximize, outcome, partner, philosophy, physical, publish, register, shift, technology	23 word families
Sublist 4	access, adequate, annual, code, commit, communicate, concentrate, confer, contrast, despite, emerge, investigate, occupy, predict, professional, promote, resolve, retain, status, summary	20 word families
Sublist 5	academy, adjust, capacity, consult, draft, enforce, expand, expose, facilitate, fundamental, generation, licence, logic, margin, monitor, objective, precise, prime, psychology, pursue, reject, welfare	22 word families
Sublist 6	abstract, accurate, assign, attach, bond, cooperate, flexible, furthermore, ignorant, incidence, input, instruct, intelligence, lecture, minimum, ministry, motivate, nevertheless, recover, transform, transport	21 word families
Sublist 7	adapt, aid, contrary, definite, dynamic, eliminate, equip, foundation, globe, guarantee, identical, insert, isolate, phenomenon, publication, quote, unique, voluntary	18 word families
Sublist 8	abandon, accompany, appreciate, automate, clarify, detect, eventual, exhibit, inspect, intense, nuclear, paragraph, restore, revise, tense, theme, visual	17 word families
Sublist 9	assure, cease, confine, converse, device, devote, founded, intermediate, manual, mature, mutual, passive, relax, revolution, route, violate	16 word families
Sublist 10	assemble, collapse, convince, depress, encounter, enormous, nonetheless, panel, reluctance	9 word families
Total		189 word families

5. The Academic Words from the AWL that were selected in Level 5 of the CEEC Six-level Word List (word families)

Sublist 1	benefit, constitute, interpret, issue, legislate, occur, structure	7 word families
Sublist 2	category, commission, compute, conduct, distinct, equate, institute, maintain, participate, perceive, potential, purchase, reside, secure	14 word families

Sublist 3	comment, consent, corporate, correspond, document, ensure, exclude, framework, justify, layer, proportion, scheme	12 word families
Sublist 4	code, grant, hence, impose, output, overall, parallel, prior, series, statistic	10 word families
Sublist 5	academy, alter, clause, compound, external, margin, modify, notion, orient, ratio, style, substitute, sustain, whereas	14 word families
Sublist 6	acknowledge, cite, discriminate, estate, exceed, federal, gender, index, initiate, intelligence, migrate, motive	12 word families
Sublist 7	adult, convert, deny, dispose, finite, mode, priority, reverse, sole, submit	10 word families
Sublist 8	commodity, contemporary, currency, guideline, induce, prospect, terminate, via, widespread	9 word families
Sublist 9	behalf, bulk, devote, duration, ethic, format, mediate, minimal, restrain, rigid, suspend	11 word families
Sublist 10	colleague, conceive, nonetheless, odd, persist, straightforward	6 word families
Total		105 word families

6. The Academic Words from the AWL that were selected in Level 6 of the CEEC Six-level Word List (word families)

Sublist 1	analyse, assess, assume, concept, constitute, contract, derive, estimate, formula, legislate, sector, significant, theory, vary	14 word families
Sublist 2	acquire, administer, assist, complex, consume, equate, institute, normal, perceive, relevant, reside, select, strategy	13 word families
Sublist 3	alternative, comment, compensate, component, consent, coordinate, core, corporate, criteria, emphasis, exclude, rely, remove, sequence, specify, valid	16 word families
Sublist 4	access, approximate, commit, communicate, confer, dimension, ethnic, implement, implicate, impose, integrate, investigate, mechanism, option, phase, predict, project, regime, subsequent, undertake	20 word families
Sublist 5	consult, decline, equivalent, evolve, facilitate, generate, liberal, mental, modify, perspective, precise, revenue, stable, substitute, symbol, transit, version	17 word families
Sublist 6	abstract, allocate, capable, discriminate, display, diverse, edit, enhance, expert, explicit, federal, incentive, initiate, intelligence, interval, migrate, neutral, precede, presume, rational, reveal, scope, transform, utilise	24 word families

Sublist 7	adapt, advocate, comprehensive, comprise, differentiate, dispose, extract, finite, infer, innovate, intervene, prohibit, successor, transmit, ultimate	15 word families
Sublist 8	accumulate, ambiguous, bias, clarify, complement, conform, contradict, crucial, displace, exploit, highlight, implicit, inevitable, manipulate, minimize, prospect, radical, random, reinforce, restore, terminate, thereby, virtual, visual	24 word families
Sublist 9	accommodate, analogy, anticipate, attain, bulk, coherent, coincide, commence, compatible, controversy, diminish, distort, erode, ethic, inherent, insight, norm, overlap, preliminary, refine, restrain, sphere, subordinate, supplement, suspend, trigger, unify	27 word families
Sublist 10	compile, forthcoming, incline, integrity, likewise, persist, undergo	7 word families
Total		177 word families

APPENDIX G

Shared Lexical Items between the 1,200-word List and Textbook Series

1. Shared word items between textbook series B & the 1,200-word List: 173 types

Frequency Scheme	Shared word items	Word types
GSL K1	act, action, actor, actress, age, agree, art, attack, base, bear, blow, build, can, catch, choose, circle, common, cover, decide, different, draw, experience, face, fail, fall, farm, fast, favorite, feed, feel, fight, fine, free, ground, grow, high, knowledge, last, laugh, lawyer, light, long, los, lovely, mean, mine, national, neighbor, newspaper, nobody, note, notice, paint, party, past, place, plant, play, please, pleasure, post, pound, power, present, quarter, race, raise, rock, roll, roller, room, rule, science, second, secretary, set, sign, simple, sleep, somebody, sound, spring, square, stand, store, successful, temple, total, train, type, visit, voice, wave, wear, well, wind, wise, work	98
GSL K2	bake, boil, brush, check, cheer, chicken, clothes, coat, comfortable, cool, corner, drum, education, envelope, fan, fork, gram, gray, insect, invite, kilogram, lot, mad, medicine, mud, nurse, pick, pin, plate, pocket, polite, pool, prize, rat, sentence, sore, straight, swing, terrible, tie, treat, trick, weak, weather	44
AWL	grade, link, physical	3
Off-list	bat, bench, blanket, candle, celebrate, centimeter, clap, crazy, dentist, fox, giant, grape, headache, honey, hop, lantern, mask, ox, peach, photo, pond, pumpkin, robot, scared, senior, shy, traffic, wallet	28

2. Shared word items between textbook series D & the 1,200-word List: 139 types

	Shared word items	Word types
GSL K1	across, act, action, agree, appear, arrive, attack, base, castle, center, choose, class, clear, course, deal, fail, far, feed, fisherman, free, gate, group, hang, heat, interest, land, last, lawyer, lie, light, marker, market, nature, newspaper, note, page, plant, please, pleasure, power, present, quarter, raise, reporter, rest, right, rise, roll, sail, salt, save, science, season, set, shake, shine, sight, sign, soldier, space, still, store, subject, successful, throw, total, type, wave, yet	69
GSL K2	ahead, bake, bean, belt, bite, boil, cage, comfortable, corner, correct, drawer, education, engineer, fever, hunt, insect, kilogram, lucky,	45

	medicine, package, pin, pipe, plate, pocket, police, pot, practice, pray, prize, proud, rope, row, screen, seed, sharp, shout, slide, stamp, straight, terrible, thick, tie, treat, trick, weak	
AWL	medium, physical	2
Off-list	bakery, balcony, beach, blanket, bug, centimeter, dentist, dragon, frog, giant, guy, gym, interview, mask, photo, planet, princess, skate, surf, teenager, thirsty, toast, whale	23

3. Shared word items between textbook series A & the 1,200-word List: 137 types

Frequency Scheme	Shared word items	Word types
GSL K1	able, act, action, appear, belong, body, bridge, can, course, cover, deal, decide, different, difficult, drop, enter, experience, face, fail, feel, fight, fine, follow, free, hand, head, help, high, kind, last, lead, lie, life, living, lose, mark, marker, mean, middle, name, national, nature, need, neighbor, north, notice, once, order, owner, part, past, place, plant, please, point, possible, post, power, prepare, present, public, race, raise, rise, roller, sail, salt, say, science, share, short, sign, simple, spring, square, stay, still, store, study, subject, test, total, train, trouble, type, understand, voice, watch, water, welcome, will, wind, wise, work	94
GSL K2	bake, birthday, bite, block, bow, club, coat, collect, cool, education, fat, foot, fry, habit, hit, key, lonely, lucky, noise, pack, paste, pen, pot, practice, pray, proud, repeat, row, sharp, slow, smoke, straw, wake, warm, weather	35
AWL	link, physical	2
Off-list	centimeter, comic, dodge, elementary, surf, thirsty	6

4. Shared word items between textbook series E & the 1,200-word List: 68 types

	Shared word items	Word types
GSL K1	across, act, action, attack, bear, choose, fail, gate, lead, march, middle, nature, note, pleasure, power, present, raise, rise, roll, science, shake, shine, sight, sign, soldier, star, subject, temple, train, type, wave, wise	32
GSL K2	engineer, envelope, fry, hide, hunt, insect, invite, plate, prize, sharp, shout, sore, straight, swing, tail, terrible, thick, throat, trick, yard	20
AWL	physical	1
Off-list	balcony, chess, dumpling, giant, glue, guitar, guy, lantern, mask, planet, prince, princess, pumpkin, senior, whale	15

5. Shared word items between textbook series C & the 1,200-word List: 63 types

	Shared word items	Word types
GSL K1	appear, blow, circle, close, color, count, decide, die, dress, fix, free, house, land, lead, light, lose, mean, mine, national, nature, neighbor, note, part, play, please, pleasure, popular, post, power, prepare, present, rock, rule, share, sound, spring, square, still, story, subject, successful, temple, touch, wind	44
GSL K2	angry, bow, cheer, collect, education, excellent, fat, fever, lot, pack, plate, spell, tie, treat	14
AWL	grade, link, medium, physical	4
Off-list	magic	1