



Lexical Collocations and their Relation to the Online Writing of Taiwanese College English Majors and Non-English Majors

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Abstract

The present study investigates the use of English lexical collocations and their relation to the online writing of Taiwanese college English majors and non-English majors. Data for the study were collected from 41 English majors and 21 non-English majors at a national university of science and technology in southern Taiwan. Each student was asked to take a 45-minute online English writing test, administered by the web-based writing program, Criterion Version 7.1 (Educational Testing Service) to examine the subjects' use of lexical collocations (i.e. frequency and variety). The test was also used to measure writing scores of the two student groups. Test results were examined to answer two major questions for correlation (1) between the subjects' frequency of lexical collocations and their writing scores and (2) between the subjects' variety of lexical collocations and their writing scores. The study findings indicate that: (1) there seems to be a significant correlation between Taiwanese college EFL learners' frequency of lexical collocations and their online writing scores; and (2) there also seems to be a significant correlation between the subjects' variety of lexical collocations and their online writing scores. This present study further reports on a pattern of lexical collocation development observed among writers of different scores, ranging from the lowest to the highest.

1 Introduction

1.1 Status of English collocations

It has been fourteen years since the appearance of Lewis' (1993) book, *The Lexical Approach*, directing language teachers' attention to the systematic re-examination of the importance of collocations in EFL/ESL education. Along with Lewis, scholars of second language vocabulary acquisition (Bahns & Eldaw, 1993; Howarth, 1998), EFL/ESL materials and curriculum design (Coady & Huckin, 1997; McCarthy, 2004a, 2004b; Richards & Rogers, 2001), pedagogy (Ellis, 1996, 2001; Nation, 2001), and lexicography (Benson, Benson & Ilson, 1986, 1997), have also advanced arguments advocating the necessity of studying English collocations.

First brought up by Palmer (1933) and later introduced to the field of theoretical linguistics by Firth (1957), the most commonly shared definition of collocations is: the tendency of one word to co-occur with one or more other words in a particular domain (Aghbar, 1990; Al-Zahrani, 1998; Gitsaki, 1999; Nation, 2001; Nesselhauf, 2003). In his monograph *Second Interim Report on English Collocations*, the father of collocation studies, linguist Palmer (1933) simply states, "Each [collocation] ... must or should be learnt, or is best or most conveniently learnt as an integral whole or independent entity, rather than by the process of piecing together their component parts" (Palmer, 1933, p. 4). The notion, collocation, however, is far from thoroughly described or under-

stood as to whether it should be approached from a semantic, syntactic, or idiomatic perspective (Hsu, 2005).

It is well-recognized that collocations are a crucial part of language use and it is collocational proficiency that differentiates native and non-native speakers (Ellis, 2001; Fontenelle, 1994; Herbst, 1996; Koya, 2006; Lennon, 1996; Moon, 1992; Nation, 2001; Wouden, 1997) but there is not much that we can do as classroom teachers. Commercial coursebook writers, echoing Lewis' ideas (Lewis, 1993, 1997, 2000) have introduced a wide collection of new pedagogical materials, all of which 'promote' the teaching and learning of collocations (e.g., Bowen, 1997; Goodale, 1993; Huizenga & Huizenga, 2005; McCarthy, McCarten & Sandiford, 2005; Paul, 2003a, 2003b; Powell, 1996a, 1996b; Watson-Delestree & Hill, 1998). When turning for help from researchers who have conducted empirical studies, EFL/ESL teachers and practitioners often found these reports on English collocations too diverse, yielding findings of limited practical value. For instance, many pioneer studies merely investigated EFL/ESL learners' knowledge of collocations (Bahns & Eldaw, 1993; Biskup, 1992; Farghal & Obiedat, 1995; Keshavarz & Salimi, 2007; Zughoul & Abdul-Fattah, 2003) or analyzed how EFL/ESL learners committed errors¹ of collocation (Huang, 2001; Jeng, 2006; Liu, 1999a, 1999b; Lombard, 1997; Wu, 2005). Only recently have we seen studies targeting the possible connection between collocations and general language skills (Al-Zahrani, 1998; Bonk, 2000; Sung, 2003).

Nevertheless, with new technology becoming available, the field of EFL/ESL is seeing many revolutionary changes. For many scholars, teachers, and researchers, computer-assisted language learning has become an issue in the core discussion. Our second language learners are now being both taught and tested using online programmed materials. A decade ago when we were still in a paper-and-pencil age, the very first empirical study in the world on collocations, conducted by Zhang (1993), fell into the area of EFL/ESL writing. Subsequently, researchers went further, investigating the relation between collocations and general English proficiency (Al-Zahrani, 1998; Bonk, 2000) and between collocations and speaking (Sung, 2003). It is time to start looking into whether the acquisition of collocations may or may not affect each of EFL/ESL learners' language skill areas, including writing, speaking, reading, and listening in the new era of computer-mediated communication (i.e. CMC).

1.2 Significance of the current study

The current study specifically investigates the use of English lexical collocations² and their relation to the online writing of Taiwanese college students (i.e. English and non-English majors). The underlying assumptions behind this study design are three-fold. First, by focusing on writing, this study, like Zhang's study (1993), intends to initiate a series of empirical studies that will examine the connections between collocations and the other language skills in a CMC generation. In addition, the development of computers, the Internet, and many e-learning materials have shaped EFL/ESL education dramatically. Learning to use English 'computer-mediated appropriately' is becoming important. Furthermore, the pressure on test takers to conduct timed, computer- or Internet-based 'speed writing' is increasing. New English proficiency exams, including TOEFL-iBT and TOEIC³, are now asking students to take an instant writing test online.

It is therefore the goal of this study (which is shared by many EFL/ESL writing teachers) to gain a better understanding of the role collocations play in our student writers' online writing, which is being judged by the latest web-based writing programs⁴. This study intends to investigate if there is a correlation between Taiwanese EFL college students' use of lexical collocations (i.e. frequency and variety) and their online writing scores as judged by a web-based writing program (in this case, Criterion 7.1, Educational Testing Service; henceforth, ETS). Test results are later examined to answer the two major questions for correlation (1) between the subjects' frequency of lexical collocations and their writing scores and (2) between the subjects' variety of lexical collocations and their writing scores.

2 Literature review

2.1 Historical background of collocation studies

Discussions on the importance of collocations began as early as in the 1980s (Celce-Murcia, 2001). However, the initial reports were mostly made by teachers-in-practice who occasionally suggested that it was urgent to implement the teaching of collocations in EFL/ESL classrooms. For example, Brown (1974), Channell (1981), and Smith (1983) all asserted that vocabulary instruction ought to include collocations. They believed that collocations provided 'contexts' and 'chances for word associations,' both beneficial for learning new words. Starting from the 1990s, discussions on the essentiality of collocations came to the attention of second language studies and EFL/ESL education because of four main reasons. First of all, scholars of TESOL methodology constantly criticized the fact that the major foreign language teaching methods or approaches (e.g. Grammar Translation Method and Communicative Approach) downplay the role of vocabulary. We needed efficient ways to present vocabulary to learners of foreign languages (Hoey, 1991; Nation, 1990, 2001; Nation & Newton, 1997; Nattinger & DeCarrico, 1992; O'Dell, 1997; Schmitt, 2000; Zimmerman, 1997). Second, the British applied linguist, Lewis initiated his talks on implementing a collocation-based syllabus (1993, 1997) as well as the Lexical Approach (1993). In addition, the availability of online corpora, such as the British National Corpus and American National Corpus, allowed immediate access to a large collection of authentic written/spoken English examples. Lastly, the compiling of the *BBJ Combinatory Dictionary of English* (Benson et al., 1986)⁵ and *Oxford Collocations Dictionary for Learners of English* (Lea, 2002) provided EFL/ESL practitioners and learners with handy reference to English collocations.

2.2 Empirical studies on the relation between collocations and English fluency

Despite earlier calls for promoting the teaching of collocations, empirical studies on collocations did not start until Zhang's doctoral dissertation (1993). At the advice of Aghbar (personal communication, 2002), Indiana University of Pennsylvania, Indiana, Pennsylvania, USA, Zhang set off a trend in collocation studies in which the correlations between the EFL students' knowledge of collocations (i.e. measured by a fill-in-the-blank test), use of collocations (i.e. frequency of accurate produced collocations recorded in student English), and English writing fluency (i.e. determined by a paper-and-pencil written test)⁶ were examined. A similar research design was later modeled by Al-Zahrani (1998) and Sung (2003). A list of these studies is summarized in Table 1 for a clear comparison.

Researchers	Subjects	Instruments	Focuses
Zhang (1993)	1. 30 native English speakers 2. 30 non-natives at a university of U.S.A.	1. collocation test (fill-in-the-blank) 2. Paper-and-pencil TOEFL writing test	1. lexical collocations 2. grammatical collocations
Al-Zahrani (1998)	81 Saudi university students of English majors	1. collocation test (fill-in-the-blank) 2. writing test 3. TOEFL test	verb + noun lexical collocations
Sung (2003)	1. 24 native English speakers 2. 72 non-natives at a university of U.S.A.	1. collocation test (fill-in-the-blank) 2. one speaking test	lexical collocations

Table 1: Empirical studies on the relation between collocations and language fluency

In Zhang's case (1993), he tested 60 (i.e. 30 native and 30 non-native) speakers of English at Indiana University of Pennsylvania by using one blank-filling collocation test and one paper-and-

pencil TOEFL-like writing test. The collocation test measured the students' collocational knowledge while the writing task collected their use of collocations and writing fluency. In this study, Zhang found that (1) native writers performed significantly better than non-native writers on the collocation test and (2) native writers outperformed the non-native writers in terms of the use of accurate collocations in writing. Zhang concluded: "(1) collocational knowledge is a source of fluency in written communication among college freshmen; and (2) quality of collocations in terms of variety and accuracy is indicative of the quality of college freshmen writing" (p. v).

Following Zhang, Al-Zahrani (1998) studied the knowledge of English lexical collocations among four academic levels of 81 Saudi EFL students and the relationship between the knowledge of lexical collocations and the participants' general language proficiency. In the study, an English collocation test consisting of 50 fill-in-the-blank 'verb + noun' lexical collocations, a paper-and-pencil TOEFL-like writing test and an Institutional Version of paper-and-pencil TOEFL test were administered. Al-Zahrani's findings included: (1) a significant difference existed in his students' knowledge of lexical collocations among the different academic years. To be more specific, the knowledge of lexical collocations increased along with the subjects' academic years; (2) a strong correlation was found between the students' knowledge of collocations and their overall language proficiency as measured by the TOEFL test; and (3) the writing test was a slightly better predictor of the students' knowledge of lexical collocations than the TOEFL test because a significant correlation between the writing test and the students' knowledge of lexical collocations was found.

Al-Zahrani's study differed from Zhang's in that the use of collocations was overlooked; therefore, no report was made in Al-Zahrani's regarding his subjects' frequency of collocations which could have been observed in the writing test. Later, moving away from EFL learners' writing skill, Sung (2003) directed her focus to the possible connection between collocations and speaking fluency. She explored EFL students' knowledge and use of English lexical collocations in their relation to speaking fluency. In her experiment, 24 native and 72 non-native speakers took two tests: one collocation test and one speaking test. The collocation test assessed the subjects' knowledge of lexical collocations while the speaking test elicited the subjects' use of lexical collocations and measuring their speaking fluency. Her findings indicated that a significantly strong correlation existed between the EFL students' knowledge of lexical collocations and their speaking fluency. Sung further concluded: "... knowledge of lexical collocations is a more significant indicator of degree of speaking proficiency than other factors such as the use of lexical collocations or length of stay in the U.S." (p. v).

In summary, this series of correlation-oriented empirical studies stopped after only the initial exploration of the relations between EFL learners' collocational knowledge and use, and their writing skill (Zhang, 1993), speaking skill (Sung, 2003), and overall English skill (Al-Zahrani, 1998). Other individual language skills, such as listening, reading, or vocabulary, have not been examined.

3 Methodology

3.1 Research design

In this study, the data were collected using one instrument – Criterion (7.1 Version) web-based writing program. Three variables elicited from the same test were examined. The use of lexical collocations was first recorded based on the raw count of lexical collocations from the subjects' writing test. This raw quantity of lexical collocations was further broken down into two sub-groups: the tokens of lexical collocations (i.e. frequency) and the types of lexical collocations (i.e. variety). 'Token' accounted for all the acceptable or "solid lexical collocations" (Sung, 2003, p. 49) collected from the students' writing, while 'type' included every new lexical collocation without a repetition. The concept of differentiating frequency/token from variety/type is not new (Fox, 2003; Hunston, 2002; McEnery, Xiao & Tono, 2006; Stubbs, 2001); however, previous studies on collocation production have never made a clear distinction between the two. The current study was intended to implement this new research design, hoping to see results that are more convincing.

Lastly, the students' online writing was measured and reported by the automated essay grading (i.e. AEG; Cheng, 2006) system provided by Criterion. In this study, the three sets of variables (i.e. tokens of lexical collocations, types of lexical collocations, and online writing scores) were collected from the same web-based writing program. The Pearson correlation coefficient was adopted to determine the degree of a relationship between two quantifiable variables.

3.2 *Study setting and subjects*

The subjects in this study were 62 EFL students at a university of science and technology in southern Taiwan. Forty-one of them were English majors (23 juniors and 18 seniors) and the other twenty-one were non-English majors (business majors) who were identified – regardless of their academic years – by a placement test as a class with the most advanced English fluency (i.e. Level Four in the subjects' university). The students joined this study voluntarily because they wanted to become familiar with the latest format of TOEFL-iBT test which has made online writing an unavoidable component. They were also eager to know whether their 9–10 years of formal English training could actually prepare them for this kind of writing task.

3.3 *Instrument – Criterion (Version 7.1) web-based writing program*

The only data collection instrument used in this study was Criterion (Version 7.1), a web-based writing program built upon a combination of four modern technologies: word processors, the Internet, corpus, and automated essay grading systems (Cheng, 2006). This type of web-based writing program has been widely adopted as an alternative tool in teaching EFL/ESL writing, and has shown its effectiveness in improving students' writing skills (see Attali, 2004; Cheng, 2006; Grimes & Warchauer, 2006; Chodorow & Burnstein, 2004, for further discussions).

Criterion was chosen based on four major concerns. First, computer-based online writing is nearly the norm for every EFL/ESL writing class. Our students almost never do paper-pencil writing anymore. Criterion comes closest to their regular writing setting. This study collected online written data produced naturally by our students. This type of computer-based writing is just beginning to receive attention. The current study intends to bring insights to the previous findings.

Second, the feature of *e-portfolios*, recording the first and the most recent essays online, allowed the researcher to access students' writing sample easily. Immediately after the online writing, all the student essays can be converted to text-only documents, speeding up the process of tallying lexical collocations. In addition, the *e-rater* function assigned a holistic score⁷ (i.e. 1–6, from the lowest to the highest) to each student essay according to the pre-programmed linguistically-specific features and instant comparisons to previous corpus-based writing samples. It only took seconds to determine a student's writing score. In terms of the validity and reliability, *e-rater* has shown 97% accuracy rate in comparison to human scoring (Chodorow & Burnstein, 2004). Criterion actually gave the current and future studies of a quantitative nature a chance to include and analyze a large sample of written data.

Finally, speed online writing has been included in many major ETS-designed English proficiency exams. For instance, the new TOEFL-iBT requests its test-takers to produce two types of online writing—'an independent writing' in responding to a prompt and 'an integrated writing' answering to an audio or a written passage. Our EFL/ESL learners will soon need assistance to cope with this new type of challenge. The current study is taking one step ahead. By examining the correlation between online writing and frequency/variety of lexical collocations, it aims at finding out possible techniques or skills which EFL/ESL can use when taking an online writing test.

To sum up, in spite of the fact that the web-based writing program, Criterion, has its inherent weaknesses – such as its overemphasis on product (Warschauer & Ware, 2006), its inability to recognize hidden meanings at sentence levels (Cheng, 2006), misleading strategies for fooling the scoring system (Herrington, 2001) – it was selected for a two-fold purpose. Its web-based features reduce the burden of grading and data collection. It is also one of the few available web-based

writing programs (e.g. currently Criterion and MyAccess) that our students can benefit from for their current needs and future academic preparation, especially for standardized computerized tests like TOEFL-iBT.

3.4 Data collection procedures

This study was comprised of two stages. In the first stage, the 41 English majors wrote online essays on the same topic—*Dress for Success* in a computer lab within the allotted 45-minute writing time. Once the students logged into their own accounts, they saw the following prompt:

Until the 1990s, business suits were standard attire in the corporate world. These days corporate dress codes vary -- some employers still expect employees to wear suits while others welcome much more casual dress. While many people welcome the increased comfort and freedom of casual business attire, others believe that casual dress in the corporate workplace is unprofessional or even harmful. Write an essay exploring the pros and cons of the trend toward casual dress in the workplace. Explain your position with reasons and examples from your own experience, observations, or reading (Criterion, 7.1 Version, 2007).

They wrote in the word processor document provided by Criterion web-based writing program where all the writing samples were stored under each student's account as well. The 24 non-English majors took the test one day after the English majors. They used the same computer lab and wrote their essays based on the same topic.

In the second stage, the researcher and four research assistants, from the instructor's access account, retrieved the 65 students' writing samples and recorded their scores as marked by the online program. Because three non-English majors' writing scores were categorized 'N/A,' indicating their essays were not gradable, the researcher excluded their data from further consideration. Altogether, there were 62 subjects at the end of the study.

3.5 Tallying lexical collocations

Tallying lexical collocations was done manually although it was time and energy consuming. The four research assistants first underlined all possible lexical collocations recognized in the students' writing according to the six subtypes⁸ of lexical collocations suggested by the *BBJ Dictionary of English Word Combinations* (Benson et al., 1997) and the seventh 'noun + noun' subtype recognized by Hausmann (1999) and Kimmes (2004). Altogether, seven subtypes of lexical collocations were investigated in this study (see Table 2).

The researcher judged whether a lexical collocation was acceptable with the help of the *BBJ Dictionary of English Word Combinations* (Benson et al., 1997), *Oxford Collocations Dictionary for Learners of English* (Lea, 2002), and three online corpora: American National Corpus (<http://americannationalcorpus.org>), Simple Search of British National Corpus (<http://sara.natcorp.ox.ac.uk/lookup.html>), and VLC Web Concordancer (<http://vlc.polyu.edu.hk/concordance/WWWConcappE.htm>), and two native speakers who are both experienced EFL teachers. Online corpora were utilized in this study because evidence showed that a corpus could illustrate how words collocate (Aghbar, personal communication, 2002; Schmitt, 2000; McCarthy, 2004b). The three online corpora were used because they were free of charge. In addition, they were designed to include a wide range of samples from different registers and language domains. The three corpora were selected along with the two native speakers from the U.S. because a balanced judgment on lexical collocations between British and American English was attempted. Besides, although the purpose of the online writing was to elicit the subjects' use of collocations, it was also used as a measurement for the subjects' writing fluency. When an acceptable lexical collocation was found with spelling or grammatical errors, it was also counted as a valid one. It was deemed as an effort to use lexical collocations. Such mechanic deficiency would later automatically result in the deduction of the students' writing scores determined

by the web-based writing program. Nevertheless, the inclusion of misspelled lexical collocations would not harm the accuracy of tallying.

Type		Example
L1	verb + noun	make an impression, break a code
L2	adjective + noun	strong tea, weak tea
L3	noun + verb naming an action	bees buzz, bomb explodes
L4	noun 1 of noun 2	a bouquet of flowers, a pack of dogs
L5	adverb + adjective	strictly accurate, sound asleep
L6	verb + adverb	appreciate sincerely, argue heatedly
L7	noun + noun	company uniform, dress code

Note. The first six labels of subtypes and examples of collocations are taken from the *BBI Dictionary* (Benson et al., 1997).

Table 2: Subtypes and examples of lexical collocations recognized in the study

At the last stage, the researcher divided the valid lexical collocations into the groups of “tokens” and “types” of lexical collocations. The data were eventually computed using Statistical Package for the Social Science (SPSS) Version 14.

4 Results and discussion

4.1 Results of the study

Test results were examined to answer the two major questions for correlation (1) between the subjects’ frequency (i.e. tokens) of lexical collocations and their writing scores and (2) between the subjects’ variety (i.e. types) of lexical collocations and their writing scores. The Pearson correlation was used to describe the correlations between the 62 EFL subjects’ use of lexical collocations and their online writing scores. Table 3 lists all the correlations between every set of two variables.

	English Majors’ Writing Scores		Non-English Majors’ Writing Scores		All Students’ Writing Scores	
Tokens of Lexical Collocations	$r=-.261$	$p=.100$	$r=.200$	$p=.386$	$r=.544^{\dagger}$	$p=.000$
Types of Lexical Collocations	$r=.384^*$	$p=.013$	$r=.162$	$p=.483$	$r=.809^{\dagger}$	$p=.000$
Total Words	$r=.621^{\dagger}$	$p=.000$	$r=.809^{\dagger}$	$p=.000$	$r=.890^{\dagger}$	$p=.000$

Note. † Correlation is significant at the 0.01 level (2-tailed); * correlation is significant at the 0.05 level (2-tailed).

Table 3: Pearson correlation between student essay scores and lexical collocations and essay length

In terms of the correlation between all the students’ tokens of lexical collocations and their online writing scores, it is significantly correlated ($r=.544$, $p=.000$). For the same category of correlation, no obvious relation is found if the English and non-English majors are considered separately. As for the correlation between all the students’ types of lexical collocations and their online writing scores, a greater correlation can be found ($r=.809$, $p=.000$), indicating that the variety of lexical collocations seems to be a better indicator for the students’ writing scores. Also another significant correlation ($r=.384$, $p=.013$) can be found between the English majors’ types of lexical collocations and their online writing scores.

An unexpected but interesting significant correlation is also found between all the students’ essay length (i.e. total words) and their online writing scores. This may not be a coincidence since

underdeveloped, short essays could have been graded with lower scores. This is beyond the scope of the current study. Later larger scale studies should be able to address this issue.

The findings of this study are consistent with Zhang (1993) who also conducted an empirical study examining the correlation between the EFL learners' use of lexical collocations and their writing fluency. Drawing his conclusion from paper-and-pencil writing samples, Zhang noted that quantity, but more important, quality for use of collocations distinguish between native and non-native college freshmen writing as well as between good and poor college freshmen writing. This study also found that the quality of lexical collocations in terms of variety is indicative of the quality of the online writing of Taiwanese EFL college students, both English and non-English majors.

4.2 Analysis of seven subtypes of lexical collocations

A closer look at the students' use of seven lexical collocation subtypes from the online writing may reveal findings of value. Table 4 presents Pearson correlation for the seven lexical collocation subtypes and their relation to the students' writing.

	English Majors' Writing Scores		Non-English Majors' Writing Scores		All Students' Writing Scores	
L1 (verb + noun)-Tokens	$r=-.364^{\dagger}$	$p=.019$	$r=.268$	$p=.240$	$r=.499^{\dagger}$	$p=.000$
L1 (verb + noun)-Types	$r=.247$	$p=.120$	$r=.247$	$p=.281$	$r=.749^{\dagger}$	$p=.000$
L2 (adjective + noun)-Tokens	$r=-.085$	$p=.599$	$r=.107$	$p=.644$	$r=.466^{\dagger}$	$p=.000$
L2 (adjective + noun)-Types	$r=.410^{\dagger}$	$p=.008$	$r=.144$	$p=.533$	$r=.701^{\dagger}$	$p=.000$
L3 (noun + verb)-Tokens	$r=-.149$	$p=.354$	$r=-.073$	$p=.755$	$r=.042$	$p=.746$
L3 (noun + verb)-Types	$r=-.149$	$p=.354$	$r=-.073$	$p=.755$	$r=.042$	$p=.746$
L4 (noun 1 of noun 2)-Tokens	$r=.084$	$p=.600$	$r=-.073$	$p=-.073$	$r=.449^{\dagger}$	$p=.000$
L4 (noun 1 of noun 2)-Types	$r=.043$	$p=.790$	(a)	(a)	$r=.448^{\dagger}$	$p=.000$
L5 (adverb + adjective)-Tokens	$r=-.294$	$p=.062$	$r=-.105$	$p=.650$	$r=-.021$	$p=.869$
L5 (adverb + adjective)-Types	$r=-.360^*$	$p=.021$	$r=-.105$	$p=.650$	$r=-.057$	$p=.658$
L6 (verb + adverb)-Tokens	$r=-.302$	$p=.055$	$r=.084$	$p=.717$	$r=.202$	$p=.115$
L6 (verb + adverb)-Types	$r=-.292$	$p=.064$	$r=.084$	$p=.717$	$r=.219$	$p=.088$
L7 (noun + noun)-Tokens	$r=.139$	$p=.385$	$r=-.078$	$p=.738$	$r=.327^{\dagger}$	$p=.009$
L7 (noun + noun)-Types	$r=.026$	$p=.873$	$r=-.178$	$p=.439$	$r=.103$	$p=.425$

Note. † Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed). (a) Cannot be computed because at least one of the variables is constant.

Table 4: Pearson correlation between student essay scores and seven lexical collocation subtypes

Examining the correlations from the perspective of the entire student group, we can see significant correlations occurring between the students' writing scores and L1 'verb + noun' subtype (both tokens and types), L2 'adjective + noun' subtype (both tokens and types), L 4 'noun 1 of noun 2' subtype (both tokens and types), and L7 'noun + noun' subtype (tokens only). Since the sample in the current study is too small, no conclusions can be made based on the correlations shown in Table 4. Previous studies of English collocations have never addressed the issue of lexical collocation subtype acquisition, thus making it difficult and almost impossible to compare the findings to those of the former studies.

However, if the total tokens and types of seven lexical collocation subtypes used by the students in their online writing are listed according to the holistic scores they received, a pattern of lexical collocation development can be observed.

Based on Figure 1, the average number of 'tokens' of seven lexical collocation subtypes does not develop along with the six levels of writing scores as marked by Criterion. Nevertheless, Figure 2 tells a bit different story if the average number of 'types' of seven lexical collocation subtypes is examined closely. In terms of the development patterns of the seven subtypes of lexical collocations, it is relatively more obvious to see the L1 and L2 subtypes might have been the earliest acquired lexical collocations as they develop in two relatively paralleled and upward lines, be-

ginning from the Score 1 to the Score 6 group. As for the other 5 subtypes, no concrete patterns can be found.

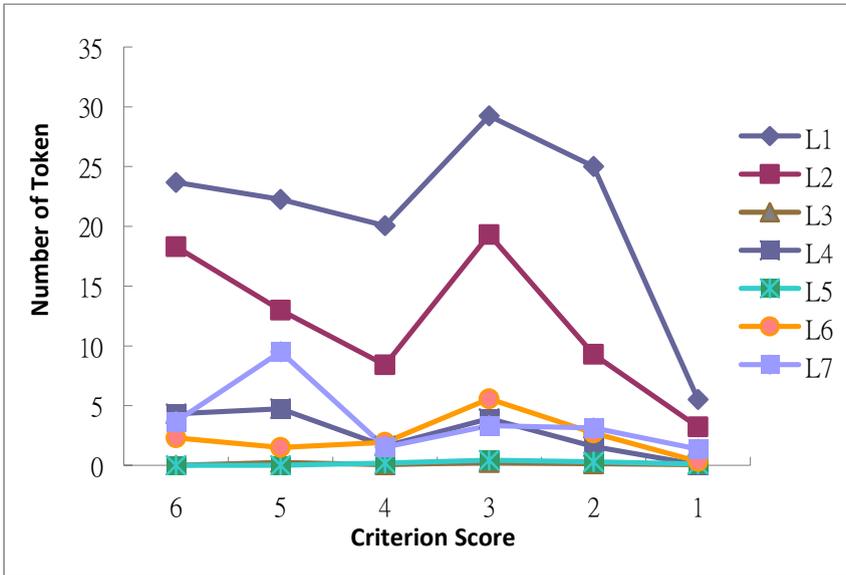


Figure 1: Average number of tokens of 7 lexical collocation subtypes used by students of six writing levels.

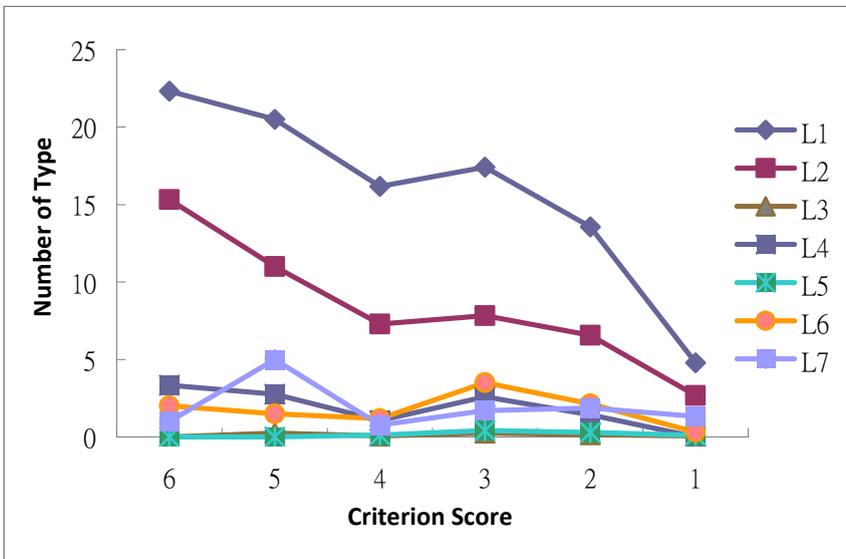


Figure 2: Average number of types of 7 lexical collocation subtypes used by students of six writing levels.

Again, the samples in this study are limited. Any claims on the developing patterns of lexical collocations can be dangerous. The findings here, however, should be considered as an initial step into later studies on the possible acquisition pattern of lexical collocations.

4.3 Discussion

The current study was conducted to investigate the two major research questions for correlation (1) between the subjects' frequency/tokens of lexical collocations and their writing scores and (2) between the subjects' variety/types of lexical collocations and their writing scores as graded by Criterion web-based writing program. The Pearson correlation was employed to describe the correlations between the 62 EFL subjects' use of lexical collocations and their online writing scores. In terms of the correlation between the students' tokens of lexical collocations and their online writing scores, it is significant ($r=.544$, $p=.000$). With regard to the correlation between the students' types of lexical collocations and their online writing scores, it is also significant ($r=.809$, $p=.000$).

The findings suggest that the variety of lexical collocations, in comparison to the frequency of lexical collocations, seemed to be a better indicator for the students' writing scores. In Zhang's (1993) study, he reported a similar finding: a strong correlation exists between his EFL learners' use of lexical collocations and their writing fluency as measured by a paper-and-pencil TOEFL-like writing test. In fact, Zhang differentiated between 'quantity' of collocations, i.e. "the number of collocations found in the subjects' writing samples" (p. 165) and 'quality' of collocations, i.e. the "variety and accuracy of collocations used in the writing" (p. 165). His grouping of 'quantity' and 'quality' of collocations is identical to that of 'token' and 'type' used in the current study. The Pearson correlations examined in both studies showed that the 'type' of lexical collocations is a better indicator for the writing fluency of EFL college students. The adaptation of 'token/frequency' and 'type/variety' could be recommended for future studies of the same focus.

In addition, Al-Zahrani's correlational study (1998) on Saudi EFL college students also revealed that strong correlations exist between the students' knowledge of collocations and their overall language proficiency as measured by the TOEFL test and between the students' performance on a writing test and their knowledge of lexical collocations. However, the present study did not implement the same instrument as that of Al-Zahrani in collecting data on the students' knowledge of lexical collocations, thus making the comparison between the two studies impossible.

4.4 Contributions of the study

The current study has attempted to explore the relation between English collocations and second language acquisition. More specifically, it examines whether a correlation exists between Taiwanese college EFL learners' frequency (tokens) of lexical collocations and their online writing scores, and between Taiwanese college EFL learners' variety (types) of lexical collocations and their online writing scores. The contributions of the study can be interpreted from three different perspectives: theoretical, empirical, and pedagogical.

From a theoretical point of view, this study has made an attempt to describe the correlation between the use of lexical collocations and EFL learners' English fluency in a more thorough manner to complement certain important features omitted in previous studies of collocations. Specifically, as stated in the section "Research Design," this study has made an effort in separating frequency/token from variety/type when tallying the total number of lexical collocations. This has been a widely accepted concept in the field of corpus-based studies of applied linguistics (Hunston, 2002; McEnery et al., 2006; Stubbs, 2001). Former studies (except the study by Zhang, 1993) investigating the correlation between the use of lexical collocations and general English fluency often describe such a relation without distinguishing frequency/token from variety/type, thus failing to make a complete and accurate representation of the notion of 'the use of collocations.'

Moreover, little has been done to classify the 7 subtypes of lexical collocations that are more challenging and difficult to acquire. In the current study, the L1 (verb + noun) and L2 (adjective + noun) lexical collocation subtypes were found to be used more frequently than the others, particularly in the online writing of EFL learners. This suggests categorization of the 7 subtypes can serve as new guidelines for conducting later classroom-based research where the teacher-researchers have clear directions to follow and to decide what to emphasize while dealing with a wide variety of collocations.

Additionally, this study has also contributed empirically to the current body of research on collocations. It is the first study to actually investigate the use of collocations collected from a web-based writing program and also the first collocational study of the computer-mediated communication nature to be conducted with Taiwanese college EFL learners. Many innovative ideas are combined and made possible in this study. For instance, it puts collocations in the center of an EFL writing course and attempts to study how college EFL writers use and proceed in the acquisition of English lexical collocations.

The third and final contribution of this study is a pedagogical one. It provides empirical data showing that there seems to be a positive correlation between the Taiwanese college EFL learners' use of lexical collocations and their overall online writing fluency. In addition, findings concerning the distribution of specific collocations in the changes of students' use of seven subtypes of lexical collocations, ranging from the lowest to the highest Criterion-based scores, may lead to the possible understanding of collocation learnability. A better understanding will be useful to both researchers and teachers of EFL/ESL writing in the improvement of materials selection, syllabuses, and teaching methods.

5 Conclusion

5.1 Pedagogical implications

The study has shown that frequency and variety of lexical collocations were both significantly associated with Taiwanese university EFL learners' online writing. And the association was even stronger between the variety of lexical collocations and the 62 student writers' online writing scores. Future larger scale studies might still need to be carried out in order to examine whether the use (i.e. frequency and variety) of lexical collocations will benefit EFL learners' writing fluency, particularly assessed by web-based writing programs. Based on the current study, the first implication we can make is to suggest our student writers to learn and use a wide variety of lexical collocations as they seem to help more than merely putting as many collocations as possible.

The next pedagogical implication concerns the subtypes of lexical collocations for Taiwanese college EFL learners. The study showed that the majority of the subjects were using a very low number of L3 (noun + verb), L4 (noun 1 of noun 2), L5 (adverb + adjective), L6 (verb + adverb), and L7 (noun + noun) subtypes of lexical collocations as long as they were writing online. That is to say, Taiwanese university EFL students might not have sufficiently gained these five lexical collocation subtypes in their online written production. Based on such findings, EFL writing teachers should especially emphasize on the practice of these subtypes (i.e. L3~L7) in class.

5.2 Limitations of the study

The fact that the subjects of the study were not randomly selected is perhaps one obvious limitation. The subjects were limited to the students at a national university of science and technology from southern Taiwan. Therefore, while the study revealed interesting findings about the relationship between the Taiwanese EFL university learners' use of lexical collocations and their online writing fluency, the findings may not be easily generalized beyond the subjects of the study.

Another limitation of this study is related to the scope of subjects. With the assistance of the web-based writing program, Criterion, this study might have had a good chance to recruit more student participants than it actually had. When each student needed to pay to maintain an online writing account, it became very difficult if the study were not in receipt of a sponsorship. Future studies of the same kind will need to take the budget into consideration.

5.3 Recommendations for future research

Studies on collocations have been carried out in the past two decades but our understanding of collocations is still not enough. As the current study explored Taiwanese college students' use of lexical collocations as well as their online writing fluency, several recommendations can be made.

First, a strong relationship was found both between the frequency of lexical collocations and online writing fluency and between the variety of lexical collocations and online writing fluency among the Taiwanese university EFL learners in the study. However, a larger sample group is needed to determine whether the frequency or variety of lexical collocations is more revealing. Thus, Taiwanese EFL learners' use of collocations in the online writing could be further examined. In the current study, the researcher used only one sample of one type of online writing test to elicit the subjects' use of lexical collocations. Future studies could consider using different web-based programs (e.g., MyAccess) or asking student participants to produce a series of online essays with a wide variety of writing prompts to elicit the subjects' written data. Second, the current study looked at the subjects' use of collocations in relation to their online writing fluency. Future research could investigate the relationship between the use and even knowledge of lexical collocations and other language skills assessed by CMC tools. For instance, the TOEFL-iBT does require our students to take internet-based speaking, listening, and reading tests. These areas of computer-mediated language skills are new territory we have not touched upon. Finally, the study also found Taiwanese EFL students performed differently on the seven major subtypes of lexical collocations. The students were particularly limited in the use of the L3~L7 subtypes of lexical collocations in their online writing. Hence, it could be a new direction to continue investigating whether there are some patterns of development in the EFL learners' use and knowledge of lexical collocations particularly related to the seven subtypes.

Collocations, as the center of second language acquisition as well as EFL/ESL education, have only begun to receive substantial attention. In the field of computer-assisted language learning, the need for more research on collocations is clear. More importantly, the correlation between the use of lexical collocations and EFL learners' online writing fluency is far from completely understood. It requires tremendous effort from researchers in linguistics, applied linguistics, computational linguistics, corpus linguistics, lexicographers, EFL/ESL practitioners, computer-assisted instruction specialists, and classroom teachers.

Notes

¹ For a detailed list of empirical studies on collocation error analysis, see Appendix A.

² Lexical collocations are word-associations where one word recurrently co-occurs with one or more other words as the only or one of few possible lexical choices. Examples of commonly seen lexical collocations include "launch a missile," "revoke a silence," and "blonde hair."

³ Educational Testing Service has announced that a new computer-based writing test component is scheduled to be implemented in 2008.

⁴ The term, web-based writing program, was first used in Cheng (2006).

⁵ A newer edition, the BBI Dictionary of English Word Combinations by Benson, Benson and Ilson, was later published in 1997.

⁶ The term, writing fluency, is used narrowly in this study to describe only students' performance observed on a writing test.

⁷ For a detailed 6-point scoring rubric, please see Appendix B.

⁸ In the BBI Dictionary, there are 7 subtypes of lexical collocations. L1 verb + noun (creation) and L2 verb + noun (eradication) were merged into L1 verb + noun in this study. 'Subtype' is also used to refer to the 7 original lexical collocations of dictionary definitions while 'type' in this study is reserved for describing the students' variety in their use of lexical collocations.

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Appendix A: Empirical studies on collocation error analysis

Researchers	Subjects	Instruments	Focus
Lombard (1997)	8 MBA graduate students	1. questionnaire 2. writing assignments	1. lexical collocations 2. grammatical collocations
Liu (1999a)	128 university English majors	1. collocation test (fill-in-the-blank)	1. lexical collocations 2. grammatical collocations
Liu (1999b)	127 university English majors	1. final papers 2. 8 compositions	1. lexical collocations 2. grammatical collocations
Huang (2001)	60 college English majors	1. collocation test (fill-in-the-blank)	1. free combination 2. restricted collocations 3. figurative idioms 4. pure idioms
Chen (2002)	30 senior high school students	1. three writing assignments	1. lexical collocations 2. grammatical collocations
Hsueh (2003)	87 senior high school students	1. 1 writing assignment	2 subtypes of lexical collocations (adjective + noun, verb + noun)
Tang (2004)	96 university non-English majors	1. modified GEPT oral & written test	1. lexical collocations 2. grammatical collocations
Wang (2005)	75 university English majors	1. a vocabulary knowledge test 2. 3 oral elicitation tasks 3. a questionnaire	5 subtypes of lexical collocations (verb + noun, noun + verb, noun 1 + noun 2, verb + adverb, adverb + adjective)
Wu (2005)	178 university non-English majors	1. collocation test (fill-in-the-blank)	verb + noun lexical collocations
Chen (2006)	40 junior college students of Applied Foreign Languages Majors	1. 40 midterm papers 2. 39 compositions	5 subtypes of lexical collocations (verb + noun, noun + verb, noun 1 + noun 2, verb + adverb, adverb + adjective)
Jeng (2006)	15 university English majors	1. student compositions	3 subtypes of lexical collocations (adjective + noun, noun + verb, verb + noun)

Appendix B: Scoring guide by Criterion (7.1), ETS (<http://criterion-cs.ets.org>)

Score of 6:	<p>You have put together a convincing argument. Here are some of the strengths evident in your writing:</p> <p>Your essay:</p> <ul style="list-style-type: none"> • Looks at the topic from a number of angles and responds to all aspects of what you were asked to do • Responds thoughtfully and insightfully to the issues in the topic • Develops with a superior structure and apt reasons or examples (each one adding significantly to the reader's understanding of your view) • Uses sentence styles and language that have impact and energy and keep the reader with you • Demonstrates that you know the mechanics of correct sentence structure, and American English usage virtually free of errors
Score of 5:	<p>You have solid writing skills and something interesting to say. Look at the 6 sample essay to get ideas on how to develop your ideas more fully or use language more persuasively and consistently.</p> <p>Your essay:</p> <ul style="list-style-type: none"> • Responds more effectively to some parts of the topic or task than to other parts • Shows some depth and complexity in your thinking • Organizes and develops your ideas with reasons and examples that are appropriate • Uses the range of language and syntax available to you • Uses grammar, mechanics, or sentence structure with hardly any error
Score of 4:	<p>Your writing is good, but you need to know how to be more persuasive and more skillful at communicating your ideas. Look at the 5 and 6 sample essays to see how you could be more persuasive and use language more effectively.</p> <p>Your essay:</p> <ul style="list-style-type: none"> • Slights some parts of the task • Treats the topic simplistically or repetitively • Is organized adequately, but you need more fully to support your position with discussion, reasons, or examples • Shows that you can say what you mean, but you could use language more precisely or vigorously • Demonstrates control in terms of grammar, usage, or sentence structure, but you may have some errors

<p>Score of 3:</p>	<p>Your writing is a mix of strengths and weaknesses. Working to improve your writing will definitely earn you more satisfactory results because your writing shows promise.</p> <p>In one or more of the following areas, your essay needs improvement. Your essay:</p> <ul style="list-style-type: none"> • Neglects or misinterprets important parts of the topic or task • Lacks focus or is simplistic or confused in interpretation • Is not organized or developed carefully from point to point • Provides examples without explanation, or generalizations without completely supporting them • Uses mostly simple sentences or language that does not serve your meaning • Demonstrates errors in grammar, usage, or sentence structure
<p>Score of 2:</p>	<p>You have work to do to improve your writing skills. You probably have not addressed the topic or communicated your ideas effectively. Your writing may be difficult to understand.</p> <p>In one or more of the following areas, your essay:</p> <ul style="list-style-type: none"> • Misunderstands the topic or neglects important parts of the task • Does not coherently focus or communicate your ideas • Is organized very weakly or doesn't develop ideas enough • Generalizes and does not provide examples or support to make your points clear • Uses sentences and vocabulary without control, which sometimes confuses rather than clarifies your meaning
<p>Score of 1:</p>	<p>You have much work to do in order to improve your writing skills. You are not writing with complete understanding of the task, or you do not have much of a sense of what you need to do to write better. You need advice from a writing instructor and lots of practice.</p> <p>In one or more of the following areas, your essay:</p> <ul style="list-style-type: none"> • Misunderstands the topic or doesn't show that you comprehend the task fully • Lacks focus, logic, or coherence • Is undeveloped--there is no elaboration of your position • Lacks support that is relevant • Shows poor choices in language, mechanics, usage, or sentence structure which make your writing confusing