

LEXICAL COLLOCATIONAL INSTRUCTION IN EAP WRITING VIA COCA

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Abstract

This study investigated the efficacy of explicit lexical collocation instruction via the Corpus of Contemporary American English (COCA). To improve competence in lexical collocation and writing performance and to examine whether collocational competence and writing performance have a linear interrelation, 16 international English for Academic Purposes students received training on the use of the COCA interface. They were asked to first analyze the lexical collocations used in an academic paper, then search COCA for collocations to see how they are used pragmatically, and, finally, write an academic research paper on their own. A dependent *t*-test measured significant differences in performance, and the Pearson product-moment correlation coefficient identified the strength of the correlation between lexical competence and writing performance and their association with each other, respectively. The results showed that when students are given explicit instruction on how to utilize COCA to identify lexical collocations and their use in various contexts, both their lexical collocational competence and writing performance improves and, furthermore, these improvements correlate with each other. Implications for teaching lexical collocation are also discussed.

Keywords: English for Academic Purposes (EAP); explicit instruction; lexical collocations; academic writing

1. Introduction

Lexical collocations (e.g., *recommend highly*, *thick fog*, *bee stings*, *closely related*) and their cohesiveness play a critical role in academic writing because they affect the clarity and readability of a text (Mahlberg, 2006; Vyatkina, 2016). Second language (L2) learners, particularly those enrolled in English for Academic Purposes (EAP) courses, need to be made aware of the use of lexical collocations in academic written texts and be able to employ these collocations themselves. The ability to incorporate lexical collocations in a passage should help both L2 and EAP learners achieve fluency similar to that of native English writers (Bahns, 1993; Saito, 2020). Because collocational competence is neither natural nor can it be developed and acquired without explicit instruction, L2 learners must be afforded targeted opportunities to learn how best to employ English lexical collocations productively. Learning lexical collocations can also aid L2 learners avoid misunderstandings, as lexical chunks are usually fixed, which require less decoding (Wray, 2012).

Lexical collocations, according to Howarth (1998), have “a syntactic function as constituents of sentences” (p. 24), which helps “in the process of composition at clause level” (p. 24). Using a phraseological approach, Howarth (1998) divided lexical unit combinations into two categories: (1) free or open and (2) restricted. The free lexical collocation combinations convey literal meanings, and their elements are freely substitutable (*carry a trumpet*, *blow a trumpet*), while the restricted lexical collocation combinations contain specific collocates whose meaning can only be discovered from contexts (*blow a fuse*). The categorization is parallel to Walker (2011) who asserted that “a collocation will typically exhibit a degree of fixedness” (p. 293). This implies that the collocation combinations are non-arbitrary and, furthermore, that their co-occurrences can be either semi-fixed or fixed.

Similarly, Gablasova et al. (2017) posited the relationship of collocation combinations based on three collocational properties: (1) frequency, (2) exclusivity, and (3) directionality. *Frequency* refers to “counting the co-occurrences of word forms” (p. 159) that is structured from noticing, representation, access, and production of language (*risk issues* and *moral issues*). *Exclusivity* is defined as “the extent to which the two words appear solely or predominantly in each other’s company” (p. 160), characterizing collocational combinations to be more easily recognized, acquired, and stored as a unit, to have stronger priming effects, and to be positively correlated (*nuclear energy* and *global warming*). Closely related to priming is *directionality*, the

third property of collocation combinations. According to the authors, directionality is “a concept that postulates that the components in a collocation do not attract each other with equal strength” (p. 160). For example, “decorations” in *Christmas decorations* may prime language learners for “Christmas,” but *Christmas* will not prime speakers for “decorations.” In like manner, language learners may prime “extenuating” in *extenuating circumstances* when they hear “circumstances,” but not *circumstances* when they hear “extenuating.”

In lexical collocational instruction, even though L2 learners tend to concentrate on learning single vocabulary items rather than word combinations, they are taught, nonetheless, to use word combinations, as such combinations do play a weighty role in assisting learners store and recall words (Lewis, 2001; Nattinger, 1980). And according to Thornbury (2005), instructors need to raise their learners’ awareness of this writing sub-skill, not least because learning collocation is a daunting task for language learners as there are so many of them. Chen’s (2019) findings also reiterated the importance of developing an awareness of collocation, as Chinese college EFL learners who failed to develop such awareness tend to produce and recognize almost all two-word combinations in their writings as creative and “freely grammatically correct combination of two words” (p. 65), which resulted in learners’ collocation errors. As most of the previous studies either only focused on the analysis of single-word units or rarely examined how collocations are being used in regard to L2 speaking proficiency, Saito’s (2020) study examined two different constructs of L2 speech, with *comprehensibility* being concerned with novice raters’ intuitive effort of understanding the L2 speech, whereas *appropriateness* dealing with how expert raters evaluate the accuracy and suitability of the collocation use. Results showed that comprehensibility and lexical appropriateness were strongly determined by the L2 speakers’ use of low-frequency combinations containing infrequent, abstract, and complex words.

Past studies have also considered university-level students’ collocational competence in relation to their overall writing performance. For example, Orenha-Ottaiano (2016) claimed that for collocational instruction to be effective, it should be conducted explicitly as collocations are set expressions and often restricted within the surrounding context. In a similar vein, Li’s (2017) study showed that corpora-based learning resulted in a significant improvement in EFL learners’ academic writing in comparison to the traditional, rule-based learning method. It is logical to surmise then that effective learning strategies need to be developed in an explicit manner, such as

teaching learners how to consult collocation dictionaries and computer concordancers (i.e., a computer program that automatically constructs a concordance).

Moreover, Liu and Zhong (2014) posited that synonyms become easily distinguishable when their typical collocates are presented. For instance, when discussing statistical results, *significantly different* rather than *importantly different* is used even though *significantly* and *importantly* are synonyms. Therefore, EFL learners need to be made aware of the present synonyms, so as to judge and select the more appropriate ones to collocate. To this end, Wongkhan and Thienthong (2020) stated that although words themselves do convey meaning, the actual meaning is more often than not determined by the co-occurred word combinations, as words that co-occurred together exert a heavy semantic influence on each other. In their study, 120 Thai EFL learners were recruited. These learners reported that they had never had academic collocations and synonyms being taught explicitly. They were given a forced-choice test, which featured 10 collocation questions with 3 synonyms as the collocate choices. The test contained four collocation types: adjective + noun (e.g., *important role*), verb + noun (e.g., *cause problem*), adverb + adjective (e.g., *vitally important*), and adverb + verb (e.g., *fully understand*) (p. 5). After analyzing participants' answers, the authors believed that the learners who were exposed to the synonymous pair lexical collocations were also the ones who were better at distinguishing and forming the correct judgment on their collocation choices.

Oakey (2020) added that while many researchers have claimed that explicit lexical collocation instruction has been proven to be effective, many EAP practitioners struggle to implement it in the classroom. The characteristics of the learners, the in-house textbook being used in the classroom, and the decontextualization of list of collocations were offered as possible reasons for this. However, the study's results suggested that EFL learners' frequent exposure to academic texts may indeed promote language learning. Even though EFL learners may not be taught lexical collocations explicitly, they can, nonetheless, acquire academic collocations both implicitly and incidentally. Khonamri et al. (2020) also argued the importance of explicit instruction in lexical collocation instruction for language learners and instructors alike. Being made aware of collocation knowledge, language learners were more likely to attend to words that usually co-occur together and even incorporate more collocations and write more complicated sentences in their writings. Conversely, language instructors found recycling to be an effective teaching strategy to help learners commit the newly learned collocations to memory. Said

strategy is achieved by revisiting the same knowledge points from a novel angle (Lewis, 1997; Harwood, 2002), explicit instruction notwithstanding. Finally, Skoufaki and Petric (2021) posited that providing a frequent input for word forms (definition, collocation, syntactic) implicitly is more effective than explicitly teaching the word forms.

Against the backdrop of such information, our study investigated the effectiveness of implementing explicit instruction to improve learners' lexical collocation competence and academic writing skills via the integration of the Corpus of Contemporary American English (COCA). COCA is a technological tool L2 instructors can employ profitably to make their collocational instruction explicit, thereby helping learners search for the most frequent English collocations within contexts displaying authentic language use. Concurrently, COCA can also be used to mediate lexical collocations in an academic writing class to maximize EAP students' acquisition of linguistic, cultural, and content knowledge, in addition to exploring the pragmatic use of lexical collocations. Following Lontas (2019), lexical collocations "refer to the combination of two (or more) content words such as nouns, verbs, adjectives, and adverbs" (pp. 64-65). Both the number and the type of collocations used in the written texts are indicators of the native fluency of the writers. To help students establish a holistic understanding of the possible word combinations, Benson et al.'s (1986) six categories were included in this study: (1) verb + noun (*inflict a wound, withdraw an offer*); (2) adjective + noun (*a crushing defeat*); (3) noun + verb (*lions roar*); (4) noun1 + noun2 (*a pride of lions*), (5) adverb + adjective (*deeply absorbed*), and (6) adverb + verb (*sincerely appreciate*). In terms of teachability, combinations such as verb + noun occur more frequently (Howarth, 1998).

2. Literature review

2.1. The use of COCA in an EAP academic writing course

Teachability considerations aside, we sought to heighten awareness of the ways by which instructors can achieve specific pedagogical ends without sacrificing in the process the contexts wherein all lexical collocations, irrespective of collocation type, ultimately attain their pragmatic use naturally. (For a more complete account of collocational competence, electronic corpora, web-based concordancing instruction, and collocation learning with a digital library, see Chan & Liou, 2005; Jaén, 2007; Laufer & Waldman, 2011; Lontas et al., 2020; Nesselhauf, 2005; Wu et

al., 2010.) Accordingly, our data collection and analysis are methodically related to how explicit instruction and the use of COCA in teaching lexical collocations and their pragmatic use can mediate the learning experiences of university-level students in EAP courses.

As noted already, this study integrated COCA as the prime reference tool. The choice to integrate an online corpus such as COCA was guided by the findings of several studies on corpus linguistics (e.g., Aijmer & Simon-Vandenberg, 2006; Belz & Vyatkina, 2005; de Kelrk, 2005), a great many of which explored pragmatic nuances of collocational knowledge use in naturally occurring data. LaCastro (2011) stated that corpus linguistics is a field of study that emphasizes the need for a collection of language learning materials and dictionaries on a body of data of pragmatically occurring written and spoken language use. As she concluded,

[c]orpora enable researchers to investigate a myriad of different phenomena including pragmatic functions and linguistics enactments in the large databases, thus providing results that may be viewed as more reliable, valid, and generalizable across populations without the lack of reliability that arises from the use of scholars' intuitions and created or self-reported data. (p. 329)

According to the lexical priming theory developed by Hoey (2005), each time an individual encounters a word, the retardation and acceleration of word association is primed for use in discourse through that experience. In other words, whenever an individual encounters a word or a combination of words, that individual also notes subconsciously how words interact with other words in common patterns of use. The cumulative effect of an individual's encounters with a word highlights not only the critical role lexical priming plays in language use, more importantly, it underscores a word's (textual) collocations/colligations, semantic/pragmatic associations, genre, style, or both, in which that particular word is naturally used. As a result, a word is primed to replicate these contexts in all subsequent encounters, which, in turn, explains how words are pragmatically used in the real world irrespective of the language modality (speaking, listening, reading, writing) in which the social or academic discourse is actualized. Node word frequency is perhaps the strongest predictor of receptive knowledge of collocation (Nguyen & Webb, 2016). In short: everything one knows about a word is a product of one's encounters with it in natural language use.

Containing more than 560 million words of text, COCA is the largest freely available corpus of American English, and it has long been considered a useful tool in promoting English learners' collocational competence. Tung et al. (2015) argued that training learners how to use

COCA is needed. In sharp contrast to those learners who frequently used COCA, the less frequent users were more likely to have negative feelings towards their experience with COCA. Indeed, they were even less likely to correct their lexicogrammatical errors despite the rich presence of authentic language, content, and structure in COCA. Among EFL learners specifically, improved collocational awareness and enhanced understanding of the target word through the in-depth knowledge provided by COCA (Chung, 2017) are but two notable benefits commonly attributed to the judicious use of COCA. Not unsurprisingly, COCA has been applied regularly in academic writing classes, as learners' collocational competence is closely related to their writing performance. The search for specific keywords in COCA can even expand learners' lexicon and underscore the language, content, and structure engendered in the writing assigned.

Alhusban and Vijayakumar (2021) posited that EAP learners must be given exposure to notice lexical collocations through frequent practice and extensive input. Such exposure will help learners notice and interpret lexical collocations using their lexical knowledge effectively. Already much research has been conducted to investigate the most effective approaches on English collocation instruction to L2 learners, one of which revolves around the comparison between the effects of explicit and implicit instruction. Previous research on this topic seemed to favor explicit over implicit instruction based on prevailing empirical evidence that explicit instruction significantly improves learners' collocational knowledge (El-Dakhs et al., 2018; Gheisari & Yousofi, 2016; Orenha-Ottaiano, 2016). Orenha-Ottaiano (2016), for example, suggested that instructors adopt explicit instruction as their presentation framework when teaching collocations precisely because they are so "highly specific" and "contextually restricted." By comparing post-test and delayed post-test scores among Iranian pre-university students from three groups (explicit instruction, implicit exposure, and control), Gheisari and Yousofi (2016) concluded that the group that received explicit instruction on collocations significantly outperformed the other two groups. A case study of Arab undergraduate learners' receptive and productive knowledge of verb + noun collocational type further corroborated the effectiveness of explicit collocation instruction to EFL learners. Said effectiveness, according to El-Dakhs et al. (2018) may even lead to both short-term and long-term learning gains. Based on Schmidt's (1990) *noticing hypothesis* that stipulates that input cannot be readily learned or stored in learners' mental lexicon unless it is noticed, exposure to a variety of resources provided additional opportunities for learners to notice target collocations in context, facilitated

understanding of these collocations, and consolidated even further their expanding knowledge base of collocations during the search for synonyms and antonyms. Additional explanations of the individual words that constituted the target collocations by teachers were found particularly helpful.

3. Methodology

3.1. The aim of the study

To investigate the effectiveness of explicit instruction on lexical collocations and their pragmatic use via COCA in EAP writing courses, we proffer three research questions (RQs):

1. Does explicit instruction of lexical collocations via COCA improve students' collocational competence in an advanced English EAP course?
2. Does explicit instruction of lexical collocations via COCA improve students' writing performance?
3. Does students' collocational competence correlate with students' writing performance?

To answer these research questions (RQ1, RQ2, RQ3), we utilized quantitative analyses of data. A dependent *t*-test measured significant differences in performance. The Pearson product-moment correlation coefficient identified the strength of the correlation between lexical competence and writing performance and their association with each other, respectively.

3.2. Participants and the context

The study's participants were sixteen international students enrolled in *Academic Writing for International Students II* - an advanced EAP course. This course was embedded in the curricular structure of an English Language Program of a large, public research university located in the Southeast of the United States. Participants' ages ranged from 20 to 40, and they all had already completed their bachelor's degrees in marketing, mass communications, business management, and education in their home countries (Brazil, China, Saudi Arabia, Taiwan, Thailand, Vietnam). They also had experiences writing academic English texts, but not in an EAP context that placed a major focus on improving knowledge of lexical collocations. A major component of the course was vocabulary instruction, reading academic articles, and writing a research paper. None of these participants had ever used COCA in any of their prior English classes, and all of them were

studying in order to enter a Master of Science program of study in marketing departments. Following institutional review board (IRB) approval, the study was conducted over a 15-week period (one semester), each week offering 6-hours of instruction.

3.3. Design and procedure

In *Academic Writing for International Students II*, the instructor, who was also one of the researchers of the study reported here, applied a linear lesson plan (see Appendix D). Throughout the semester, explicit instruction on the use of lexical collocations was implemented (see, for example, Gheisari & Yousofi, 2016). The use of COCA was also integrated as the primary technological tool to improve the participants' lexical competence and writing skills. Vocabulary Levels Test (VLT) at the academic level (Nation, 1983) was listed, and COCA was utilized to search for word combinations. Thereafter, these combinations were divided into six lexical collocation categories: (1) verb + noun (*design a method*); (2) adjective + noun (*scientific evidence*); (3) noun + verb (*evidence suggests*); (4) noun1 + noun2 (*a piece of evidence*), (5) adverb + adjective (*deeply absorbed*), and (6) adverb + verb (*sincerely appreciate*). However, only the first four categories were taught and assessed due to the unavailability of the last two subcategories in COCA (see Appendix A).

As already discussed, the study reported here used COCA for consultation purposes despite the fact that many different types of corpora are available for use today, such as the Wikipedia corpus, the British National Corpus (BNC), and the British Academic Written English (BAWE) corpus, all of which have been well documented and explored in facilitating English language learning in previous studies (Liu, 2010; Luzon, 2011; Marcus, 2019; Tung et al., 2015). Among them, COCA is the largest freely available corpus of American English, and its size, contemporariness, and inclusion of sentence examples are what English language learners of academic writing are likely to encounter in their current and future writings. Frankenberg-Garcia (2018) posited that only with practice in reading and writing in academic English may EAP writers be equipped with the accuracy and proficiency in the production of collocations in the academic English category.

By offering explicit instruction to EAP students on how best to utilize COCA to search for collocations and, furthermore, how to employ contextual clues to understand collocational meaning, these students were provided with targeted opportunities and the reference tool needed

to both build and strengthen their lexical collocational repertoire. They were also explicitly instructed to peruse several research articles to analyze the collocations employed therein (abstract, introduction, literature review, methodology, research analysis and procedural structure, conclusion). These two approaches combined may have helped these students improve not only their lexical collocational competence, but, more importantly, perhaps, their academic writing performance as well.

To utilize COCA in an EAP course when looking for collocations to see how they are naturally used in context, it is vital that students receive training on how to employ COCA *with a purpose* and *for a purpose*. To begin with, students need to first register and fill out a brief form at <https://www.english-corpora.org/>. Thereafter, they can log into their account and search for collocations and up to nine N-grams. In the collocates display, students are able to choose and read the word combinations, which provide insights into their meaning and usage within a particular context (<https://www.english-corpora.org/coca/>). These considerations aside, the study's participants received training on how to profitably use COCA to find the word combinations selected for learning. Before training could commence, participants were asked to register and fill out a brief form to maximize the usability of the site's functions. During training, participants were instructed to log into their account and search for the collocations of a particular word and choose up to two N-grams only before and after the word. From the list of available word combinations, they were then asked to click on the first five, read each collocation in a sentence, and share the collocational meanings while employing critical thinking skills and contextual clues. The participants completed this activity in the classroom using their own laptops.

Throughout the study spanning the lexical collocation competence pre-test, lexical collocation explicit instruction, and lexical collocation competence post-test (see Appendix B), we used the Vocabulary Levels Test (VLT) as a lexical source for the academic vocabulary. According to Nation (2001), the use of the VLT only indicates the magnitude of vocabulary knowledge; that is, the VLT does not reflect other aspects of word knowledge such as word combinations in collocations. The VLT was applied in this study because it is considered a valid and reliable diagnostic tool that can measure a learner's lexical weaknesses at a certain vocabulary level so that after the diagnosis, the student's lexical capacity may be improved (Enayat et al., 2018; Kremmel & Schmitt, 2018; Schmitt et al., 2001). And since previous studies

suggested that improved collocation competence resulted in improved writing proficiency (Li, 2017; Rahimi & Momeni, 2012; Reynolds, 2016), we surmised that by first exposing EAP students to academic level vocabulary from the VLT, then combining the vocabulary with its collocates on COCA, and, lastly, analyzing how the lexical combinations are used in authentic contexts as provided therein, the participants should equally be able to employ their knowledge of lexical collocation to improve their proficiency in writing.

Thus contextualized, our study focused solely on academic-level vocabulary (*coincide, coordinate, expel, frustrate, supplement, and transfer*) and excluded other vocabulary levels such as low-frequency level vocabulary (*blame, hide, hit, invite, pour, and spoil*) or high-frequency level vocabulary (*acquiesce, contaminate, crease, dabble, and squint*) (Nation, 1983).

3.4. Data collection tools and procedures

Referring to previous studies that utilized quantitative data to measure the effectiveness of corpora in collocation competence (Chen, 2011; Daskalovska, 2015; Gheisari & Yousofi, 2016) and writing proficiency (Li, 2017; Reynolds, 2016), in a similar way, the study reported here also employed such data, but with a control group only. While conducting a study with both a control and an experimental group is certain to uncover additional insights not captured in this study, the low number of convenience samples prevented us from having an experimental group. Moreover, our study does not have an experimental manipulation because all of the participants underwent the same experimental protocol. Instead, pre-test and post-test scores were used to quantify the effectiveness of COCA as the prime reference tool in an advanced English EAP course in improving students' writing performance and collocational competence.

To test the difference in means between two data sets from similar sources - students' pre- and post-collocation tests and students' pre- and post-writing assignments - a *t*-test was employed. The pre- and post-collocation tests employed the same set of researcher-made tests that had been adapted from the Academic Word List (V2AV level, academic vocabulary such as *coincide, implementation, and mediate*) in Vocabulary Levels Tests (VLT). The collocation test consisted of 30 questions, including 5 sentence completion questions, 10 multiple-choice questions, 5 paraphrasing questions, and 10 matching questions. Moreover, the pre- and post-writing tests were the students' writing projects on literature reviews that had to include such writing elements as (1) the title of the study, (2) the research question(s) pursued, (3) the purpose

of the project, (4) the research methods employed, (5) major findings, and, finally, (6) a list of sources. These writing projects were then graded based on the following points: introduction, body of the paper, conclusion, references and citations, quality of sources, writing style, and format (see Appendix C). Finally, to investigate the linear relationship between the two dependent variables - lexical collocational competence and academic writing performance - a Pearson product-moment correlation coefficient (Rodgers & Nicewander, 1988) was used to measure the normally distributed data (Table 1).

4. Findings and discussion

The researchers computed the mean values and standard deviation of the pre-test and post-test for lexical collocational competence and academic writing performance (Table 1). In the former, students' post-test scores (M=74.38, SD=15.04) had improved from the pre-test (M=50.63; SD=16.82). In the latter, students' post-test scores (M=85.25, SD=7.55) had equally improved from the pre-test (M=79.00, SD=7.93).

Table 1. Simple descriptive statistics

	Number	Mean	Median	Mode	SD	Variance	Range
Collocation Pre-test	16	50.63	52.50	55.00	16.82	282.92	60.00
Collocation Post-Test	16	74.38	75.00	85.00	15.04	226.25	55.00
Writing Pre-test	16	79.00	80.00	88.00	7.93	62.93	24.00
Writing Post-test	16	85.25	86.00	76.00	7.55	57.00	20.00

Calculating the mean and standard deviation of the pre-test and post-test of both dependent variables, the researchers were able to confirm the hypothesis that EAP students performed well when lexical collocations were explicitly instructed through the use of COCA in an EAP academic writing course.

To answer RQ1 (whether explicit instruction of lexical collocations via COCA improves students' collocational competence in an advanced English EAP course), a dependent *t*-test was conducted. The analysis of a dependent pre- and post-collocational *t*-test showed that there is a statistically significant difference with respect to students' lexical competence in pre-test and post-test scores of M= 23.75, *t*-value= 7.71, *p*-value= <.05 (Table 2). The increase in scores is the result of improved students' performance. Their ability to use lexical collocations may be the result of utilizing COCA profitably to learn lexical collocations which correspond to the VLT

words at the preselected academic level. By explicitly teaching EAP students the different types of lexical collocations and how to systematically search for them utilizing COCA as a viable technological tool, these students were provided with rich opportunities to become all the more aware of the purposeful use of collocations in authentic contexts.

Table 2. Dependent t-test of pre- and post-collocation tests

N	Mean	Std Dev	Mean	95% CL	Mean	DF	t Value	Pr > t
16	23.75	12.3153	23.75	17.1876	30.3124	15	7.71	<.0001

To answer RQ2 (whether explicit instruction of lexical collocations via COCA improves students' writing performance), another dependent *t*-test analysis was conducted. The analysis showed that there is a statistically significant difference between the pre-test and post-test scores of $M = 6.25$, $t\text{-value} = 5.17$, $p\text{-value} = <.05$ (Table 3). The students achieved higher scores in their academic writing assignments. This difference may have resulted from the integration of the lexical approaches (see Appendix D) in the EAP academic writing class.

Table 3. Dependent t-test of pre- and post-academic writing assignments

N	Mean	Std Dev	Mean	95% CL	Mean	DF	t Value	Pr > t
16	6.25	4.8374	6.25	8.8276	3.6724	15	5.17	0.0001

To answer RQ3 (whether collocational competence correlates with writing performance), a Pearson product-moment correlation coefficient was computed. The analysis showed that there was a positive correlation between the two variables, $r = 0.985$, $n = 16$, $p = 0.002$ (Table 4). A scatterplot summarizes the results in Figure 1. A value of 0 indicates that there is no association between the two variables. A value greater than 0 indicates a positive association, that is, as the value of one variable increases, so does the value of the other variable.

Table 4. Pearson correlation of post-collocation test and post-writing test

Pearson Correlation Coefficients, N = 16		
	collocation_posttest	writing_posttest
collocation_posttest	1	0.68832
writing_posttest	0.68832	1

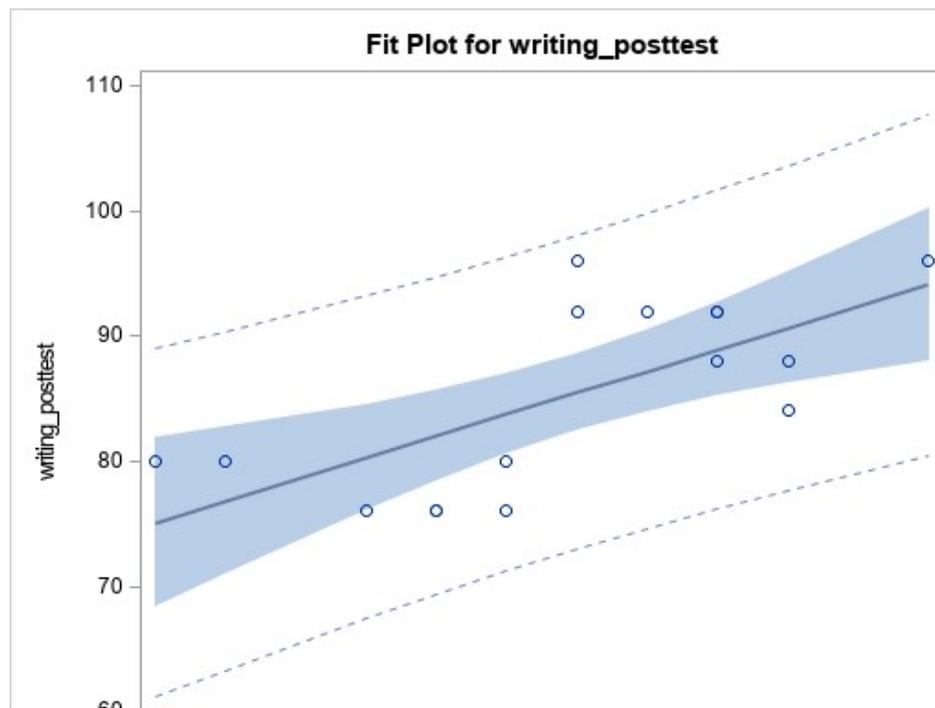


Figure 1. Scatterplot of correlation between academic writing and lexical collocation competences

The results of this study indicate that the change in pre- and post-lexical collocational test scores were statistically significant ($M = -23.75$, $t\text{-value} = -7.71$, $p\text{-value} < .05$). The increase in writing performance of the EAP students who were offered explicit instruction in lexical collocation was equally statistically significant ($M = -6.25$, $t\text{-value} = -5.17$, $p\text{-value} < .05$). In correlation terms, students' lexical collocational competence as a result of explicit instruction via COCA was positively correlated with students' writing performance. Thus, our study confirms that when lexical collocations are taught explicitly in a writing class that strategically employs COCA, there is a notable increase in lexical competence and academic writing performance. These results provide further corroborating evidence to the results already reported in the studies of Robins (1967), Thornbury (2005), and Orenha-Ottaiano (2016), all of which support the

proposition that collocational knowledge can indeed affect L2 learners' linguistic abilities to achieve native-like English proficiency, especially when such capability is contextually nurtured in instructional environments promoting authentic language use. Mahlberg (2006) equally stressed the importance of the cohesive use of lexical collocation in academic writing because it affects the clarity and readability of a text.

It is logical to surmise then that lexical collocations should be taught explicitly through the judicious use of a viable corpus. L2 learners, particularly those enrolled in EAP writing courses, need to become aware of the use of lexical collocations in academic texts and amass the requisite knowledge and skill to employ these collocations *with a purpose* and *for a purpose* within contexts supporting their natural use. Our findings clearly suggest that the ability to incorporate lexical collocations in a passage helped EAP students achieve near native-like fluency. Especially in instruction focusing on lexical collocations, L2 learners should be explicitly taught how to use these word combinations to express meaning in academic writing. Becoming aware of the pivotal role word combinations play in the expression of thought is a necessary first step toward attaining higher levels of lexical collocational competence (Lewis, 2001; Liantas, 2019; Nattinger, 1980). When lexical collocations are instructed explicitly, L2 learners may perform better than when the collocations are instructed implicitly (Orenha-Ottaiano, 2016). Raising learners' awareness of the various subcategories of lexical collocations is an equally important consideration here (Thornbury, 2005).

These pedagogical implications aside, our findings also show that an online corpus should be utilized in collocation instruction. COCA is one of many online corpora language instructors can use to offer their students explicit instruction in English collocation. Specifically, instructors should provide adequate training to their students on how best to search for the most frequent collocations while simultaneously developing a deep appreciation for their use in natural contexts befitting further analysis. As shown, COCA can be used as a suitable reference tool to mediate lexical collocations in an academic writing class. Not only does such a corpus play an essential role in helping L2 learners build their collocational repertoire, but it also helps maximize EAP students' acquisition of linguistic and content knowledge (e.g., Ackermann & Chen, 2013; Aijmer & Simon-Vandenberg, 2006; Belz & Vyatkina, 2005; de Kelrk, 2005). In short, corpora allow EAP instructors and students alike to identify the pragmatic functions lexical collocations serve in written and spoken language (Horváth, 2001; Merckle, 2008).

To sum up, the study reported here involved 16 participants who were majoring in the Master of Science in Marketing. It was conducted over a period of 15 weeks and participants met 18 hours per week. A larger number of participants and a greater length of study may indeed reveal greater improvements in students' lexical competence and academic writing and, conceivably, even show a stronger positive correlation between these two variables. Conducting a study with both a control and an experimental group is certain to uncover additional insights not yet captured in this study. Similarly, the researchers could collaborate with the other EAP instructors at the language institute to further investigate students' improvements in lexical collocational competence and overall writing performance, respectively. And the same reference instrument could again be utilized to gather additional output for another round of analysis likely to yield observations worthy of future investigations.

5. Conclusion

This study investigated the efficacy of explicit lexical collocation instruction via the Corpus of Contemporary American English (COCA). Results obtained herein show that there was a strong, positive correlation between lexical collocational competence and academic writing performances. This findings confirmed the hypothesis that lexical collocational competence as a result of explicit instruction via COCA correlated with academic writing performance. Indeed, as the participants improved their lexical collocational competence based on their pre- and post-test scores on the lexical collocational assessment, they also improved their overall flow and accuracy of their writing performance. There are thus several ways to improve the quality of EAP education, particularly in academic writing courses. Due to space constraints, we only present three such ways in closing.

First, EAP instructors are counseled to provide explicit instruction in lexical collocations. Explicit instruction has already been found to be more effective than implicit instruction as such instruction expedites the development of the four language skills, particularly the learning process of academic writing. Second, EAP instructors should seek creative ways to integrate into their teaching arsenal an online corpus such as COCA. Combined with instructional efforts highlighting lexical collocations and their pragmatic use, corpus-based learning has been shown to have an effect on how well L2 learners ultimately learn the lexical collocations in question. Most definitely, corpus-based learning can mediate the learning experiences of university-level

students enrolled in an EAP course that is exclusively focused on academic writing. Compared to traditional teaching and learning methods of lexical collocations, English-corpora learning has been shown to make students more aware of the ‘mistakes’ - the collocation errors - they commonly make in their writings. As a result of such awareness, they tend to self-edit and correct their mistakes, thereby further improving their collocational competence. Third, EAP instructors should give serious thought to the ways in which they provide feedback to students who tend to commit particular errors in English collocation. And while a corpus-based teaching mode may indeed improve learners’ lexical collocation, pragmatic application, and autonomous learning ability, ultimately, the feedback instructors provide is more than likely to influence the symbiotic relationship that exists between learners’ collocational competence and overall writing skills (Chang, 2018). In the end, lexical collocation instruction in EAP academic writing via COCA is but one way in which the quality of EAP education may be further improved in the years ahead.

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Appendix A. Words drawn from the V2AV level

VLT word: **evidence**

verb + noun	found evidence/provides evidence/indicates evidence
adjective + noun	no/any evidence/forensic evidence/scientific evidence
noun + verb	evidence suggests
noun1 + noun2	a piece of evidence
adverb + adjective	This subcategory for the word <i>evidence</i> was not available in COCA.
adverb + verb	This subcategory for the word <i>evidence</i> was not available in COCA.

VLT word: **method**

verb + noun	used a(the) method/developed a method/design a method
adjective + noun	scientific method/effective method/common method
noun + verb	This subcategory for the word <i>method</i> was not available in COCA.
noun1 + noun2	method of analysis
adverb + adjective	This subcategory for the word <i>method</i> was not available in COCA.
adverb + verb	This subcategory for the word <i>method</i> was not available in COCA.

VLT word: **implementation**

verb + noun	support the implementation/facilitate the implementation
adjective + noun	successful implementation/joint implementation/sustained implementation
noun + verb	This subcategory for the word <i>implementation</i> was not available in COCA.
noun1 + noun2	implementation and development/program implementation/fidelity of implementation/implementation strategies
adverb + adjective	This subcategory for the word <i>implementation</i> was not available in COCA.
adverb + verb	This subcategory for the word <i>implementation</i> was not available in COCA.

VLT word: **accumulation**

verb + noun	prevent the accumulation
adjective + noun	capital accumulation/private accumulation
noun + verb	This subcategory for the word <i>accumulation</i> was not available in COCA.
noun1 + noun2	wealth accumulation/snow accumulation
adverb + adjective	This subcategory for the word <i>accumulation</i> was not available in COCA.
adverb + verb	This subcategory for the word <i>accumulation</i> was not available in COCA.

VLT word: **phenomenon**

verb + noun	explain (this) phenomenon/describe (the) phenomenon
adjective + noun	cultural phenomenon/natural phenomenon/recent phenomenon/widespread phenomenon
noun + verb	phenomenon is known (as)/phenomenon called/phenomenon occurs
noun1 + noun2	weather phenomenon
adverb + adjective	This subcategory for the word <i>phenomenon</i> was not available in COCA.
adverb + verb	This subcategory for the word <i>phenomenon</i> was not available in COCA.

Appendix B. Sample collocational competence post-test questions

I. Multiple Choice Questions: Please choose the correct answer from the four options given.

1. Television news teams from around the world cover the event as Metropolitan Police officers lock down the **surrounding** _____ .

- a. place
- b. area
- c. space
- d. spot

2. The sketch comes nearly five months after the last **piece of** _____ was disclosed by a team of investigators comprised of local, state and federal authorities, including the FBI.

- a. information
- b. clue
- c. evidence
- d. trace

3. UNIDENTIFIED MALE: First off, I really, really enjoy having Mr. Trump here. As a 32-year-old businessperson myself, he is a tremendous _____ **model** for young people like me and that look at him and write down their goals and strive to be better, that is a comment.

- a. role
- b. inspiration
- c. action
- d. icon

4. At a recent colloquium on the New American History, my graduate students **vigorously** _____ a statement from one of their texts. Ann Douglas writes, "America is the only nation to exercise the dubious privilege of never seeing the world, or itself through anyone's eyes but its own."

- a. discussed
- b. critiqued
- c. debated
- d. judged

5. When it comes to protection from the sun, is your standby sunscreen doing the trick? 3.6 million cases of skin cancer will be diagnosed this year alone. Ninety percent of what you consider skin aging may actually be due to **sun** _____. Dermatologists recommend using a sunscreen with an SPF of thirty or higher to block ninety-seven percent of harmful rays.

- a. burnt
- b. light
- c. shine
- d. exposure

6. You do not have to do something if it doesn't relate directly to your primary goals. That's why a firm so important in the grand _____ **of things**.

- a. plan
- b. scheme
- c. devise
- d. plot

7. If a need is powerful enough within an individual, it can positively affect the **intrinsic** _____ of the individual to demonstrate behavior which leads to satisfaction to accomplish the need.

- a. action
- b. incentive
- c. boost
- d. motivation

8. In the end, we completed the project **ahead of** _____, and the trust built amongst the team was strengthened.

- a. intention
- b. schedule
- c. plan
- d. imagination

9. I was just thinking about, you know, I love Beyoncé. Remember she always talks about Sasha Fierce like a lot of, artists have this **alter** _____ where it gives them some oomph when go out on stage. It gives them this confidence.

- a. ego
- b. personality
- c. self
- d. identity

10. Many Japanese say nonchalantly that they are born Shinto, marry Christian, and die Buddhist. “Japanese don’t _____ **themselves** to a specific god or religious doctrine, but they pick parts of established religions and make them their own,” Dr. Yamanaka says.

- a. regard
- b. believe
- c. dedicate
- d. devote

11. Like Barkley, who announced his college choice with a simple **press** _____ and no news conference, Daniels followed suit in the era of social media, letting fans know with a tweet and no cameras and no fancy announcement.

- a. release
- b. media
- c. report
- d. announcement

12. During peak travel times, performance worsens—a fact at all major airports. Peak travel times _____ **roughly** to highway rush hours, although airport rush hours tend to start a little earlier.

- a. equal
- b. associate
- c. correspond
- d. accord

13. This war has nothing at all to do with any of that stuff. It has only to do with the impact of our policies in the Islamic world. And I would say until you get the enemies' motivation straight, it's impossible to have a strategy that will _____ **victorious**.

- a. ensure
- b. emerge
- c. cast off
- d. ray

14. The President's team fully was aware that the memo was going to be discussed and the conversations were going to be discussed at the hearing and had the opportunity when many reporters asked if they would _____ executive **privilege** to try to prevent some of that from being talked about, and they declined that opportunity.

- a. invoke
- b. prevent
- c. execute
- d. utilize

15. According to Sigmund, Freud's psychodynamic theory, an unsatisfactory outcome in psychological development during the first year of life can be a type of oral fixation in which the response to anxiety is to seek oral soothing. Naturally, babies seek food and comfort; in those first months of life, if they receive food and comfort reliably and lovingly, they learn that briefly waiting for food and affection does not mean terror and pain. If a baby never learns to _____ **between** despair over being neglected and accepting mild discomfort when there is a delay before needs are met, impulse control will be poor.

- a. balance
- b. intercede
- c. mediate
- d. resolve

II. Mix and Match Questions: Match each item with its correct collocation.

Group One:

- a. deny
- b. diminish
- c. highlight
- d. minimize
- e. identify

1. Strategies are used to help **accurately** _____ error patterns that are active in the student's speech.
2. This graph is used to _____ the **differences** found between the groups.
3. No one has the right to _____ the child's **access** to education.
4. Sheldon did not intend to _____ the **importance** of Geology.
5. To _____ **risk** of infection from dead birds, any employee who discovers any dead birds should dispose of them at will.

Group Two:

- a. professional
- b. rigid
- c. controversial
- d. neutral
- e. supplementary

1. This short lecture managed to cover the essential topics with brevity, and more information about the topics can be found in the _____ **materials**.
2. He never discloses his feelings which is probably because his childhood was overshadowed by his parents' _____ **rules**.
3. Even though everyone is gossiping about her, her expression **remains** _____.
4. The company received a series of complaints lately because one of the sales associates failed to behave in a _____ **manner**.
5. Although Mr. Thaksin is a successful and a billionaire businessman, he is regarded as a _____ **figure** in Thai politics.

Group Three:

- a. integration
- b. stability
- c. orientation
- d. exploitation
- e. termination

1. You will be subject to an early _____ **fee** if you want to quit early because you have already signed the contract.
2. Measures need to be taken to **prevent** over _____ of the natural resources.
3. **Providing** _____ for children is easier said than done.
4. The meeting is open to everyone, regardless of what their political or **religious** _____ is.
5. The co-existence and development of different cultures is the basic trend of **cultural** _____.

Appendix C. Research paper grading rubric

Name: _____

<p>Introduction</p> <p>Is the topic of the paper clearly and concisely introduced? Does the introduction include a clear and concise statement? Does the information forecast the remainder of the paper for the reader?</p>	<p>/ 15</p>
<p>Body of the Paper</p> <p>Does the paper summarize the articles individually, one at a time, or does it provide a thematic summary of the research drawn upon? Does the paper provide examples to help the reader understand points made? Does the paper synthesize the material reviewed into a few main points? Is all information factually correct? Does the paper provide excellent background, context, and idea development? Does the paper include an excellent discussion of detail?</p>	<p>/ 40</p>
<p>Conclusion</p> <p>Is there a conclusion? Does the paper provide a summary of what has been discussed? Is there an implication or future direction?</p>	<p>/ 15</p>
<p>References & Citations</p> <p>Does the body of the paper cite sources as necessary and have a minimum of 3 sources? Does the paper draw sources from at least 3 peer-review journal articles? Does the citation of all data obtain from other sources? APA citation style is used in both text and bibliography.</p>	<p>/ 6</p>
<p>Quality of Sources</p> <p>Are the sources relatively recent? Is there a variety of sources?</p>	<p>/ 4</p>
<p>Writing Style</p> <p>Is the paper well organized? Is the paper free from grammar & spelling errors? Are there smooth transitions between sections? Does the paper use proper lexical collocation?</p>	<p>/ 16</p>
<p>Format</p> <p>Does the paper follow the margin, font, and page specification found in the paper guidelines? (4-5-pages, 12-point font, 1" margins, double spacing)</p>	<p>/ 4</p>

Total Points: _____ / 100

Appendix D. Sample linear lesson plan

STEP 1 - Review Previous Lesson

Concepts	<ul style="list-style-type: none"> · Definition of lexical collocations · Types of lexical collocations · Definition of argumentative research paper
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STEP 2 - New Lesson Objective

Students are able to: <ul style="list-style-type: none"> · List lexical collocations in an abstract · Use COCA to look for collocations · Write an abstract 	Class: EAP 1851-Graduate Level (English for International Students II)
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Resources Needed	<ul style="list-style-type: none"> · Academic Writing Textbook by Marshall · COCA 	Estimated Time: 1:30
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STEP 3 - Warm-Up

Build Background Knowledge/Interest	Students will consider previous discussion on writing an argumentative research paper and their hypothesis for their paper.
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STEP 4 - Introduction

New Information/ Skills	Students will study the structure of several abstracts from Academic Writing Textbook by Marshall as samples of an argumentative research paper abstracts and search for lexical collocations and their pragmatic use.
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STEP 5 - Presentation

Whole Group Activities	Students will share the lexical collocations they have identified in a sample abstract in Marshall's textbook.
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STEP 6 - Small Group/Interactive Work

Pair, Triad or Small Group Activities	<ul style="list-style-type: none"> · Students will work in triads to look for 6 lexical collocations from a sample abstract, use COCA to look for authentic sentences, and use contextual clues to define the collocations. · Students will either create either a <i>Kahoot!</i> or a <i>Quizlet</i> game that includes the 6 lexical collocations, and engage their classmates in said web-based game.
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STEP 7 - Checking for Understanding

Summative Assessment	<ul style="list-style-type: none"> · Students will construct the abstract for their argumentative research paper. · Students will review the 10 lexical collocations they have learned in class on Google Classroom and do the assessment on Google Forms.
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