

# A Systematic Review of Studies on L2 Collocational Knowledge among Non-native English Learners

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DOI: <https://doi.org/10.37178/ca-c.21.5.061>

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## **Abstract**

*More and more studies came up to investigate L2 collocational knowledge among non-native English learners and yielded fruitful findings. However, there is a dearth of reviews on these studies, and not a systematic review is found. The present study employed “two-stage reviews” strategy for a systematic review. The first stage of review presents a description of the distribution of 115 existing articles, showing that studies are mainly concentrated in Asian countries. Participants are mainly EFL learners and distributed in university setting. Though productive knowledge are more examined than receptive knowledge, studies employing written learner corpora or writing tasks with large scale of data are in deficiency. At the second-stage, the present paper carried out an in-depth review of 36 articles and discussed learners’ problems in L2 collocation production, showing that learners have difficulties in both of accurate use and diverse use of L2 collocations. The problems in lexical collocations are significant and mainly related to lexical choice. Verb-noun collocations cause great problems to L2 learners. L2 learners generally lack the concept of English collocations and often fail to notice collocation restrictions. Additionally, the present study provides some directions for future research and teaching practice.*

**Keywords:** Collocational knowledge, systematic review, non-native English learners

## **Introduction**

Studies have found that native speakers usually express language in form of multiword phraseological units instead of single words [1-3]. According to Schmitt and

Carter [4], a formulaic sequence is a general term for a multiple-word sequence, covering a collocation, an idiom, a proverb, or a lexical bundle. Scholars held the opinion that the competence of this kind of phrasal units eased speakers' psycholinguistic processing, and assisted them in understanding and constructing utterances [5-6]. Henriksen [7] claimed that collocations, being frequent phrasal units, were essential sub-set of formulaic sequences. Through years, collocations were defined in many ways, mainly from the perspective of frequency-based approach and from the view of phraseological approach (the main representatives were [8-9]). The present paper quotes Laufer and Waldman [10] definition that collocations are "habitually occurring lexical combinations that are characterized by restricted co-occurrence of elements and relative transparency of meaning" (p.648).

In the last two decades, there has been an increase in the number of studies exploring non-native speakers' use of English collocations. Some studies claimed that non-native learners had difficulties in L2 collocation use and L2 collocational competence improved slowly (e.g. [10-13]). Some studies explored patterns or problems in L2 collocation production, or factors that affect the acquisition of L2 collocations. These studies have yielded fruitful findings (e.g. [14-18]). It is very necessary to conduct a systematic review on these empirical studies. From a systematic review, we could see features of the distribution of these studies. It would benefit researchers for further studies with research gaps. Additionally, we could synthesize significant problems in L2 collocation use from what most of studies have found out. It would provide learners and teachers first-hand data to understand the nature of L2 collocation acquisition and learners' difficulties. However, there is a dearth of comprehensive reviews on these studies, especially for the studies carried out in the late 10 years.

We found a limited number of reviews on studies about L2 collocation acquisition, but they used a narrative method based on less exhaustive search strategies, and some reviews are not restricted to empirical studies. Among these reviews, in particular, three of them focused on studies about L2 collocation teaching practice (i.e. [19-21]), additionally, the review of Gablasova, Brezina and McEnery [22] concerned corpus technology in L2 collocation research, Goulart [23] investigated a relation between language proficiency and collocation use among L2 learners, and a book-length volume reviewed studies with a focus on constructing learner corpora, pedagogical materials, collocation assessment and learning process of L2 collocations (i.e. [24]). Last but not least, Pei [25] and Henriksen [7] reviewed studies about learners' knowledge of L2 collocations. Pei's [25] review is based on quite limited references and some of the articles were published in Chinese language. Henriksen's [7] review is more extensive than Pei's review. However, these two reviews were both conducted based on a narrative method, and half of the studies covered in the reviews were carried out before 2000.

In conclusion, the existing reviews on studies of L2 collocation acquisition employed a narrative method. A narrative review usually provides a descriptive synthesis on selected studies, but lacks of a systematic literature search. Based on the research gaps stated above, the present paper aims to carry out a systematic review. Unlike a traditional narrative review, a systematic review adopts a systematic search of literature to identify, appraise, and synthesize all of the existing articles relevant to research topics. A systematic review aims to reduce literature selection bias [26].

### **General Aim and Review Questions**

Generally, the present paper intends to synthesize existing empirical studies about L2 collocational knowledge among ESL and EFL learners, including receptive and

productive knowledge. In the synthesis, the paper aims to find out gaps of existing studies and identify learners' problems in L2 collocation production. First of all, the present paper intends to provide readers a general description about the distribution of existing empirical studies on the topic. And then we intend to review a more narrow scope of studies in-depth to find out difficulties faced by learners in production of L2 collocations.

Based on the general objectives of the present paper, two questions are proposed as follows:

- How are empirical studies about L2 collocational knowledge among ESL/EFL learners carried out between 2000 and 2020 distributed?
- What are the problems faced by ESL/EFL learners in L2 collocation production?

### ***Methodology***

It was claimed that different strategies should be used to describe and synthesize different kinds of evidence to answer different questions in a systematic research synthesis [27]. EPPI-Centre, affiliated to University College London, is devoted to develop methods for systematic reviewing and synthesis of research evidence. It proposed two-stage reviews strategy which caters for the needs of breadth and depth of a systematic review. The first stage usually describes information of generic variables such as countries where studies conducted, population and methodologies, etc. The first-stage review conducts a simple synthesis of the existing studies, which can help reviewers to address a broader field of research and provides readers an overall view of studies on the topic. EPPI-Centre [27] suggested that with limit of time and effort, reviewers may narrow and refine the scope of studies at the second-stage review. It can be achieved through narrowing the inclusion criteria of the first stage to identify the sub-set of studies for an in-depth synthesis. With the aims of the present study, we employed "two-stage reviews" strategy proposed by EP-PI-Centre [27].

Before a literature search, a systematic review needs an explicit review protocol to predefine the criteria for inclusive and exclusive studies. This part introduces inclusion and exclusion criteria, data search and data selection.

#### *Inclusion and Exclusion Criteria*

Based on the aims, the present paper covers the empirical studies that were

- with original data published in English between 2000 and 2020;
- published in peer-reviewed journals, book chapters, conference proceedings, or thesis of doctorate degree;
- with focus on L2 collocational knowledge, including receptive and productive knowledge;
- and with focus on EFL/ESL learners.

Studies are excluded if they are epistemological commentaries or review papers, or if they focus on

- other types of formulaic sequences/multi-word units, such as idioms, lexical chunks or proverbs, etc.; or if the investigation of collocations only accounts for a small proportion;
- technology or development of learner corpora;
- or development of syllabus or teaching materials.

Studies covered by the first stage of review were selected based on the inclusion

/exclusion criteria mentioned above. And studies at the second stage were selected from the pool of the first-stage studies if they

- focused on learners’ productive knowledge of L2 collocations;
- employed written corpora/writing tasks methods for data collection (as to the studies using mixed methods, only the part using written corpora/writing tasks methods would be covered);
- and possessed data size more than 5000 words.

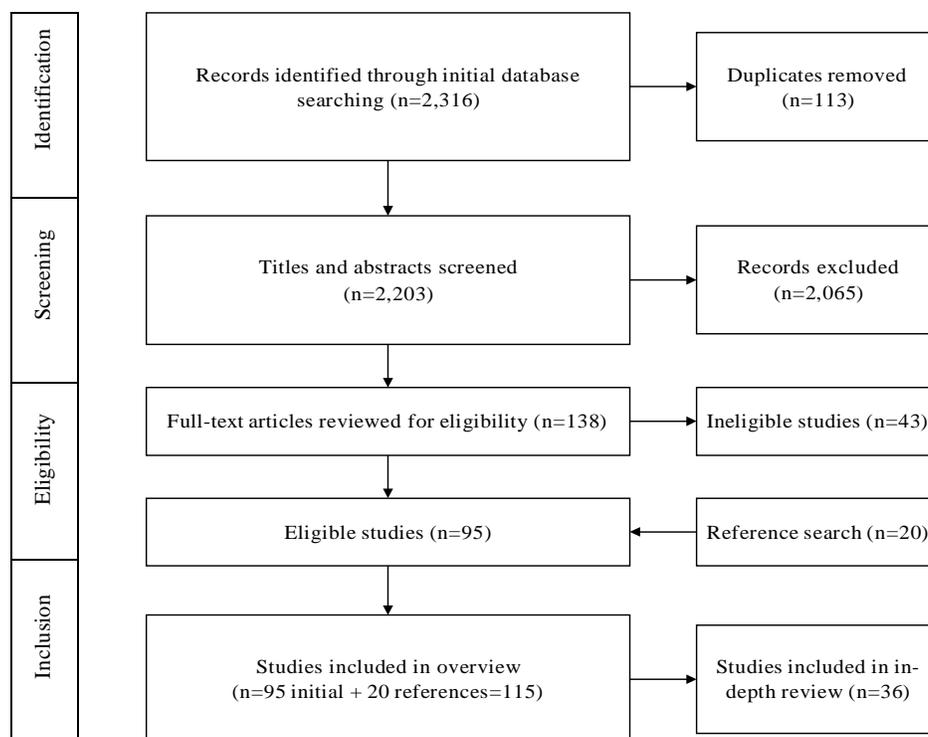
**Literature Search and Selection**

We conducted the literature search according to the guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), proposed by Moher, Liberati, Tetz-laff, Altman and Prisma Group [28]. The search results are presented in the Figure 1.

As is shown in Figure 1, firstly, we conducted an electronic literature search in five databases, i.e. Education Resources Information Center, JStor. Art & Sciences, Elsevier Science Direct, Proquest Direct, and Elsevier-Scopus. Search terms consist of three parts as described below. The initial search yields 2,316 articles, in which 113 duplicate studies were removed, with 2,203 articles left. Secondly, the titles and abstracts of 2,203 articles were screened, and the screening procedure excluded 2,065 articles.

*Figure 1*

**PRISMA diagram of search of studies on L2 collocational knowledge among non-native English learners**



Thirdly, the remaining 138 articles were downloaded for further full-text inspection, and then we excluded 43 articles according to the first-stage review criteria and gained 95

eligible studies. In order to retrieve optimum literature, 20 additional eligible articles were obtained from reference lists of the initial included studies. All in all, a total of 115 articles were selected for the first-stage review. And furthermore, 36 studies were picked out from the pool of the first-stage studies for the in-depth synthesis at the second-stage, according to the specific inclusion/exclusion criteria for second-stage review.

### *Search Terms*

To ensure for retrieving optimum literature, the search terms cover as many as their variants and synonyms. The searched terms consisted of three parts. The first part of terms is about collocation. Considering that collocation is a subset of formulaic sequence, the searched keywords for this part include collocation, formulaic, and formulaic sequence. The second part of terms is about English learning. The searched keywords for this part are English, English learning, and English acquisition. The last part of terms is about second language learners. The searched keywords consist of second language learners, foreign language learners, Non-native learners, second language learning, second language acquisition and second language. These groups of terms were combined based on the search strategy using Boolean operators (see Atkinson & Cipriani, 2018 for details).

### *Findings*

The findings are illustrated in two parts. The first part shows results of the first-stage review to answer the first research question. The second part presents results of the second-stage review to answer the second research question.

- First-stage Review: How are empirical studies about L2 collocational knowledge among ESL/EFL learners carried out between 2000 and 2020 distributed?

We categorized general information of existing studies in terms of years, participants' nationalities, education levels and L2 proficiencies, as well as methods for data collection. Table 1 shows the distribution of years and participants' nationalities. These studies are generally distributed over 20 nationalities except for 18 studies on participants of different nationalities. Studies conducted on Chinese L2 learners (Mainland and Taiwan) and Iranian L2 learners were the most, equally accounting for about 16.5%, followed by studies on blended participants of different nationalities (15.6%) and Thai participants (about 8.7%), ranking on top four in the list. In general, the existing studies were carried out mainly in Asian countries, and concentrated in several countries, such as China, Iran, Thailand and etc. The participants involved in these studies are mainly English learners as foreign language. Additionally, we can see that the number of studies increases over the years. Studies carried out during the late 10 years almost triple those conducted between 2000 and 2010. Especially, studies from 2011 to 2015 are the most.

Regarding to education levels of participants, as was shown in Table 2, a majority of studies were conducted on undergraduate students (69%). In contrast, merely a small part of studies involved postgraduate students (9%) and secondary or high school students (6%). In addition, about 10% of studies are on students of blended levels (e.g. postgraduate and undergraduate), and 3% of studies are on informal-school adults who take language courses in language institutes.

Table 1

## Distribution of years and participants' nationalities (n=115)

Nationalities	ESL/EFL	2000-2005	2006-2010	2011-2015	2016-2020	Total
		n=12	n=1	n=51	n=33	n=115
Chinese	EFL	2	9	4	4	19
(Mainland/Taiwan)						
Iranian	EFL	0	2	14	3	19
Blended participants	ESL/EFL	4	3	7	4	18
Thai	EFL	0	1	4	5	10
Arabian	EFL	3	0	3	3	9
(Saudi/Jordanian/Libyan)						
Malaysian	ESL	0	0	4	2	6
Japanese	ESL/EFL	1	1	2	1	5
Korean	EFL	0	1	0	4	5
Polish	ESL/EFL	1	1	1	0	3
Russian	ESL/EFL	0	3	0	0	3
Swedish	Unclear	0	0	2	1	3
Turkish	EFL	0	1	0	2	3
Spanish	Unclear	0	0	1	1	2
Chinese	ESL	0	1	0	0	1
(Hongkong)						
Dutch	EFL	0	0	1	0	1
German	Unclear	1	0	0	0	1
Iraqi	EFL	0	0	1	0	1
Italian	EFL	0	1	0	0	1
Burmese	EFL	0	0	0	1	1
Nigerian	ESL	0	0	1	0	1
Pakistanis	ESL	0	0	0	1	1
Vietnamese	EFL	0	0	0	1	1
Unclear	Unclear	0	0	1	0	1

Note: The statistics of ESL and EFL were based on the descriptions of participants in the studies. The participants who were not described as ESL or EFL in the studies were marked unclear, and the participants consisting of ESL and EFL were marked ESL/EFL in this table

When we look into proficiencies of participants, most of studies (83 out of 115 studies) involved participants of single-level proficiency while only 32 studies involved participants of blended proficiencies. The results suggest that participants involved in

existing studies are relatively concentrated in university setting, and merely a small part of studies examined L2 collocation use from a perspective of competence development.

Table 2

### Distribution of education levels of participants (n=115)

Education level	Number of studies (n=115)	Percentage
postgraduate	10	9%
undergraduate	79	69%
secondary/high school	7	6%
Informal-school adults	3	3%
blended	12	10%
no description	4	3%

Table 3 presents a general distribution of research methods for data collection. We referred to the categories of research methods in Henriksen's [7] study. Results show that a majority of studies (about 96%) investigated written output of L2 collocations and they are distributed in three general categories of methods which are "essay writing or written corpora", "offline elicitation tests", and "online reaction tasks". According to types of output tasks, productive knowledge (about 64%) is more examined than receptive knowledge (about 36%). However, studies employing written corpora or essay writing methods account for slightly more than a half (about 57%), and only a small proportion of them possess data more than 20,000 words (about 28%). The results suggest that studies with large scale of data are in deficiency. Additionally, online reaction tasks were rarely used (about 10%), but the number in recent 10 years are bigger than that in last 10 years.

Table 3

### Distribution of methods for data collection

Methodologies	2000- 2005 n=15	2006- 2010 n=22	2011- 2015 n=61	2016- 2020 n=43	Total n=141
<b>Written corpora, essay writing</b>					
Above 20,000 words	2	5	13	4	24
Under 20,000 words	2	6	11	6	25
<b>Offline elicitation tests</b>					
Written translation	2	2	6	2	12

Gap filling /cloze tests	4	2	8	11	25
Multiple choice/ matching/ acceptability judgment	4	4	8	11	27
C test	0	0	3	1	4
Error recognition and correction	1	0	0	1	2
Associate test	0	1	1	0	2
<b>Online reaction tasks</b>					
Online recognition	0	1	4	5	10
Self-paced reading	0	0	2	0	2
Eye-tracking	0	0	0	2	2
<b>Oral production</b>					
	0	1	5	0	6

Note: The statistics of Table 3 were obtained according to occurring frequencies of each method because 21 articles utilized multiple methods, in which, 16 articles used 2 methods and 5 articles used 3 methods. Thus 115 articles obtained an amount of 141 occurring frequencies of all types of methods.

### *Summary of Findings on Distribution of Studies*

*Results of the first-stage review have shown four main features for the distribution of existing studies.*

Firstly, studies were carried out mainly in Asian countries, and relatively concentrated in several countries, such as China, Iran, and Thailand.

Secondly, the levels of participants involved in studies are lack of diversity. A majority of studies were conducted on EFL learners. Most of participants are on similar levels of education (i.e. the undergraduate students), and only a small part of studies involves learners of stratified proficiencies. From the results, we might learn that only some of studies conducted comparative studies on participants of different levels.

Thirdly, productive knowledge of L2 collocations are more examined than receptive knowledge. However, studies employing written learner corpora or writing tasks with large scale of data are in deficiency. Additionally, it is worth noting that studies employing online reaction methods, though accounting for a small part, were increasing in the late 10 years, which might imply that scholars become more interested in exploring working mechanisms or underline principles of L2 collocation use by conducting research with more delicate design.

Fourthly, more and more studies were carried out to examine L2 collocational knowledge. Recent 10 years, especially the period between 2010 and 2015 witnessed a great increase in the number of studies.

*Second-stage Review: What are problems faced by ESL/EFL learners in L2 collocation production?*

As Nesselhauf [11,29] pointed out, in comparison with elicitation tests, learners' writings or large learner corpora had advantage to look directly into what learners actually produced under a natural output condition. In order to find out difficulties that ESL/EFL learners have in L2 collocation production, we conduct an in-depth review on studies examining writings or written corpora. 36 studies have been selected by the inclusion/exclusion criteria, of which, 28 studies mainly look closely at learners' deviant collocations among different patterns, and 8 studies put focus on learners' overuse or underuse phenomenon. As to articles containing multiple sub-studies employing different research methods, we only analyze the findings of sub-studies that employed written corpora or essay writing methods.

### *Deviant Collocations among Different Patterns*

Some studies investigated both lexical and grammatical collocations, some studies specially examined lexical collocations or grammatical collocations, and some other studies only focused on some certain patterns of collocations, such as "verb-noun", "noun-noun", or "preposition related" collocations. Some major conclusions which generally reach agreement among most of studies can be drawn as follows:

First, L2 learners face problems in both lexical collocations and grammatical collocations. However, they are more likely to make mistakes in lexical collocations than grammatical collocations. (e.g. [30, 31]). In particular, Anwar and Khan [30] found that Arabian postgraduate students produced more lexical collocations than grammatical collocations, while errors in lexical collocations (52.68%) were more than grammatical collocations (11.61%). Like-wise, similar finding was obtained by Mahmoud [31], with 53.33% incorrect lexical combinations and 10.71% incorrect grammatical combinations found in the writings of Arabian university students. In addition, Thai university students also made more errors in lexical collocations than in grammatical collocations.

Second, problems in verb-noun collocations are outstanding to L2 learners. Some studies compared error rates among different patterns of lexical collocations such as verb-noun (or noun-verb), verb-adverb (or adverb-verb), adjective-noun, and adverb-adjective, and found that errors in verb-noun combinations were the most [31, 48, 43].

Furthermore, some studies specifically investigated verb-noun collocations and found that errors on verb-noun collocations were usually related to wrong choice of verbs or nouns, or verb-prepositions. Wrong choice of verbs occurred the most, followed by wrong choice of nouns (e.g.[11, 45]).In addition, some studies found that learners had problems in using verbs of high frequency, especially in delexicalized use (e.g. [36])A case in point, French, Swedish and Chinese learners were often confused about the delexicalized use of "do" and "make" in collocation production [35,45], Third, some studies found that the degree of restriction to combinations influenced L2 collocation production. Nesselhauf [11] found that L2 learners made the most of errors in collocations with a low degree of restriction. This finding is supported by the empirical evidences from Martelli's [43] study. In Martelli's [43] study, Italian students were found to make mistakes more frequently to collocations with a low degree of restriction in both of verb-noun and adjective-noun patterns. Additionally, Wang and Shaw's [45] finding is a supplement to the relation between the degree of restriction and errors. They found that the major problem on free collocations was mismatch between lexical items, while the major difficulty on restricted collocations was related to the use of determiners and number of noun collocates (i.e. plural noun or singular noun) as regard to verb-noun collocations. In other words, this finding suggests that wrong choice of lexis often occurs to collocations with a low degree of restriction.

Fourth, in terms of grammatical collocations, some studies found that L2 learners

had difficulty in using preposition-related collocations, and errors were usually related to preposition omission, preposition addition, and incorrect use of prepositions [30-34].

#### *Overuse and Underuse phenomenon in L2 collocation production*

Some studies examined overuse and underuse phenomenon in L2 collocation production. The findings mainly reveal that L2 learners tend to overuse some simple or favored collocates, and on the other hand they rarely use novel collocates or collocations of low-frequency in target language (e.g. [34-40]). The details of findings are introduced as follows.

Three studies were conducted on Chinese EFL learners and found that Chinese learners were apt to employ lexical simplification strategy and use a narrow range of simple words in collocations. The examples illustrated in Fan's [38] study are that the item "fat" was used as many as 21 times together with "man" by learners but it was only used once in British corpus, and additionally that the amplifier "very" was used 15 times in "intensifier+adjective" pattern by learners but only 7 times in British corpus. Nesselhauf [11] focused on three synonymous words, i.e. "big", "large", and "great" and found that learners overused collocations with "big" to express some abstract concepts or vague ideas. Moreover, Xia [39] examined the verb "ability" in collocation use and found that Chinese learners were prone to overuse "have" to collocate with "ability" under the influence of first language.

Some studies were conducted on blended participants of different nationalities. Yoon [40] checked the association strength of verb-noun combinations produced by non-native learners across 5 nationalities. The study found that low-frequency collocations were underused by all of these learners in comparison to native speakers. Durrant and Schmitt's [37] study involved participants of 7 different nationalities. The study found that learners tended to repeat favored collocations and overuse high-frequency collocations, while rarely used low-frequency combinations, especially those with high MI scores but novel in target language.

In addition, some studies found that learners underused collocations of delexical structure and often made errors on delexicalized verbs in "verb-noun" collocations (e.g. [35-36]). Last but not least, Ang and Tan [33] examined the use of preposition-related collocations among Malaysian learners and found that learners over-used some certain prepositions without being sure of their correct use, which suggested that these prepositions seemed to be fossilized in Malaysian learners' writings.

## **Discussion**

### *Major Problems in L2 Collocational Production*

The in-depth review at the second stage presents that problems in L2 collocation production are related with both lexical and grammatical aspects, but lexical problems seem to be more complicated and challengeable than grammatical problems. Due to limited length of the pre-sent paper, this part mainly discusses major problems in lexical aspect.

According to the definition by Cross and Papp [41], collocations are "arbitrarily restricted typical word combinations" (p.58). Sometimes, two words combine with each other based on their semantic properties. This type of combination is called free combinations whose restrictions seem flexible [42]. However, collocating rules are quite complicated and arbitrary in collocations where some words may collocate with a limited

number of words. For example, we can say “take a picture” or “take a photo”, but we cannot say “take a film/movie”, and this rule cannot be explained semantically (see [11]). It is hard to tell a clear rule to explain the collocating restriction between these component words. Nesselhauf [11] claimed that it was difficult to draw the distinction between “the semantically motivated restriction and the arbitrary restriction” of free combinations and collocations respectively both in theoretical and practical way. Therefore, if learners fail to notice the restriction of a collocation, they would probably produce the collocation based on semantic properties in the way of a free combination, running a risk of making mistakes in lexical choice. Thus, it is not surprising to the finding that L2 learners have significant lexical problems when they produce English collocations.

The finding that mistakes of lexical choice are apt to occur to collocations with a low degree of restriction seems to suggest that collocations with a low degree of restriction are hard to catch learners’ awareness, probably because they are more like free combinations. As was shown in Nesselhauf’s [11] and Martelli’s [43] study, learners made more mistakes to verbs that collocate with a wide range of nouns than those having a small set of collocates. Nesselhauf [11] explained that collocations with high sense of restriction were probably often acquired and produced holistically while those with a low degree of restriction were often produced by learners in creative way. These findings suggest that L2 learners might be inadequate to distinct collocations with a low degree of restriction from free combinations.

With regard to various patterns of collocations, verb-noun collocations cause great trouble to L2 learners. In comparison with other types of collocations, using verb-noun collocations seems to be more complicated. Mastery of a verb-noun collocation involves not only correct choice of verbs and nouns, but sometimes involves delexicalized use of verbs (e.g. [35, 44]) the use of verb-preposition structure (e.g. [32 34]), as well as the use of whole combinations including pre- and post-modification patterns of nouns, such as “take pride in” (see [11]).

One of significant problems of verb-noun collocations lies in the use of some high-frequency verbs (e.g. [35, 44, 45]). Altenberg and Granger [35] pointed out that high-frequency verbs “were characterized by a high degree of polysemy” and the choice of these words in collocations were usually arbitrary. Due to complexity of meanings and delexicalized structures in use, high-frequency verbs, though are often encountered by learners and seem “safe” to learners at the first sight, turn out to be problematic as well. Probably, learners fail to notice the collocation complexity of high-frequency verbs. As was shown in Chen’s [47] study, learners liked to create free combinations that consist of highly frequent words, and learners by inter-viewed reflected that they considered collocations as two words combined freely following grammatical rules. The findings suggest that collocation knowledge of high-frequency verbs is easily to be neglected. Sometimes learners make mistakes on a L2 collocation not because they are unfamiliar with single words, but because they might not be clear about what words can or cannot collocate with these single words.

In general, L2 learners possess rough lexical collocation knowledge in vocabulary learning. Without accurate collocation knowledge of words, learners would be easily influenced by mother language, employing L1 translation strategy, synonymy or approximation strategies in production (e.g. [47]), or they would make overgeneralization errors. For example, as was shown in Huo’s [48] study, Chinese students, because of generalizing rules of “play+noun” structure, produced deviant combinations like “play computer” and “play sports”. Wang and Shaw [45] discovered that learners tended to blend free combinations with restricted collocations and produced some deviant combinations such as “do the pollution”.

From above sources of errors, we seem to learn that the underlying reason for

learners' inaccurate use of lexical collocations might be that L2 learners are lack of the concept of lexical collocations. Or we may assume that learners do not distinct lexical collocations from free combinations. Learners may produce semantically-motivated combinations without awareness of restrictions on lexical choice. As claimed by Chen (2017), learners produced a high ratio of created combinations probably because they lacked awareness of collocations, rather than make an attempt to produce novel collocations. This phenomenon might be attributed to the influence of open choice principle, a traditional way of description language, where language text was considered as a great number of open-up choices which was only restrained by grammaticalness (Sinclair, 1991). In the tradition of language teaching, grammatical rules and individual words were considered as two important issues [45]. Learners get used to acquire vocabulary in unit of single words, putting a lot emphasis on improvement of vocabulary size [49], but usually do not notice collocational relationship between words.

Some other studies have concerned overuse or underuse phenomenon in L2 collocation use. The major problem found on this aspect is that L2 learners overuse some favored or simple collocating words, and on the other hand, underuse low-frequency or innovative collocations. This problem in surface reflects that learners have a limit range of vocabulary, but in depth might reflect that learners are poor in collocational knowledge. Many studies have shown that collocational knowledge improved slower than vocabulary knowledge to L2 learners. Under the influence of "decontextualised word learning" tradition [50], learners might memorize a lot of individual words from word lists but might not be clear about collocational relations between words that they have learnt. Thus they would rely on words which they consider "safe" in collocation use. This kind of "safe" words would be more easily retrieved when they are often used in collocation production and become the "collocational teddy bear" [29] If learners keep using a limit range of collocations repeatedly in their writings, the development of diverse collocational knowledge will be inhibited.

Though overuse or underuse phenomenon is unavoidable to L2 learners before they get to native-like proficiency, it is noting that some "safe" collocations produced by L2 learners are not real collocations. Shih [51] found that Chinese learners tended to overuse collocations with "big" to refer to abstract concepts and vague expressions, resulting in production of deviant collocations. Ang and Tan [33] found that Malaysian learners were apt to over-use some prepositions and at the same time kept using them in combinations without con-firming their correctness. Chen (2017) claimed that L2 learners relied heavily on pseudo collocations created in the way of free combinations. These findings indicate that some certain collocating words overused by learners might be fossilized in learners' mental lexicon. Without corrective feedback timely, learners might keep using these created combinations in writing and might not be aware of their deviance.

All in all, many studies showed that L2 collocation use caused considerable problems to L2 learners, even at an advanced level (e.g. [11, 29, 52, 53]). The problems discussed in the present study suggest that accuracy and diversity in L2 collocation use are two important aspects worth noting in L2 collocation acquisition.

### ***Directions for Future Research and Teaching Practice***

The first-stage review shows that a majority of studies are conducted on participants from Asian countries who are mainly EFL learners. In contrast with ESL learners, EFL learners might have more problems in L2 collocation acquisition because they are lack of the expo-sure to target language. Due to different teaching and learning environments, interlanguage systems between EFL learners and ESL learners are supposed to be quite different. Thus, in the future, more "Contrastive Interlanguage

Analysis" [57] studies should be done to explore similarities and difference between EFL learners and ESL learners in L2 collocation use. Contrastive Interlanguage Analysis may provide valuable data to understand factors in L2 collocation acquisition, such as cross-linguistic traits, learning strategies, teaching settings, input-related environments, learner-related factors (such as confidence, creativity), etc.

The distribution of methodologies employed by existing studies shows that offline elicitation methods are most used by studies on L2 collocation use, but many of them are quite limited in sample sizes, item sizes and item scope. Though these studies have yielded fruitful findings, the findings need to be further proved by studies employing larger data, especially under a natural output condition, or utilizing other methodologies, such as online reaction experiments which are more likely to provide delicate data of mental processing of L2 collocations. What is more, future studies are expected to use mixed methods to explore learners' collocational knowledge from multiple perspectives, which allows advantages of each methodology to be integrated. At the meantime, diverse participants across a wide range of education levels and of stratified proficiency levels are expected to be seen in the future studies.

In general, many of previous studies examined L2 collocation knowledge merely through comparing producing rates or error rates among different patterns of collocations. The data analysis of many studies lacks detailed descriptions of deviant features of unacceptable collocations, for example, based on a delicate lexical categories as was shown in Nesselhauf's [11, 29] studies. Future studies should not only be restricted to find out what learners are able to or not able to produce, but also tell delicate features of deviances existing in learners' interlanguage.

The last point worth noting is that, definitions of collocations given in many of studies are vague and diverse, and moreover, some studies lack operational definitions and clear procedures on how to retrieve target combinations. These factors would affect the validity of studies and make it difficult to compare findings across different studies. Therefore, future studies are expected to delimit their research to a definite operational definition of collocations and provide clear research procedures.

Based on problems we have discussed above, the present study has obtained the following implications for teaching practice.

The first issue is related with learners' awareness of collocations. To increase learners' collocation concept, vocabulary syllabus should cover more content about collocations. In-structures should put more focus on collocational relationship between words both in teaching materials and teaching activities, as well as teach collocational restrictions explicitly.

The second issue is about what kinds of collocations should be highlighted and taught explicitly in the class. At the open-end of the collocational continuum, lexical collocations have more transparent meanings and look more like free combinations [9]. Instructors should highlight some lexical collocations especially with a low degree of restriction in class, and help learners distinct them from free combinations. In addition, verb-noun collocations should also get special attention in teaching, especially to complicated use of verbs. In addition, Nesselhauf [11] suggested that L1-L2 non-congruent collocations should also receive special concern in class. Instructors should help learners notice L1-L2 difference when they learn non-congruent collocations. In general, unlike native speakers, being lack of massive exposure to target language, it is quite hard for L2 learners to fully follow arbitrary restrictions of English collocations [11]. Before learners are adequate to master restrictions, it seems inevitable to encourage learners to acquire them as a whole. Memorization strategy is proved to help human mind to reduce processing effort [54]. Therefore, the present study holds the opinion that to acquire a collocation and store it as a whole is an effective way to improve the accuracy

in collocation production, at least to the learners who are at the primary level of proficiency and lack sufficient exposure to target language.

The third issue is about how to improve diversity of collocations in learners' writings. Existing studies show that Chinese students are cautious in selecting collocating words and usually like to use "safe" words repeatedly (e.g. Cross & Papp, 2008) [55]. Firstly, a lack of exposure to target language and input resources such as the style of textbooks had great influence on diversity in collocation production [56]. An interview about learning sources of Chinese students reveals that a majority of students acquired collocations in class [46]. Cross & Papp [55] argued that many example sentences of English used in the textbooks in Mainland China were created, lacking contextualization. To improve this condition, textbooks for English class should often be updated with as much as authentic native language. In addition, instructors should provide sufficient authentic materials to learners for reading after classes. Secondly, learners should be encouraged to use newly-learnt collocations or novel collocations. An issue worth noting is that when we encourage learners to make great efforts to use diverse collocations, we should motivate learners to do correction on their production. Corrective feedback could be obtained from teachers, classmates, or dictionaries. If learners fail to get corrective feedback timely, deviant collocations might be used repeatedly and be fossilized in interlanguage as we discussed above.

### **Conclusion**

The present paper is an exploratory systematic review to employ two-stage review strategy to review empirical studies investigating L2 collocation use/knowledge among EFL/ESL learners. The first-stage of review presents a general description of the distribution of 115 existing articles with regards to the years, the nationalities and the proficiencies of participants, as well as methodologies. These studies are mainly concentrated in Asian countries. Participants selected by these studies are lack of diversity. Though the studies examining productive knowledge are more than those examining receptive knowledge, the studies employing written learner corpora or writing tasks with large scale of data are in deficiency. At the second-stage, the present paper carried out an in-depth review of 36 studies and discussed learners' problems in L2 collocation production, showing that learners had difficulty in both of accurate use and diverse use of L2 collocations. The problems in lexical collocations are significant and mainly about lexical choice. Verb-noun collocations cause great problems to L2 learners. In general, L2 learners are lack of the concept of English collocations and fail to give enough attention to collocation restrictions, which is the underlying factor that influences the accuracy in collocation production. Finally, the present study pro-vides some directions for future research and teaching practice.

At the same time, the present systematic review has its limitations. Firstly, existing studies about L2 collocation acquisition cover a wide range of topics, such as collocation teaching practice, collocation learning strategies/process, collocation assessing techniques, learner corpora techniques, etc. In order to make clear and operable inclusion/exclusion criteria for a systematic review, the present paper is delimited on L2 collocation use/knowledge. Secondly, collocations, as a subtype of formulaic sequence, are usually covered by studies investigating formulaic sequence, but considering that collocations only account for a small proportion in these studies, and these studies lack discussion on learners' problems based on specific features of collocations, the present paper had ignored studies investigating formulaic sequence in general sense. Thirdly, the present paper only covered studies published in English language, which might ignore some studies published in local language and in local journals.

All in all, the limitations in the present systematic review might disappoint readers who concern a wide range of related issues about L2 collocation acquisition and all of subtypes covered by formulaic sequences, but to look back at the aims of the present paper, the limitations do not exert virtual influence on major findings about L2 collocation knowledge in the present systematic review.

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