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Article

Relationship Between Collocational Competence and Collocation Learning Strategies in an English for Specific Purposes Context

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Abstract
Development of L2 learner's collocational competence is among the most complex aspects of language acquisition. It is strongly influenced by external factors such as instruction, L2 language proficiency, L1 influence, as well as the psychological-affective ones such as motivation and language learning strategies. Collocation learning strategies (CLS), a subcategory of vocabulary learning strategies, can be defined as mental and physical actions learners consciously use to assist them in the specific task of learning collocations. The overall aim of this study was to examine the relationship between collocational competence and CLS in an English for specific purposes (ESP) context. ESP collocations are multi-word expressions containing at least one specialised term which is usually the node of collocation. CLS frequency use was measured by the CLS Questionnaire (Tabak, 2022). The collocation knowledge test included the following three parts: 1) receptive knowledge test, i.e., a combination of a fill-in-the-blank and multiple-choice task, modelled after the COLLMATCH format (Gyllstad, 2007), 2) test of receptive-productive knowledge of whole collocations adapted from the CONTRIX format (Revier, 2009), and 3) productive knowledge test, i.e., an L1-L2 translation task. Multiple regression analysis revealed that CLS are not a significant predictor of receptive collocation knowledge. CLS referring to learning collocations in context emerged as a positive predictor, and organisational CLS as a negative predictor of receptive-productive and productive collocation knowledge. Also, CLS referring to discovery of collocation meaning by guessing negatively correlated with the translation test scores. The results point to the importance of teaching and learning collocations in context.

Keywords
Collocation learning strategies, collocational competence, collocation testing, ESP

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1 Introduction

In applied linguistics, collocations have been extensively researched in vocabulary acquisition studies as an important part of lexical competence since collocational competence contributes to language proficiency. Most of the previous studies (Gitsaki, 1999; Wray, 2002; Nesselhauf, 2003, 2005) suggest that second language (L2) and foreign language (FL) learners often experience difficulties with collocation recognition and production, which, in turn, becomes a source of many language errors. Many studies have attempted to identify the reasons for this challenge. Some of the factors that might impact collocational knowledge are intralinguistic, while others refer to the learner and the learning environment. Intralinguistic factors mainly refer to collocation-specific features such as frequency of occurrence and co-occurrence, morphosyntactic structure, span, or transparency. Some of the more prominent external factors include characteristics such as the age of onset and cut-off for collocation acquisition, L2/FL input and output, instruction, L2 proficiency, first language (L1) influence, learning strategies, and motivation.

To be more successful in their language acquisition, learners use various learning strategies. These strategies can be task-specific and related to language skills. In this respect, there are various types of strategies, such as reading strategies or vocabulary learning strategies (VLS). In L2 vocabulary acquisition learners employ a wide range of VLS, but they particularly benefit from explicit deep processing VLS (Ellis, 1995; Schmitt, 2010).

Since collocation learning is impacted by different factors that include the specific characteristics of collocations (frequency of occurrence and co-occurrence, morphosyntactic structure, strength of association, semantic transparency), collocation learning strategies may be perceived as a separate construct or a specific group of language learning strategies. Collocation learning strategies (CLS) can be defined as specific group of learning strategies for the acquisition of collocations, or more specifically, the actions learners use consciously to assist them in collocation learning. Since collocational competence is the most salient feature of the depth of vocabulary knowledge, this study aims to examine the learners' self-directed approaches to L2 collocation learning. Before we proceed, we first address the theoretical framework and review prior relevant studies related to the present study: collocational competence, CLS and collocation testing. In the second part of the paper we describe the study of the relationship between collocational competence and collocation learning strategies in English for specific purposes (ESP) context.

2 Literature Review

2.1 Collocational competence in ESP

With different approaches in defining and classifying collocations, collocation-targeted research in (applied) linguistics struggles to provide a clear understanding and a comprehensive definition of the concept. It has been established, however, that collocation "is a psychological association between words (rather than lemmas) up to four words apart and is evidenced by their occurrence together in corpora more often than is explicable in terms of random distribution" (Hoey, 2005, p.5). For an L2 learner, acquisition of collocations presents one of the greatest challenges. The difficulty of collocation learning has been attributed to some of the collocation-specific characteristics which include varying degrees of transparency of meaning, non-compositionality, the strength of association between the components, and span.

In the context of teaching and learning English for specific purposes (ESP), vocabulary plays a central role. A prominent feature of ESP vocabulary are specialised technical and semi-technical words which often appear as a part of a collocation. Having this in mind, ESP collocations have been defined as

multi-word expressions containing at least one specialised term which is usually the node of collocation (Patiño, 2014; L'Homme, 2018). The most frequent morphosyntactic types of ESP collocations are noun + verb, adjective + noun, and noun + noun collocations.

The mastery of collocations, like any formulaic sequences, has been recognised as a central aspect of communicative competence that enables native speakers to process language fluently and idiomatically in line with their basic communicative needs (Henriksen, 2013:, p.303). By the same token, a good mastery of collocations is essential to L2 learners, too. The process of acquiring knowledge of collocations in L2 is similar to the acquisition of individual lexical units. This process includes noticing the collocation, understanding its meaning and function, and learning how to use a collocation not only accurately but also appropriately.

The main constituents of L2/FL learner's collocational competence are collocation recognition and production. Recognition, i.e. receptive knowledge mainly involves the knowledge of meaning, while productive knowledge, activated in speaking and writing, involves primarily the knowledge of form (Revier, 2009). It seems that the productive knowledge of collocations lags behind the receptive knowledge (Laufer & Waldman, 2011; Nizonkiza, 2012).

Development of collocational knowledge is influenced by a number of factors that should be considered when selecting collocations to be taught. These factors can be divided into two categories: intralinguistic (collocation-specific) and external factors (both extralinguistic and interliguistic). Intralinguistic factors include aspects such as frequency of occurrence and co-occurrence, morphosyntactic type of collocations, collocation span, semantic transparency etc. The frequency of occurrence is one of the most prominent collocation-specific features. More frequent collocations are acquired and produced more efficiently than the less frequent ones (Durrant & Doherty, 2010; Wolter & Gyllstad, 2013). Some studies have found that collocations with more frequent nodes were easier to recognize (Nizonkiza, 2015). Another interesting finding refers to the frequency of co-occurrence or the strength of association between the collocation components. While it has been established that native speakers' collocation processing is affected by their frequency of co-occurrence (Ellis et al., 2008), L2 speakers' recognition and production are more driven by the frequency of occurrence. Most of the previous studies focus on verb + noun or adjective + noun collocations. The first combination has turned out to be more problematic for L2/FL learners of English. A few studies (Gitsaki, 1999; Peters, 2016; Nguyen & Webb, 2016) that included different morphosyntactic types indicate that there is a stronger association between the components of adjective + noun collocations which helps L2/FL learners to perceive them as a whole.

External factors are more learner- and/or context-oriented, and refer to the implicit/explicit collocation teaching, L2 proficiency, L1 influence and individual differences between the learners such as age, motivation, or language learning strategies. Since L2/FL learners often lack authentic L2 input and output, there is a need for systematic instructional support (Wray, 2002). Some researchers support the explicit teaching of collocations (Ying & Hendricks, 2004; Ying & O'Neill, 2009), while others are in favour of a more natural approach in combination with some input interventions such as visual enhancement or input flood treatment (Bishop, 2004; Webb et al., 2013). Studies exploring the relationship between L2 proficiency and collocational competence revealed that collocational errors are made even at the most advanced stages in both receptive and productive knowledge of collocations (Gitsaki, 1999; Nizonkiza, 2015). Errors in collocation production are often attributed to L1 influence, which manifests as approximation, direct translation, or paraphrase (Biskup, 1992; Reder, 2006). These errors depend on the congruency of collocations (whether collocations are similar or different in L1).

Individual differences have also been frequently discussed in the context of collocation acquisition (Wray, 2002; Han, 2004; de Wit, 2007; Wray, 2008). It has been established that L2 speakers can achieve higher collocational competence based on their attitudes and motivation to use L2 (Zhang et al, 2017; Asbulah et al, 2020). Language learning strategies have also been explored as one of the external factors

that could influence collocation acquisition (Lewis, 2000; Wray, 2002). The next chapter describes prior studies that have explored the use of language learning strategies in collocation acquisition.

2.2 Collocation learning strategies

Cognitive language learning theory defines learning strategies as complex cognitive skills within the cognitive, associative, and autonomous learning process (O'Malley & Chamot 1990). Language learning strategies include cognitive, metacognitive, and social strategies and they can be directed to specific knowledge or skills (for example vocabulary learning strategies or grammar learning strategies). Learning strategies employed to learn collocations (i.e. CLS) can be viewed as a subcategory of vocabulary learning strategies. We define them as mental and physical actions L2 learners consciously use to assist them in the specific task of learning collocations.

Language learning strategies, as well as vocabulary learning strategies as a specific group of strategies (Pavičić Takač, 2008) have been extensively studied within the field of L2 acquisition ever since the 1970s when the language learner became the focus. But during this rich and fascinating history of strategy research, only a handful of studies, such as Aston (1997), Liu (2000), Ying and Hendricks (2004), Barfield (2006) and Ying (2010) have attempted to examine CLS. Aston's study (1997) explored the process of collocation acquisition in a formal context. The study was an experiment where learners and teachers worked together to develop methods for the use of a new type of self-access resource, computerized text corpora. The participants' feedback revealed that they used discovery CLS such as collaboration with their colleagues or consulting their teacher or collocation dictionary, and cognitive CLS such as grouping collocations to learn them. This early study provided an insight into various strategies the learners used in autonomous electronic corpus research.

Liu (2000) examined the strategy use in producing lexical collocations in writing. In particular, he explored whether the strategy use was related to the acceptable and unacceptable collocation production in writing, and if the good or the poor writers used different strategies in producing collocations. The study included seven different strategies: retrieval, literal translation, approximate translation, use of de-lexicalised verbs, use of synonyms, appeal to authority and appeal for assistance. The results showed that the more successful learners did not differ significantly from the less successful ones in their strategy use in producing correct collocations. When it came to inaccurate (unacceptable) collocations, the more successful learners mostly used the strategy of the literal translation, while the less successful ones used the retrieval strategy. However, the significant difference was found in the frequency of the strategy use. It was also established that the more successful learners are also more efficient strategy users. In addition, the study emphasized the importance of raising learners' awareness of collocations by designing collocational exercises.

Ying and Hendricks (2004) explored process-oriented approach to learning collocations in a writing class: CAR (collocation awareness raising). The learners were given a written assignment that required collecting useful collocations while reading and recording and categorizing the collocations they have found. Collocation awareness raising approach was implemented before, during and after the task. It has been determined that this type of approach plays a positive role in the students' learning and writing processes, and improves the quality of their output. The collocation awareness-raising influenced their writing strategies and the metacognitive level in two ways: influencing the way they prepare to write and influencing the way they read. It has also been established that the process helped them to reflect on their past learning habits and pushed them to change and adapt them to different learning tasks.

The postulation that more successful collocation learning involves a high degree of metacognitive awareness has also been confirmed by Barfield's (2006) study. The more successful learners in his study selectively employed a range of strategies to achieve their learning goals, and reflection became a critical link in the process of learning and using of language for communication. Barfield also emphasizes the

role of social and affective strategies in the collocation competence development. He explains that the more successful collocation learners change their identities from a formal L2 learner to the active L2 learner-user, and finally to the L2 user. In order to acquire the collocations successfully, learners must change their understanding of language learning.

Ying (2010) tested a process-oriented approach (AWARE – A: awareness raising, W: why is awareness necessary, A: acquiring noticed features, R: reflection on learning process, E: exhibiting what has been learned) to learning collocations in English. The AWARE process consists of three levels: noticing of collocations, developing awareness of learning strategies and developing metacognitive awareness by reflecting on the learning process and content. In Ying's study, the metacognitive awareness included the awareness of the strategies for collocation learning. The results indicated that the learners who actively practiced the steps recommended by the approach were more successful in their collocation learning and developed better learner autonomy.

As this concise literature review shows, L2 learners use various collocation learning strategies, which encompass both traditional framework (cognitive, metacognitive, and social) and collocation-specific strategies. It has also been established that it is necessary to raise L2 learners' metacognitive awareness of collocations and their use.

Although all of these studies are valuable and encouraging in that they offer a glimpse into specific CLS, none of them resulted in a typology and classification of CLS that could be useful in empirical research or instruction. The present study attempts to fill that void.

2.3 Collocation testing

Collocation testing has so far been addressed from two different perspectives: the first one is corpus-based, and it mainly explores the characteristics of collocations in L2 written production (Siyanova & Schmitt, 2008; Laufer & Waldman, 2011), while the other focuses on the testing of controlled collocation knowledge and instructional tasks, as well as on the collocation processing (Gitsaki, 1996; Wray, 2008; Yamashita & Yiang, 2010; Wolter & Gyllstad, 2011).

Because collocation knowledge encompasses many dimensions, collocation testing is a daunting task that requires consideration of a number of factors. Revier (2009: 18) differentiates the scope of the knowledge tested, the aspect of the knowledge tested, the task required of test takers to demonstrate evidence of the targeted knowledge, and the format in which the chosen task is realised. The scope refers to the question whether the construct tests the knowledge of the parts of collocations (e.g., collocates only) or the knowledge of the whole collocations. The aspect refers to whether the test takers are required to demonstrate the knowledge of the form or the meaning of collocation, i.e. receptive or productive knowledge. Receptive knowledge can be operationalised through tasks requiring recognition or recall. In recall process, the form or the meaning of a word is retrieved and supplied when triggered by some sort of prompt stimulus, whereas in a recognition process the form or meaning of a word is recognized from a set of options (Gyllstad, 2007: 72). The format employed specifies the actual technique used to elicit the collocation knowledge. The most common format for the elicitation of the receptive knowledge of collocations is a multiple-choice test. It is necessary to include both appropriate collocations and distractors. The criteria for choosing the distractors differ: some authors choose the distractors according to the frequency of occurrence and co-occurrence (Gyllstad, 2007; Siyanova & Schmitt, 2008; Yamashita & Jiang, 2010), while others also include pseudo-collocations (Wolter & Gyllstad, 2013; Szudarski & Conklin, 2014) and synonyms (Koya, 2005; Webb & Kagimoto, 2011; Nizonkiza, 2015).

So far, there have been a few standardised tests developed to assess the L2 collocation knowledge. One of them was developed by Gyllstad (2007), who offered two test formats aimed at measuring receptive knowledge of English collocations: COLLEX (collocating lexis) and COLLMATCH (collocate

matching). COLLEX includes a multiple-choice task, consisting of appropriate and inappropriate collocations. COLLMATCH has a grid format in which the test takers are required to decide whether the collocation is appropriate.

Revier (2009) developed a constituent matrix test (CONTRIX) with a cloze gap and a grid offering a range of choices for the node and collocate. Distractors in the grid are all appropriate collocations, but only one word combination fits into the context of the sentence. It provides a new format of recognition-/production-based test, since the test takers need to choose both the node and the collocate, and at the same time pay attention to the context of the gap sentence. According to Revier (2009), such a test format allows to measure the productive knowledge of whole collocations rather than their individual components.

Translations have frequently been used as a test format for collocation production. However, there are some drawbacks that need to be considered when using this format. Translations are subject to various alternative responses, including paraphrases, which cover the intended meaning but not the targeted collocation, which does not necessarily mean that the learner is not familiar with the target collocation.

The main challenges of collocation testing include several parameters: defining what is measured (knowledge of the whole collocations or partial collocation knowledge, recognition, recall or production), the choice of the suitable format for testing (corpus-based or test format), the choice of the collocations for testing (free production or controlled recognition and production), the choice of the test items (based on different intralinguistic and external factors), the test validation and reliability and the test administration (one time or longitudinally).

3 Methods

3.1 Research problems and hypothesis

The main aim of this study is to examine the role of CLS in collocational competence in an ESP context. More specifically, it sets out to explore whether there are any underlying dimensions of CLS, and which dimensions of CLS are used by ESP learners. Finally, it explores what interdependencies between CLS and types of collocational knowledge may be observed in the population of ESP learners. Based on the previous research (cf. Ying & Hendricks, 2004; Barfield, 2006; Ying, 2010) we may assume that the metacognitive awareness, which includes awareness of learning strategies, is related to the more successful collocation learning. Thus, it is hypothesized that CLS use will be a significant predictor of collocational competence in ESP.

3.2 Participants

Participants in the study were first year students of Faculty of Transport and Traffic Sciences at the University of Zagreb, Croatia. The instruments were administered to a total of 152 students: 19 % female (N = 29) and 81 % students (N = 123) aged 19 – 20. They had been learning English as a foreign language only in school (72 %), and some had attended extra English classes (12 %).

3.3 Instruments and materials

3.3.1 CLS questionnaire

The CLS questionnaire (Tabak, 2022) used in the study consisted of two parts. The first part of the questionnaire contained demographic questions to gather more information about the participants. The main part of the questionnaire targeted CLS frequency of use (see Appendix). The CLS questionnaire

consisted of 63 items followed by a five-point Likert type scale (1 - I never or almost never do this, 5 – I always or almost always do this).

3.3.2 Test for measuring receptive and productive knowledge of ESP collocations

To measure receptive and productive knowledge of ESP collocations, a collocation test was developed. The test consisted of 21 collocations, divided into three different task formats, with seven collocations in each task.

The first task tested only receptive knowledge of collocations. It was a fill-in-the-blank with multiple-choice options, modelled after the COLLMATCH test format (Gyllstad, 2007). The second task, adapted from the CONTRIX test (Revier, 2009), examined both receptive and productive knowledge of whole collocations. The final part was a translation test, measuring only productive knowledge of collocations.

For the receptive knowledge task, the test takers' responses were scored dichotomously as either correct (1) or incorrect (0), and the total number of points was 7. The receptive-productive knowledge task (R-P) and the productive knowledge task were scored using a scale from 0 to 2. Incorrect responses were scored 0 points and included the following deviation types: incorrect node and correct collocate, incorrect collocate and correct node, both node and collocate incorrect. Cases in which both node and collocate were correct, but the grammatical element of the collocation was incorrect were awarded 1 point. Responses with the correct node, collocate and the grammatical element were awarded 2 points. Both the receptive-productive and productive tasks had a maximum of 14 points each.

The ESP collocations to be included in the test were carefully chosen. First, a small, specialised corpus was compiled from the selected ESP texts. It consisted of 10,542 words and encompassed the terminology for transport and traffic sciences. The terminology was extracted using an online lexical analysis tool *TermoStat* (Drouin, 2003). This tool uses statistical and linguistic analysis to determine specialised terms within a corpus. It analyses the corpus based on the frequency of the terms within the specialised corpus and compares their frequency to the reference corpus to determine the lexical unit's characteristic for the specialised corpus (see Figure 1).

Figure 1

Single and Multi-word Terms (i) based on Frequency of Occurrence (f)

i	f
phone	25
driver	25
road	24
traffic	19
people	19
car	16
mobile phone	14
accident	14
light	14
effect	13
driving	12
system	12
use	11
percent	10
code	10

After determining the most frequent lexical units, it calculates their specificity within the specialised corpus. The higher the specificity, the more likely are these lexical units to be terminological units, i.e., terms.

Figure 2

Selected Terms Based on Specificity Score

List of terms | Cloud | Stat | Structuration | Bigrams

Candidate (grouping variant)	Frequency	Score (Specificity)
mobile phone	14	93.16
cargo	25	63.62
chunnel	7	59.32
airplane	6	53.66
congestion	18	53.38
use of mobile phone	5	51.96
carpool	5	51.96
logistic	9	48.98
traffic congestion	7	48.39
biodiesel	4	45.18
traffic regulation	4	45.18
traffic	39	43.44
ethanol	6	42.76
alternative fuel	5	38.68
fuel option	3	37.26
parcel shipment	3	37.26
zip code	3	37.26
base station	3	37.26
break bulk	3	37.26

Figure 2 shows the specialised terms extracted via TermoStat. The next step was to identify their collocations using the online corpus linguistics tool Sketch Engine. Due to the test format, it was also necessary to select the distractors for the test. The distractors were found in the British National Corpus (BNC) database according to the frequency of co-occurrence.

The test items were selected based on the collocation *frequency of occurrence* (F), *co-occurrence (mutual information, MI)*, and *morphosyntactic type (MST)*. These criteria were selected based on their wide application and relevance reported in previous studies (Durrant & Schmitt, 2009; Wolter & Gyllstad, 2013; Szudarski & Conklin, 2014; Siyanova-Chanturia & Spina, 2015; Makinina, 2018). Within the test, each task included several morphosyntactic types of collocations, ranking from high to low on a scale of frequency of occurrence and co-occurrence. Since the absolute threshold for frequency of occurrence and co-occurrence has not been set in the previous research, we used their mutual information as a criterion. For example, the items were considered of low F – high MI if their MI score was significantly higher than their F score. The unequal distribution of the collocations belonging to different MSTs is attributed to the nature of the specialised corpus. The most frequent MST in the corpus was *adj + adv*. The items selected for the test included these MSTs: *verb + noun* (e.g., *reduce traffic congestion, fuel a car*), *noun + verb* (e.g., *trains running, congestion occurs*), *adj + noun* (e.g., *emitting source, alternative route*), *noun + prep + noun* (e.g., *smoothness of acceleration, levels of exposure*), *adv + adj* (e.g., *easily accessible*), *verb + adv* (e.g., *drive recklessly, run properly*), *verb + adj + noun* (e.g., *take public transportation, set up a regular service*), *noun + noun* (e.g., *tailpipe emissions, lane marking*), *verb + noun + adj* (e.g., *keep the streets clear*).

3.4 Procedures

The questionnaire was administered to all participants during their regular ESP classes. The researcher explained the aim of the study and provided detailed instructions on how to answer the questions. The collocation test was administered after the questionnaire. Participants were given 45 minutes to complete the test. The purpose of the test was to examine their receptive and productive knowledge of collocations. The first test task testing the receptive knowledge, the second task tested both receptive and productive knowledge, and the third task tested the productive knowledge.

The data was analysed statistically, using SPSS 19.0 Version. Given the novelty of the questionnaire used, in order to reduce the item number to a fewer, more manageable number of dimensions, and to identify the underlying, not-directly-observable constructs we ran a factor analysis, computed descriptive statistics and checked reliabilities. Next, a correlation and regression analyses were conducted to examine the relationship between collocational competence and CLS use.

4 Results

4.1 Descriptive statistics and reliabilities

The factor analysis resulted in seven factors which were grouped into two categories (Discovery and Consolidation strategies) following the basic principles of Schmitt's (1997) organisational framework of vocabulary learning strategies.

Two factors were categorized as Discovery CLS: *Strategies for determining collocation meaning using formal sources* (CLS questionnaire items 13, 14, 15, 16, 18, 19; cf. Appendix) and *Strategies for determining collocation meaning by analysing or guessing* (items 9, 10, 11, 12, 17). The first set of discovery CLS includes strategies L2 learners use to discover the meaning of the new collocation by using formal sources such as monolingual dictionaries or collocation dictionaries, as well as a number of social strategies including asking their teacher for the correct meaning, paraphrase or the appropriate use of the collocation. The second discovery CLS set contains strategies of primarily guessing the meaning of collocations from the context, or the strategies of relying to L1 in determining the meaning of collocations.

Consolidation CLS encompass five sets of strategies: *Organisational strategies* (items 26, 32, 40, 41, 42, 44, 47, 48, 56, 39, 59) include metacognitive strategies for planning and organizing learning of collocations by grouping them according to their meaning, node or topic, and writing them down in a specialised notebook. *Learning collocations in context* (items 55, 36, 27, 54, 28, 37, 24, 52, 23, 34) is a set of strategies employed to revise or "recycle" the use of collocations by using them in different context, telling a story which includes new collocations, or creating a new sentence with the target collocation. This set also includes strategies of exposure to the media and native speaker input to learn new collocations. *Strategies based on collocation-specific characteristics* (items 22, 61, 63, 62, 21, 60, 25, 20) comprise strategies of cognitive manipulation in order to memorize new collocations, such as connecting the collocations to the learner's personal experience or creating a mental image of the collocation. *Form-focused collocation learning strategies* (items 30, 38, 29, 31, 33) encompass rote memorisation of form, focusing on spelling and pronunciation. The last set of CLS, *Independent collocation learning strategies using technology and online sources* (items 50, 49, 51, 45, 46) contain strategies directed towards self-initiated collocation learning by using technology and formal sources available online.

The resulting CLS taxonomy shows that CLS encompass both generic language learning strategies (memory, cognitive and metacognitive) and collocation-specific learning strategies.

The factor analysis showed that the first two components (classified as discovery strategies) explained 41 % of the total variance. Other five factors in the category of consolidation strategies explained 43 % of the total variance. Within each factor, the items with a saturation of at least .40 were retained.

To test the reliability, the internal consistency of each subscale was assessed by Cronbach's alpha coefficient. Table 1 shows the alpha coefficient, skewness, kurtosis, and frequency distribution of CLS used (mean as the indicator of central tendency). All the alpha values were acceptable. A lower alpha coefficient for Factor 2 (*Strategies for determining collocation meaning by analysing or guessing*) was not unexpected and was not considered concerning given the small number of items included in the factor. The level of skewness and kurtosis of the data were within acceptable parameters suggesting no serious violations of the normality of the distributions.

Table 1

Descriptive Statistics and Reliabilities for the CLS factors (N=152)

	Factors of CLS	***α***	***M***	***SD***	***skewness***	***kurtosis***
Discovery CLS	1. Strategies for determining collocation meaning using formal sources	.74	2.13	0.67	0.58	-0.02
	2. Strategies for determining collocation meaning by analysing or guessing	.42	3.29	0.65	-0.32	-0.14
Consolidation CLS	3. Organisational strategies	.82	2.00	0.68	0.55	-0.41
	4. Learning collocations in context	.80	2.64	0.67	0.13	-0.23
	5. Strategies based on collocation-specific characteristics	.77	3.20	0.72	-0.29	-0.66
	6. Form-focused collocation learning strategies	.76	3.27	0.92	0.02	-0.64
	7. Independent collocation learning strategies using technology and online sources	.74	2.34	0.83	0.43	-0.31

Table 2

Descriptive Statistics for the Collocation Test Results (N=152)

	M	*SD*	*skewness*	*kurtosis*
Receptive collocation knowledge	0.80	0.15	-0.53	-0.28
R-P collocation knowledge	1.05	0.52	0.15	-0.72
Productive collocation knowledge	0.27	0.30	1.40	2.25

Table 2 shows the average score per item in each test task. The scores on the receptive task were the highest (participants gave on average 80 % correct answers). On the receptive-productive knowledge task, there were on average 52.5 % correct answers. Participants were the least successful on the receptive task, with only 13.5 % of the correct answers. The descriptive statistics for the test scores showed that skewness and kurtosis were within a range of normal distribution.

4.2. Correlation and regression analyses

To examine the relationship between CLS and collocational competence in ESP, a correlation and regression analyses were conducted.

Table 3

Correlations for Study Variables

Factor	Receptive knowledge test	Receptive-productive knowledge test	Productive knowledge test
Discovery CLS formal sources	-.06	-.11	-.01
Discovery CLS analysing or guessing	.12	.08	-.02
Organisational CLS	-.15	-.32**	-.18*
Learning collocations in context	.05	.18*	.18*
Collocation-specific CLS	-.09	-.02	-.04
Form focused CLS	-.08	-.06	-.08
Independent CLS - technology and formal sources	.04	-.06	.11

Note: * p < .05. ** p < .01.

The results on the test of receptive-productive knowledge and productive knowledge test were positively, weakly but significantly correlated with Learning collocations in context. The correlations between receptive-productive knowledge and productive knowledge test and Organisational CLS were weakly negative and significant (table 3).

Table 4

Summary of Regression Analyses for Collocation Learning Strategies Predicting Collocation Knowledge (N = 152)

	Receptive knowledge test			Test of R-P collocation knowledge			Productive knowledge test		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Discovery CLS formal sources	-.01	.02	-.04	-.01	.07	-.07	-.01	.04	-.03
Discovery CLS analysing or guessing	-.01	.02	-.02	-.10	.06	-.13	-.08	.04	-.17*
Organisational CLS	-.04	.02	-.17	-.32	.07	-.43**	-.11	.05	-.26**
Learning collocations in context	.03	.02	.14	.23	.07	.31**	.12	.04	.27**
Collocation-specific CLS	-.02	.02	-.11	.01	.07	.02	-.03	.04	-.08
Form focused CLS	-.01	.02	-.01	.05	.06	.08	-.01	.03	-.06
Independent CLS - technology and formal sources	.02	.02	.11	-.01	.06	-.02	.06	.03	.16
R^2		.04			.17			.10	
F		1.09			5.37**			3.37**	

Note: * p < .05. ** p < .01.

Regression analyses (table 4) revealed that CLS were not a significant predictor of receptive collocation knowledge. CLS explained 17 % of the variance on the test of receptive-productive knowledge and 10 % of the variance of productive collocation knowledge, with CLS referring to *Learning collocations*

in context being a positive predictor, and *Organisational CLS* being a negative predictor of results on the respective tests, while CLS referring to *Discovery of collocation meaning by guessing* negatively predicted productive collocation knowledge test scores.

5 Discussion

The main aim of this study was to explore the relationship between CLS and collocational competence. We ran the correlation analysis to determine the relationship between the variables, and the regression analysis to discover how much each of the variables affects the predicted variable. The regression analysis enables us to see which group of CLS is more important in predicting success in the test of collocation competence.

The correlation analysis revealed that the *Organisational CLS* correlate negatively with both R-P and productive collocation knowledge. This group of strategies refers to the strategies of learning collocations without the context, namely grouping them by topic, node or meaning, which helps L2 learners to memorize the collocations, but not to use them in context, which was required from them in both R-P and productive tests. The correlation analysis also suggests that *Learning collocations in context* positively correlates with R-P and productive knowledge, which shows that these strategies are especially useful for collocation recognition and production. Only assembling a collection of ESP collocations does not lead to more successful R-P and productive collocation knowledge, but making effort to make sentences with learned collocations and to use them in context does.

The results suggest that none of the CLS dimensions are a significant predictor of receptive collocation knowledge. One of the possible explanations is that receptive knowledge is less reliant on the employment of learning strategies but more affected by intralinguistic factors such as the nature of the collocations themselves. This assumption is supported by the previous studies (Barfield, 2003; Nguyen & Webb, 2016). In these studies, the most prominent predictor of the receptive collocation knowledge was the frequency of occurrence and co-occurrence. Other predictors were semantic transparency and congruency of collocations. However, one would expect that the two dimensions of discovery strategies might play a role in receptive knowledge.

The results also revealed that the discovery strategies of *Guessing the meaning from the context* correlates negatively with productive knowledge. Nation and Newton (1997) noticed that although guessing plays a role in collocation recognition process, non-native speakers infer the meaning from contextual clues through meticulous analysis, meaning that they benefit from "explicit" deep processing learning strategies and tasks which are based on repetition and cognitive processing. This helps L2 learners build associative networks in their mental lexicon. Producing collocations based on contextual clues is complex, requiring from the learners to infer meaning from the form, which depends on the semantic transparency of the collocation, so this set of strategies does not seem to contribute to the development of productive knowledge of collocations.

The set of CLS *Learning collocations in context* proved to be a positive predictor of both receptive-productive and productive collocation knowledge. This set encompasses the CLS such as:

I use collocations in context in order to remember them.

I use a collocation in a sentence to remember it easier.

I connect the new collocations logically in a story to remember them easier.

I make a new sentence using a collocation to remember it.

By using these strategies, the learners increase their exposure to the collocation input and produce output which proved to be beneficial for the development of collocational competence. This has also been

suggested by other studies (Durrant & Schmitt, 2010; Szudarski & Carter, 2016; Macis & Schmitt, 2017; Pellicer-Sanchez, 2017), which support the claim that greater exposure results in greater collocational competence. The descriptive analysis, however, shows that these strategies are not frequently selected by L2 learners in our sample. This points to the conclusion that learners may benefit from the explicit strategy instruction of this group of strategies.

The set of *Organisational CLS* was found to be a negative predictor of both receptive-productive and productive collocation knowledge. These strategies are mainly focused on learning collocations without a context, by focusing on the form, but they also include several metacognitive strategies referring to the planning of the collocation learning process. Admittedly, these results may seem to be unexpected, since it could be assumed that all CLS make at least a minimum contribution to the development of collocational knowledge. While a more comprehensive explanation warrants further empirical investigation, we can speculate that focusing on the form of collocations while studying, without considering the context, is not as helpful in using the collocations in production, possibly because of the nature of the collocations. Collocations differ according to their level of transparency, and their meaning does not depend on the meaning of the collocation constituents.

6 Conclusion

The study presented in this paper examined the role of CLS in collocational competence in an ESP context. More specifically, it explored which dimensions of CLS are preferably employed by ESP learners, and looked into which interdependencies between CLS and types of collocational knowledge may be observed in the population of ESP learners. Based on the results of the conducted analyses, we confirmed that at least some dimensions of CLS, namely *Learning collocations in context*, substantially contribute to the development of collocational competence in ESP. The use of these strategies proved to be a significant predictor of both R-P and productive collocation knowledge. This study shows the importance of teaching and learning collocations in context and suggests that collocation instruction may benefit from complementing it with explicit teaching of CLS, especially those that involve multiple exposures to the whole collocations.

Overall, this study confirmed that CLS are a factor that potentially impacts collocational competence of EFL learners. If further studies were to examine more hypothetically significant factors affecting collocational competence, such as explicit instruction of selected CLS, we might arrive at insights that would enable us to develop a guiding framework for the design of a protocol for teaching collocations and CLS successfully. For example, since the CLS of *Learning collocations in context* were found to be rarely used by the learners, it would be interesting to explore the impact of the explicit instruction of these strategies on the collocational competence.

One limitation of this study is the relatively small number of test items used to measure collocation knowledge. There were 21 items altogether, but only seven items per task. This was due to two factors: first, the test items were drawn from a relatively small corpus of specialised texts in the field of transport, and second, the condition that the target collocations do not reappear in the three tasks had to be met. Nevertheless, considering the total number of items in the test, the test was viable for collocation recognition and production assessment. A follow-up study could focus on one of the aspects of collocational competence which would then be measured by one test format with a larger number of test items. Another limitation is that the questionnaire examines only the perceived strategy use, so in order to fully explore the use of the CLS in the future studies it might be useful to include qualitative data as well, in form of an interviews or verbal protocols. Lastly, the ESP field would undoubtedly benefit from insights into the relationship between CLS and collocational competence in professional fields other than transport.

Appendix

COLLOCATION LEARNING STRATEGIES QUESTIONNAIRE

This questionnaire refers to learning of collocations in English. Collocations are combinations of two or more words that are specific for all languages. In English there are different types of collocations, such as adjective + noun (*a huge profit*), noun + noun (*a pocket calculator*), verb + adjective + noun (*learn a foreign language*), verb + adverb (*live dangerously*) etc.

Please, read these statements carefully and choose one of the responses (numbers 1 do 5) that refers to your learning of collocations. The aim of this questionnaire is to find out what you do when learning collocations. There are no right or wrong answers to these statements.

1 – I **never or almost never** do this.
2 – I **rarely** do this.
3 – **Sometimes** I do this (less than 50 %).
4 – I **often** do this (about 50%).
5 – I **always or almost always** do this.

1. When I read an English text, I underline all the nouns in the text and look up their collocations later.
2. When I read an English text, I notice the collocations only if they are marked in the text (underlined, written in different colour, printed in bold...).
3. When I read an English text, I notice the collocations of the key words.
4. When I read an English text, I notice only the collocations in which one word is unfamiliar to me.
5. When I use media (watch a movie, listen to music, browse the internet) I try to notice the collocations used.
6. I notice a collocation in the text only if all its parts are unknown words to me.
7. I notice a collocation in a sentence only if all its parts are immediately to the right and to the left of the node.
8. When I read an English text English, I consciously attend to collocations.
9. I guess the meaning of a collocation by its part that carries the most of the meaning (e.g., *have a **nightmare**, make a **mistake**, do **business***).
10. I guess the meaning of collocation by literally translating all its parts.
11. If I encounter an unknown collocation, I ignore it if I understand the text gist.
12. I try to guess the meaning of an unknown collocation from the context.
13. If I do not understand a collocation, I look it up in a collocation dictionary.
14. If I do not understand a collocation, I look it up in a monolingual dictionary.
15. If I do not understand a collocation, I ask the teacher to translate it.
16. If I do not understand a collocation, I ask the teacher to explain the meaning of the word in English.
17. I discover the meaning of a collocation through class activities.
18. If I do not understand a collocation, I ask the teacher to use it in a sentence.
19. I ask my colleague to explain the meaning of an unknown collocation.
20. I connect an image with a collocation's meaning to remember it.
21. I make a mental picture of a collocation's meaning in order to remember it.
22. I remember a collocation if I connect it with my personal experience.

23. I connect collocations with other words with similar or opposite meanings.
24. I group collocations by topic in order to remember them (e.g. *break the rules, breach of contract, commit a crime...*).
25. I group collocations by the node in order to remember them (e.g., *break the rules, break a record, break the news...*).
26. I group collocations graphically in order to remember them.
27. I use collocations in a sentence in other to remember them.
28. I try to use the new collocations in a story to remember them.
29. When I learn new collocations, I try to remember their spelling.
30. When I learn new collocations, I try to remember their pronunciation.
31. I say a collocation out loud in order to remember it.
32. When I learn a new collocation, I underline the first letters of the node and the collocate(s).
33. When I learn a new collocation, I learn all its aspects immediately (pronunciation, spelling, meaning, morphosyntactic type…)
34. I analyse word parts of the collocation in order to guess the meaning (suffixes, prefixes…)
35. I rely on the part of speech (a noun, a verb…) to remember a collocation.
36. When I learn a new collocation, I connect its meaning to its definition.
37. I learn all parts of the collocation as a whole.
38. I pronounce a collocation out loud repeatedly in order to remember it.
39. I write down collocations repeatedly to remember them.
40. When I test myself I make collocation lists.
41. When I test myself, I write the collocations down on the cards.
42. I write down the collocation in the same form I encountered it in the text. (e.g., *He started a car*).
43. I write down the collocation in the infinitive form or its base form without the context. (e.g., *to start a car*).
44. I write down collocations in a specialised notebook.
45. I use different media in English (songs, movies, web pages …) to learn new collocations.
46. I test myself with different tests available to check if I remember the collocations.
47. I plan when and how to learn collocations in advance.
48. When I read an English text, I make a plan to look for collocations.
49. I google the collocates of the words I already know.
50. I use online collocation dictionaries to find the collocates of the words I already know.
51. I use a bilingual dictionary to find the collocates of the words I already know.
52. I learn new collocations by imitating native speakers' language or what I have heard in English media (songs, movies…)
53. I read a collocation silently several times in order to memorise it.
54. I use collocations in new sentences in order to memorise them.
55. To memorise new collocations, I use them in context.
56. To memorise a new collocation, I cover one part of the collocation and try to memorise it using the other part as a cue.
57. I learn collocations by translating them into my mother tongue as a whole expression.
58. When I learn collocations, I create an acronym from the initial letters of the base and the collocate(s).

(e.g., ***B**urst **I**nto **T**ears – **BIT***).

59. I memorise a collocation by making a table using different nodes and collocates and connecting the correct ones.
60. I remember a collocation if its meaning is related to the topic of my interest.
61. I remember congruent collocations easier.
62. I remember the collocations that the teacher mentions more frequently in class.
63. I remember more easily the collocations with concrete rather than abstract meaning.

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