Teaching Second Language Collocations via Concordances: The Case of Deductive and Inductive Approaches

Zahra Fakher Ajabshir*
Assistant Professor of TEFL, University of Bonab,
Bonab, East Azarbaijan, Iran
Email: fakherzahra@yahoo.com

ABSTRACT

This study investigates the differential effects of the deductive and inductive cognitive approaches on the improvement of verb-adverb collocational knowledge in the context of classroom concordancing. Eighty-two participants were assigned to deductive, inductive, and control groups. During two intensive 90-minute sessions, the experimental groups were given some receptive and productive tasks to do using the concordancer as a reference tool. While the collocational patterns for accomplishing the tasks were explicitly presented to the deductive group, the inductive group was required to work out the underlying patterns. The analysis of the data gathered from receptive (multiple-choice) and productive (sentence-completion and sentence writing) collocation pretest and post-test revealed that concordance had significant effects on the improvement of L2 collocational knowledge. While both the deductive and inductive groups showed similar gains in receptive knowledge of collocations, the inductive approach was found to be more effective in developing productive knowledge. Overall, the students had positive views of concordance.

*   Zahra Fakher Ajabshir has authored some books and published several papers at local and international journals.

1. Introduction

Acquisition of the second language (L2) vocabulary involves the acquisition of multi-word units, amongst them collocations (Schmitt, 2010). Knowledge of collocations is essential in achieving a native-like mastery of language and lack of this knowledge might cause difficulties for L2 learners. Receptively, lack of the collocational knowledge might entail miscomprehension (Martinez & Murphy, 2011). Productively, speakers who overuse, underuse, and misuse collocations may appear odd, incompetent, and non-native-like to native speakers. Given the importance of collocations to language mastery, it is unfortunate that many L2 learners tend to make deviant L2 combinations (Ellis, 2008), and that their collocational knowledge lags further behind their general language and vocabulary knowledge (González-Fernández & Schmitt, 2015).

Considering the problems of L2 learners with collocations, more second language acquisition (SLA) research on collocations is necessary to explore the effect of different instructional approaches on raising students' awareness of collocations. Over the past few decades, the use of the data-driven learning (DDL) approach in L2 teaching has received considerable attention among teachers and researchers (Gholami Nezhad & Anani Sarab, 2020). DDL involves the identification and inducing of linguistic rules by observing a vast array of language samples via concordancing tools. Concordancers allow users to examine numerous authentic texts for the use of words or a combination of words, and to explore how and in what contexts a word has been used, and which words appear prior to or following that word. Empirically, some studies (e.g., Boulton, 2010; Menon & Mukudan, 2012, Vyatkina, 2016a, 2016b) have reported the beneficial effects of DDL on the development of L2 collocational knowledge. This topic calls for further studies to substantiate the earlier findings, and to reach firmer conclusions.

In response to the perceived need for studies addressing collocations, this study explores (a) the extent to which concordancers serve as an effective tool for improving the collocational knowledge of verb-adverbs, and whether instruction delivered via concordancers results in differential gains in receptive and productive knowledge of collocations; (b) the difference in impact (if any) of deductive and inductive cognitive approaches on collocation learning; and (c) students' perceptions of concordancing.

2. Background

2.1. Corpora and Concordancers

During the last few decades, the use of corpus-based approaches and concordancers in L2 learning has drawn the attention of L2 teachers and practitioners. Concordancers display language in a way that enables the users to search the concordance lines and to discover patterns, test their hypotheses, work out solutions to their linguistic problems, and generate more accurate and complex language. Query through the concordance interface offers the search results in numerous concordance lines, where the search word is highlighted. The use of corpus-based approaches has been supported by theoretical assumptions and empirical studies.

Theoretically, the noticing hypothesis (Schmitt, 1990) supports the use of corpora. Noticing the target features can be facilitated by input enrichment and input enhancement (Sharwood Smith & Truscott, 2014). In the context of corpus-based learning, input enrichment is realized by a great amount of exposure to exemplars of language patterns in authentic data. Corpora afford frequent exposure to real manifestations of language in a way that is hardly possible in conventional classes, especially in L2 contexts. Input enhancement, on the other hand, can be realized by increasing the saliency and visibility of target patterns (e.g., by typographical highlighting) through concordancing tools. Concordancers display query results with the search words highlighted and thus make the target features more visible. Empirically, a wealth of studies has documented the effectiveness of computer-based and paper-based corpora on linguistic outcomes, which will be reported in the following section.

2.2. Previous Studies on Corpora and Collocation Learning

So far, the role of corpora (whether paper-based or computer-based) in the development of different aspects of L2 has triggered a number of studies. Part of the existing research has been on vocabulary (e.g., Boulton, 2010, 2012), grammar (e.g., Smart, 2014), writing (e.g., Huang, 2014), and students' attitudes and experiences with corpus-based instruction (e.g., Ali Rezaee, Marefat, & Saeedakhtar, 2014; Chan & Liou, 2005; Vyatkina, 2016b). Meanwhile, some studies have been conducted focusing narrowly on the effectiveness of corpus-based instruction, in particular, concordancing, on the acquisition of L2

collocations (e.g., Chan & Liou, 2005; Daskalovska, 2015).

Studies addressing the role of concordancing on L2 collocational knowledge came up with significant advantages of concordancing on different collocational patterns including noun-noun and noun-adjective (Menon & Mukundan, 2012), verb-noun (Chan & Liou, 2005), verb-proposition (Vyatkina, 2016b), verb-adverb (Daskalovska, 2015), and verb-infinitive and verb-subjunctive (Frankenberg-Garcia, 2014), just to name a few. Some studies addressed languages other than English (Vyatkina, 2016a), while others investigated the issue among learners at different proficiency levels (Boulton, 2010).

Included in the literature are a few studies which have addressed how the characteristics of learners (Chan & Liou, 2005) and specific features of corpus-based instruction (Frankenberg-Garcia, 2014) affect the linguistic outcomes. Using a bilingual concordance, Chan and Liou (2005) investigated the effect of five web-based practice units on the acquisition of verb-noun collocations among high- and low-level learners. While both proficiency groups revealed significant collocation gains, learners at the lower level were found to be more receptive to the treatment effect. This finding, however, is inconsistent with Gavioli's (2005) argument about lower level learners' frustration while working on a new language (L2) with new methods and novel technology. In a further study, Frankenberg-Garcia (2014) found that, in the production of L2 collocations, learners working with multiple concordance lines outperformed those who worked with one concordance line, those who worked with definitions of target

features, and those who were in the control group.

While there is a wealth of corpus-based studies (see Boulton, 2010, for an overview) comparing the computer-based and paper-based approaches what remains underexplored is the comparative studies of different types of corpus-based approaches, regardless of the medium. Sun and Wang (2003) investigated the effect of deductive and inductive approaches on learning collocations by using a concordancer. They also examined the difficulty level of collocations on the learners' performances. They found that the inductive group had an overall better performance than the deductive one. With regard to the difficulty level of the collocations, while there was no significant difference between the two approaches with respect to the difficult items, easy patterns were better acquired by the inductive approach.

In sum, as argued by Boulton and Cobb (2017), there is a need for more research to draw firmer conclusions about the potentiality of corpus-based instruction in the development of L2 collocations. In response to such a gap, the current study aims at exploring the differential effects of instruction delivered via deductive or inductive approaches on the improvement of L2 collocational knowledge in the classroom concordancing context. Moreover, as stated by Vyatkina (2016b), corpus-based studies integrating multiple measures for assessing the linguistic outcomes are rare. In response to the need for employing a variety of measures, receptive and productive (including less-controlled and more-controlled) measures were used in this study. The research questions specifically addressed

are the following:

1. Are there any significant effects of concordancers in the improvement of receptive and productive knowledge of verb-adverb collocations?

2. Do deductive and inductive instructional approaches differentially affect learning gains in receptive and productive knowledge of verb-adverb collocations?

3. What are the learners' perceptions of concordancing in learning L2 collocations?

3. Method

3.1. Participants

The participants of this study were 76 (35 males and 41 females) selected from among Iranian freshman EFL students majoring in English Language Teaching or English Literature in a university located in East Azarbaijan Province, Iran. Analysis of their scores at the Cambridge Preliminary English Test (PET) [$M = 74$, $SD = 3.4$; $F (2, 98) = 9.21$), $p < 0.05$] showed that they were at a similar level of proficiency (intermediate) were selected. Their ages ranged from 18 to 29 years ($M = 23.7$; $SD = 5.7$) and they were from Azari-Turkish or Persian language backgrounds. They were randomly categorized into two experimental (deductive and inductive) groups and a control group, with 10 males and 13 females in the deductive group, 12 males and 15 females in the inductive group, and 13 males and 13 females in the control group.

3.2. Measurement Instruments

Two versions of receptive and productive tests of L2 collocational knowledge were

used as the pre/post-test in this study. The receptive test included 20 multiple-choice items in which the target verb for each collocation was provided and the participants were required to choose the correct collocate from among alternatives provided. The 20 verbs were randomly chosen from the top 331 verbs from the 3500 most common words in native English, according to the Macmillan Essential Dictionary (Rundell & Fox, 2003). Following Church and Hank (1990), the adverbial collocates for the verbs were chosen based on their mutual information (MI). MI is an index of the probability of occurrence of two words together, as compared with their occurrence independently. A higher index implies a strong relationship between the node and the collocate. The adverbial collocates in the receptive test thus had a higher MI index compared with the other collocates of that verb. In scoring the receptive test, since there was only one correct answer for each item, 1 point was allocated for each correct answer, the maximum score being 20.

The productive test included 10 less controlled (sentence-completion) and 10 more controlled (sentence-writing) items. The verbs for the sentence-completion part were given and the participants were required to produce the correct adverbial collocate for each verb. For the sentence-writing section of the test, some verbs were provided and the participants were required to write their own sample sentence including the verbs with appropriate adverb collocates. The maximum score for the productive test was 20, 10 for each of the sentence-completion and sentence-writing parts. For each of the correct adverbs provided in the sentence-completion part, 1 point was allocated. In the sentence-writing section, the participants got 1 point for each item if they had used a correct verb-adverb collocation and the sentence was unambiguous and grammatically correct. For answers with the correct collocations but ambiguous or grammatically incorrect sentences, 0.5 points was allotted. In scoring both parts of the production test, any adverb available at the list of the collocates generated by BNC/COCA was acceptable. The participants were not penalized for the spelling errors (See Appendix I for sample receptive and productive test items).

Regarding the validity and reliability measures, the internal validities of the tests were approved by two EFL professionals. Both of the receptive and productive tests enjoyed acceptable internal consistency reliability, as shown by the Cronbach alpha coefficients of .89 and .83, respectively. The performances in the productive test were rated by two non-native EFL professionals (one male and one female with the average age of 40), who had at least 10 years of experience in English language teaching in some institutes and universities. Where discrepancy occurred between the raters, they discussed to arrive at a consensus; otherwise, the final score was the average of two scores awarded by the raters. The inter-rater reliabilities of the pretest and post-test were verified by Spearman-Brown Formula with coefficients of .79 and .83 for the pretest and post-test, respectively.

3.3. Students' Survey Questionnaire

A questionnaire was designed to survey the students' attitudes toward using concordancers in learning collocations. It had two sections. The first section, including

seven items, probed into the learners' prior experiences with computer-assisted language learning (CALL) and especially the use of concordancers. The items included dichotomous response options (yes/no). A blank space was provided to elaborate on their answers if the students' answer was "yes". The second section, including 15 items, assessed the students' attitudes toward instruction delivered through concordancers. The items were designed with a 5-point Likert scale ranging from *strongly disagree* (1 point) to *strongly agree* (4 points) and *no opinion* (no points). Some items in the questionnaire were adapted from earlier studies (Chang & Sun, 2009; Huang, 2014), but since these studies addressed writing and proofreading skills, only the items directly relevant to L2 collocational knowledge were used. Further items were developed by the teacher-researcher of the current study.

3.4. Concordancers

Two online concordancers including the British National Corpus (BNC) and the Corpus of Contemporary American English (COCA) were installed on the PCs. These two concordancing tools complement each other and allow for searching and generating concordance lines through a rich source of authentic instances of language use. BNC and COCA are freely available at http://corpus.byu.edu/bnc/ and https://corpus.byu.edu/coca/, respectively.

3.5. Procedure

This study was conducted as an intensive extracurricular program within a writing course. It lasted two weeks, four sessions, with the first and fourth sessions being allocated to administering the pretest and the post-test. The instruction was offered during

two 90-minute sessions (sessions 2 and 3) in a language laboratory. Given the experimental groups' schedules and the availability of computers, each of the experimental groups (deductive and inductive) attended the language laboratory and received the treatments in two different sessions. Prior to the treatment, they were familiarized with the purpose and function of the concordancer, and how to use it.

Four steps were offered by Saumell (2012) as essential in inductive learning, including (a) exposure to language through examples and illustrations, (b) observation and analysis of language, (c) statement of the rules, and (d) application of the rules in practice tasks. Following Saumell (2012), in each of the instructional sessions, the inductive group searched instances of the use of the 10 target verbs via concordancers. After searching the verbs, the participants analysed the concordance lines and worked out the underlying collocational patterns, that is, the most frequent collocates of a given verb and the position of each adverb collocate (prior to or following the verb). Finally, drawing upon these patterns, they accomplished the given tasks.

As for the deductive group, the collocational patterns were explicitly presented by the teacher (researcher). She offered a number of the most frequent collocates going with each of the target verbs. She also explained whether each adverbial collocate frequently appears before or after the verb.

After the explicit presentation of the collocational patterns to the deductive group and the discovery of these patterns by the inductive group, they were engaged in accomplishing some tasks in two stages. In

the first stage, they were asked to use the concordancers as a reference tool and to generate at least three concordance lines for each verb. In each of the treatment sessions, the focus was on 10 different verbs.

In the second stage, worksheets including a matching exercise and a cloze task were distributed among the participants. The matching exercise required them to match each verb with the correct adverbial collocate and during the cloze task, they needed to complete each sentence with the appropriate adverb collocates for the given verbs. The participants' performances while accomplishing the tasks were monitored and their answers were checked, discussed, and shared with the whole class.

While the deductive and inductive groups accomplished the two stages of the tasks using the concordancers, the control group performed only the second stage. They did the matching and cloze tasks without any reference to concordancers. All groups completed the tasks with as much time allocated as they needed. One week after the treatment, a post-test was administered with the same items used in the pretest, but in a different order

4. Results

To answer the research questions, the quantitative, qualitative, and survey data were triangulated and analysed. The descriptive statistics for receptive and productive collocation pretest-test scores were provided as follows (Table 1). Since the skewness and Kurtosis values fall within the landmarks of normality, the assumption of the normality of the data was met.

Table 1. Descriptive statistics for receptive and productive collocation pretest-test scores

		Receptive pretest		Productive pretest		Skewness	Kurtosis
Group	n	M	SD	M	SD		
Deductive	23	15.3	3.31	11.8	2.65	-.07	-.32
Inductive	27	15.7	3.53	11.3	3.03	-.07	.62
Control	26	14.9	4.05	12.1	2.96	-.32	-.43

The results of two ANOVAs (Table2) run on pretest scores show that there were no statistically significant differences among the performances of three groups in receptive ($F = 47.65, p = 0.07, \eta^2 = .67$) and productive ($F = 43.07, p = 0.07, \eta^2 = .71$) collocation pretests. The assumption of homogeneity of the three groups in terms of their receptive and productive knowledge of collocations is thus met.

Table 2. ANOVA for receptive and productive pretests of collocations

Test	Groups	N	M	SD	df	F	Sig.	$\eta2$
Receptive	Deductive	23	7.65	3.31	5	47.65	0.07	.67
	Inductive	27	7.85	3.53				
	Control	26	7.45	4.05				
Productive	Deductive	23	5.80	2.65	5	43.07	0.07	.71
	Inductive	27	5.65	3.03				
	Control	26	6.05	2.96				

*Not*e: *p* is significant at the 0.05 level.

Table 3 shows the descriptive statistics for receptive and productive collocation post-test scores**.** To answer the first research question, two AVOVAs were run on the post-test scores across the three groups to examine the effect of concordancing on the receptive and productive collocational knowledge (Table 4).

Table 3. Descriptive statistics for receptive and productive collocation post-test scores

Group	n	Receptive post-test		Productive post-test		Skewness	Kurtosis
		M	SD	M	SD		
Deductive	23	30.2	3.23	27.1	2.54	-.56	.06
Inductive	27	31.7	2.87	30.9	4.03	-1.10	.7
Control	26	20.2	3.86	18.7	3.34	.08	-.18

Table 4. ANOVA for concordancer effect on receptive and productive collocation post-tests

		SS	*df*	SD	F	Sig.	Eta squared
Receptive post-test	Between groups	584.3	9	16.7	47.65	.0000	.66
	Within groups	108.2	5	8.71			
	Total	692.5	14	25.41			
Productive post-test	Between groups	421.9	7	21.23	43.07	.0000	.70
	Within groups	87.6	5	9.04			.66
	Total	509.5	12	30.27			

*Not*e: *p* is significant at the 0.05 level.

As shown in Table 4, the main effect of concordancing was statistically significant with a medium effect size in receptive post-test ($F = ٤٧,٦٥$, $p = ٠,٠٠$, $\eta^2 = .66$) and a large effect size in productive post-test ($F = ٤٣,٠٧$, $p = 0.00$, $\eta^2 = .70$). The values obtained for eta squared show that 66 percent and 70 percent of the variance in receptive and productive collocation post-test means can be explained by the type of instruction. In response to the first research question, it can be concluded that concordancing significantly affected the improvement of the receptive and productive knowledge of verb-adverb collocations. Paired comparisons were run to find out where the differences between the groups lie (Table 5).

Table 5. Paired comparisons for receptive and productive post-tests of collocations

		Mean difference	SEM	Sig.	95% confidence interval	
					Lower bound	Upper bound
Receptive post-test	Deductive Control	10.00*	2.09	0.00	6.95	13.45
	Inductive Control	11.50*	2.12	0.000	5.09	15.28
	Deductive Inductive	1.50	1.89	0.061	0.75	5.98
Productive post-test	Deductive Control	8.٣٤*	2.23	0.000	5.67	11.23
	Inductive Control	12.17*	3.03	0.000	7.65	17.37
	Deductive Inductive	3.83*	2.57	0.000	1.23	7.49
	Inductive	10.00*	2.09	0.00	6.95	13.45

Post hoc pairwise comparisons revealed that both the deductive and inductive groups made significant gains in the receptive and productive tests of collocations, compared with the control group. Further inspection of the paired comparisons showed that while the mean difference between the deductive and inductive groups in receptive post-test of collocations was not statistically significant (mean difference = 1.50, $p = 0.75$), the difference between mean scores of the two groups in productive post-test was significant (mean difference = 3.83, $p = 0.00$), with the inductive group significantly outperforming the deductive group in production of verb-adverb collocations. In response to the second research question, it can be concluded that in the context of concordancing, deductive and inductive approaches resulted in roughly similar gains in receptive knowledge of collocations; however, the inductive approach resulted in better

performance in productive language use.

5. The Students' Survey Results

To answer the third research question, the participants' answers to the survey questionnaire were examined. The results of the first part of the questionnaire suggested that while almost all learners had access to computers and the Internet, they had not received any instruction via CALL approach. The majority of the students (87%) reported that they hardly consulted online resources or computer programs to learn English.

Surprisingly, most of them (91%) had not heard about collocations and none of them had ever heard about concordancers. Studying collocation via concordancing, thus, represented a novel experience for them.

The second part of the questionnaire assessed the students' perceptions of the concordancing following treatment. Table 6 summarizes the percentage of responses to each item based on a 5-point Likert scale.

Table 6. Learners' perceptions of concordancers

	N	1	2	3	4	N	M	SD
1. I enjoyed learning English collocation through a corpus and concordance.								
50	1 (2%)	5 (10%)	3 (6%)	41(82%)	0 (0%)	3.68	0.92
2. Studying concordance lines is helpful for learning the collocation of the words.								
50	2 (4%)	7 (14%)	12 (24%)	29 (58%)	0 (0%)	3.36	1.37
3. I think the concordancer was user friendly.								
50	6 (12%)	8 (16%)	12 (24%)	24 (48%)	3 (6%)	2.96	1.06
4. Studying the concordance lines helps me memorize the usage of target words.								
50	5 (10.6%)	10 (21.2%)	15 (31.9%)	17 (36.1%)	0 (0%)	2.76	1.42
5. I prefer learning the usage of the words by studying concordance lines to being taught directly by the teacher.								
50	8 (16.6%)	12 (25%)	7 (14.5%)	21 (43.7%)	3 (6.2%)	2.74	0.89
6. Studying concordance lines helps me incidentally learn more new words in the concordance output.								
50	3 (6.3%)	5 (10.6%)	11 (23.4%)	28 (59.5%)	0 (0%)	3.16	0.48
7. Learning about concordances has increased my confidence in using English.								
50	5 (14.8%)	ө (10.6%)	15 (31.9%)	19 (40.4%)	2 (4.2%)	2.72	1.06
8. Overall, the tasks completed by concordancers are very useful resource for learning new words or collocations.								
50	11 (22.4%)	7 (14.2%)	13 (26.5%)	14 (28.5%)	4 (8.1%)	2.40	1.32
9. I think I can use the collocations and expressions learned from the concordance exercises in future.								
50	6 (12%)	8 (16%)	12 (24%)	22 (44%)	2 (4%)	2.92	0.87
10. I hope we can have more concordance exercises to do in the future.								
50	7 (14.8%)	4(8.5%)	13 (27.6%)	20 (42.5%)	3 (6.3%)	2.68	0.49
11. I have some difficulty in studying concordance lines due to time and effort spent on analyzing the data.								
50	3 (6.5%)	5 (10.8%)	15 (32.6%)	22 (47.8%)	1 (2.1%)	2.92	1.05
12. I have some difficulty in studying concordance lines due to unfamiliar vocabulary in the data.								
50	11 (22%)	6 (12%)	16 (32%)	15 (30%)	2 (4%)	2.62	1.23

13. I have some difficulty in studying concordance lines due to cut-off sentences in the exercises.						
50	10 (22.4%)	9 (20%)	9 (20%)	10 (22.2%)	7(15.5%)	1.90	1.21

14. I have some difficulty in formulating the overall patterns of the usage of the words even I spend time and effort studying the concordance lines.						
50	9 (18%)	6 (12%)	9 (18%)	26 (52%)	0 (0%)	3.04	0.81

15. Overall, studying the concordance lines is time-consuming and boring.						
50	6 (12%)	2 (4%)	4 (8%)	35 (70%)	3 (6.0%)	3.24	1.02

Note: N= the number of students who answered the item.

1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N = no opinion

The students' responses to the questionnaire imply that most of them hold positive attitudes towards using concordancers. They considered the concordancer useful for learning collocations (82%) and the usage of the L2 words (68%). More than half of the students (58.2%) reported preferring concordance lines to traditional teacher-directed instruction. Not only was the concordancing helpful in developing the collocational knowledge, but also it proved effective in incidental acquisition of new lexical items, as reported by 82.9 percent of the students. Some students (72.3%) suggested that concordancing increased their confidence in using words acquired recently. The majority of the participants (68%) also reported their willingness to use online corpora and concordancing tools in future.

While the majority of the students evaluated the concordancer as an effective resource for acquiring the collocational knowledge, some had a negative evaluation of the usefulness of this tool. This negative attitude was attributed to the time and effort spent on analyzing the data (17.3%), unfamiliar vocabulary in the data (34%), and cut-off sentences in the exercises (42.2%). Some students (30%) reported that they failed to formulate the overall patterns of the

usage of the words even after they spent time and effort studying the concordance lines. Finally, 16 percent of the participants considered analysing the concordance lines time-consuming and boring.

6. Discussion and Conclusion

The aim of this study was to explore the differential effects of the deductive and inductive approaches on the improvement of the collocational knowledge in the context of classroom concordancing. The results demonstrated significant positive effects of concordancing in improving the knowledge of verb-adverb collocations. Both experimental groups revealed more gains compared with the control group. The second finding was that while deductive and inductive approaches resulted in rather similar degrees of receptive gains, the inductive approach appeared to be more effective in the improvement of productive knowledge of verb-adverb collocations. The majority of the students were also found to hold positive attitudes toward concordancing.

On the theoretical level, the better performances of the experimental groups (exposed to concordancers) lend support to the noticing hypothesis (Schmitt, 1990). Students' repeated exposure to collocational

patterns included in the corpora and retrieved via concordance lines (input enrichment), with the target constructions being highlighted (input enhancement), satisfied the requirements of noticing the target features and helped improve learners' knowledge of the target collocations. As an attention-drawing interface, the concordancer engaged the learners in an exploratory task during which the learners put their attentional resources to find out which adverbs go with the given verbs. Highlighting the keywords in the search results increased the likelihood of noticing the verb-adverb co-occurrences and helped learners' develop the awareness and understanding of these collocations. In addition to theoretical support, the finding of this study in terms of the positive contribution of concordancers to promoting L2 collocational knowledge is consistent with the findings of some studies (e.g., Chan & Liou, 2005; Daskalovska, 2015; Frankenberg-Garcia, 2014).

The overall outperformance of the inductive group can be explained in the light of the involvement load hypothesis (ILH) (Laufer & Hulstijn, 2001). ILH consists of three components: need, search, and evaluation. According to Laufer and Hulstijn (2001), need is the motivational non-cognitive element of involvement and is the drive to keep up with the task requirements; search is the learner's endeavor to discover the meaning and/or usage of the word; and evaluation is the learners' comparison of the word with other words to assess whether the word fits the given context. Retention of unfamiliar constructions, according to ILH, is dependent upon the amount of need, search, and evaluation imposed by the task. In the concordancing context of this study, learners felt a need to learn L2 collocations; via concordancers looked up the possible options forming acceptable verb-adverb collocations; and finally assessed which adverb is suitable for the given verb. The amount of the task-induced involvement load seems to be even more in the case of the inductive approach, which requires a deeper level of cognitive processing compared with the deductive approach (Motha, 2013). This might explain the better performance of the inductive group in productive language use, which is more difficult than the receptive, as it calls for more and deeper processing (Pellicer-Sánchez, 2015). This is also consistent with the findings of some studies (e.g., Jean & Simard, 2013; Qi & Lai, 2017) which documented the better performance of L2 learners when they were taught inductively.

As shown by the learners' responses to the survey, concordancing was viewed favourably by the learners in this study, supporting previous studies (e.g., Ali Rezaee et al., 2014; Vyatkina, 2016b). However, it should be borne in mind that the novelty effect (Clark & Sugrue, 1988) might have contributed to the learners' improved performance. Since they had no prior experience of concordancers, it represented a novel approach to learning and this novelty may have encouraged the students to use the computer eagerly and to show more effort and persistence, which is reflected in their better performance.

While the knowledge of L2 collocations is essential for achieving high levels of L2 proficiency, most of the L2 learners even with a large reservoir of lexical and grammatical knowledge, show a deficiency in collocational use, especially when it comes

to the productive use. L2 learners' problems with collocations may be attributed to some factors. One factor is the lack of enough input in written and spoken texts. As argued by Pellicer-Sánchez (2015), collocational patterns do not occur sufficiently in the input learners receive. A further factor relates to learners' lack of awareness of the importance of collocations and the communication problems associated with the lack of this knowledge. Under the misconception that breadth of lexical knowledge is the sole predictor of better L2 performance, learners may be familiar with individual words, yet may not be able to identify the appropriate collocates of a given word, and eventually may construct mal-formed collocations.

Some pedagogical implications may be drawn from this study. The beneficial effects of concordancing in promoting the collocational knowledge suggest that teachers and material designers should incorporate computer technology in general and concordancing tools in particular in the design of curricula to foster L2 learners' collocational knowledge. Teachers are also recommended to draw upon deductive and inductive approaches to promote the receptive and productive knowledge of collocations. However, decisions on choosing which approach to use, apart from the task type (receptive or productive), are dependent on other factors like the nature of the language being taught, the preferences of teachers/students, and the particular goals and contextual features of the language learning/teaching situation.

The limitations of this study include the small population size, which does not enable drawing more generalisable conclusions. Moreover, the multifarious nature of collocations does not permit generalizing the findings of a specific study to other contexts and collocational patterns. The findings of this study on verb-adverb collocations may not represent a complete picture of general collocational learning; thus, further studies on other collocational patterns are needed. Moreover, the technical and administrative issues did not allow for a longer treatment. Longitudinal studies addressing the acquisition of collocations over a long run, employing larger corpora, appropriate measurement instruments, and a systematic control of variables, will undoubtedly provide us with a better understanding of the development of L2 collocational knowledge. These may be potential directions for future research.

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Appendix I.

Sample receptive test items

Choose the correct adverb.

1. Studies show that children and adolescents are………influenced by violent television programs.

a. successfully   b. thoughtfully   c. greatly   d. carefully

2. She ………..asked her mother for permission, which was granted.

a. easily   b. safely   c. politely   d. enormously

Sample productive test items

a. Complete the following sentences with an appropriate adverb (Less-controlled items).

1. We ……thanked him for the help he gave us to hold the wedding party last weekend.

2. The new test will enable us to identify …….. patients who are most at risk.

b. Write sentences with the given verbs using appropriate adverbs (More-controlled items).

1. recognize

2. influence