The Effects of Horizontal and Vertical Axes on Iranian EFL Learners' Vocabulary Learning Regarding the Cognitive Domain Levels

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Abstract

Vocabulary learning is and indeed has always been one of the major concerns in foreign language teaching and learning. Among different aspects related to vocabulary learning and teaching, the sense relations play an important role. These relations can be found in two dimensions as the horizontal axis represents syntagmatic relations-like collocations, fixed expressions and idioms, while the vertical axis represents paradigmatic relations-such as synonyms, antonyms and hyponyms. The present study was an attempt to investigate the effects of horizontal and vertical axes on Iranian EFL learners' vocabulary learning regarding the cognitive domain levels. To this aim, 84 Iranian high school students (second grade) were chosen through a PET as the homogeneity test. These participants were also pretested through a researchers-made vocabulary test and

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were divided into three homogeneous groups to represent the horizontal axis group (HAG), vertical axis group (VAG), and control group. The participants went through the processes of pretesting, treatment, and posttesting. The results of data analysis (MANOVA and Independent T-test) indicated that the horizontal group significantly outperformed the vertical group on the posttest of vocabulary, while both VAG and HAG outperformed the control group. It was also revealed that the components of cognitive domain; i.e. comprehension, application, synthesis, and evaluation, except knowledge, were significantly impacted by the horizontal training method. Therefore, syntagmatic relations or horizontal axis can be considered successful in helping EFL learners improve their vocabulary. The findings are fruitful for EFL teachers and syllabus designers to develop efficient vocabulary teaching procedures.

Keywords: Cognitive Domain, EFL Learners, Horizontal Axis, Vertical Axis, Vocabulary Learning.

Introduction

The reason underlying the importance of vocabulary learning is very straightforward: "the building blocks of language learning and communication are not grammar, function, notions, or some other unit of planning and teaching but lexis, that is, word and word combination" (Richards & Rodgers, 2001, p. 132). It is thus no wonder then that the ELT literature is simply overwhelmed by an ever-growing array of studies on vocabulary acquisition (e.g., Avila & Sadoski, 1996; De la Fuente, 2002; Genç, 2004; Gu, 2018; Knight, 1994; McKeown & Curtis, 2014; Naeimi & Foo, 2013).Vocabulary knowledge is considered as one of the language skills crucial for fluent language use (Nation, 1994) and vocabulary size is an indicator of how well L2 learners can perform all the four language skills of speaking, reading, listening, and writing (Bear et al., 2012; Naeimi & Foo, 2013).

Syntactic categories which represent groups of words have been investigated in descriptive linguistics (Croft, 1991) and later in cognitive linguistics in terms of researching cases and semantic categories (Schlesinger, 2006). It is argued that syntactic categories can be replaced for one another without changing the grammaticality of a sentence (Yatbaz et al., 2012). Linguists identify syntactic categories based on semantic, syntactic, and morphological properties of words. It was also found out that children use prosodic and phonological features to bootstrap syntactic category acquisition (Ambridge & Lieven, 2011). "Relationships between linguistic units can be classified into two types: syntagmatic (concerning positioning), and paradigmatic (concerning substitution)" (Haruki, 2006, p. 76). Syntagmatic relations determine which units can combine to create larger groups and paradigmatic relations determine which units can be replaced for one another. The paradigmatic vs. syntagmatic axes for words in a simple sentence and their possible substitutes are illustrated in Figure 1. Similarly, according to De Waard (2010), the relationship between vocabulary and syntax can be found in two dimensions which is usually named "axes". "Horizontal axis represents syntagmatic relations-like collocations, fixed ex-

pressions and idioms" (p. 41). In fact, horizontal axis equals "syntagmatic rela-tions which define combinatory possibilities; the relations between elements that might combine in a sequence" (Haruki, 2006, p. 79). In contrast, vertical axis represents "paradigmatic relations-such as synonyms, antonyms and hy-ponyms" (De Waard, 2010, p. 41). As Haruki (ibid) mentions, vertical axis rep-resents paradigmatic relations which are the oppositions between elements that can replace one another "(p. 79).
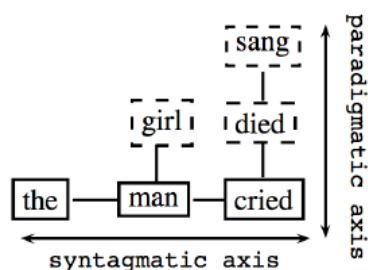

Figure 1. *Syntagmatic vs. Paradigmatic Axes for Words in a Simple Sentence (Chandler, 2007)*

The concept of learning syntactic categories using paradigmatic representa-tions of word context has already been discussed in the literature (Chandler, 2007; Schutze & Pedersen, 1993; Yatbaz et al., 2012). One of the most im-portant components in language learning is vocabulary, as it forms the biggest part of language communication. Some vocabulary items and word combina-tions such as phrasal verbs, collocations, idioms, and expressions create com-plexity for EFL and ESL students, partly because there are so many of them, but also because word combinations seem so often completely random (Eren & Metin, 2018). The way in which L2 words are presented in course books or the way through which teachers telling students that they should acquire them by heart can increase these complexities (Grogan et al., 2018). However, if one looks carefully at the particle, patterns start to develop which suggest that the combinations are not so random after all (Gu, 2018).

Due to the importance and complexity of vocabulary learning, theorizers and practitioners in the field of language pedagogy have always tried to find the best ways of grasping vocabulary knowledge. In other words, "there is a big dilemma in the selection of an effective approach for vocabulary instruction" (Grogan et al., 2018, p. 2). On the other hand, the learning and teaching of for-eign language vocabulary has not been receiving enough attention in Iranian schools. The bulk of theoretical discussions had already been focused on the teaching of syntactic structures and reading comprehension and currently, the communicative competence is regarded as the key to all success in foreign lan-guage acquisition in this context. Vocabulary learning is most often treated as a problem marginal to other language learning activities since it is the matter of

common belief that the acquisition of foreign lexicon is a by-product of having the learner participate in these other activities.

Because of the aforementioned problems, among different aspects related to vocabulary learning and teaching, the present researchers intend to focus on the sense relations that exist among words. The horizontal axis represents syntagmatic relations-like collocations, fixed expressions and idioms, while the vertical axis represents paradigmatic relations-such as synonyms, antonyms and hyponyms (Yatbaz et al., 2012).

On the other hand, based on Bloom (1965), the cognitive domain involves knowledge and development of intellectual abilities and skills. There are six levels of complexity: knowledge, comprehension, application, analysis, synthesis, and evaluation. The higher the level, the presumably more complex mental operation is required (Goyal & Rajalakshmi, 2018). Such a perspective has not been taken into consideration in teaching L2 vocabulary to the EFL learners in the Iranian context. Thus, it is necessary to determine with the help of which vocabulary teaching technique (horizontal or vertical axis), students' vocabulary knowledge moves up into higher levels of cognitive domain (Boers, 2013). In line with what has been discussed so far, this study sought to investigate the effect of horizontal (syntagmatic) (i.e., collocations, fixed expressions and idioms) and vertical (paradigmatic) (synonyms, antonyms, and hyponyms) axes on Iranian EFL learners' vocabulary learning regarding the cognitive domain. Therefore, the central aim of this thesis was to bring awareness toward syntagmatic and paradigmatic word relations to the EFL classroom.

Literature Review

Words are building blocks in a language. Knowledge of target language can start developing through learning the lexical items. Experiences of being a language learner have brought us no hesitation in recognizing the importance of vocabulary in language learning. Due to its importance, several techniques exist to offer new words in a course such as "physical demonstration, verbal explanation, providing the students with synonyms and antonyms, translation, using visual aids, exemplification, presenting words in contexts and chunks" (Nash & Snowling, 2006, p. 56). Since leaners are not usually capable to utilize the offered vocabularies communicatively, however, it seems obvious that some of the mentioned techniques are not accompanied with a great deal of vocabulary retention (Rahimi & Momeni, 2012).

Mashhady et al. (2012) found that presenting homonym word pairs facilitated word retrieval in short-term memory by decreasing the cognitive demands. If presented together, homonym pairs can be retrieved faster because their lexical forms are similar. The second part of their study revealed that when learning is measured by semantic representations, synonyms can facilitate word learning by decreasing cognitive demands as the meanings of the words are identical for synonym pairs.

Ansari and Khojasteh (2013) compared the influence of three useful techniques to carry a meaning as: synonyms, dictionary definitions, and context-on acquisition (effectiveness of the method). Immediate and delayed post-tests indicated that the context group outperformed the definition and the synonyms groups. Hoshino (2010) investigated the relative effectiveness of five types of word lists (synonyms, antonyms, categorical, thematic, and arbitrary) in facilitating L2 vocabulary learning in a classroom setting. Comparing the effectiveness of the type of word lists on learners, he concluded that "Within a classroom setting, this study makes it clear that presenting new vocabulary in categorical lists promotes vocabulary learning" (p.310). Higa (1963, as cited in Webb, 2007) found that learning two distinct words are far easier than learning two synonyms simultaneously, and it seems worth mention that synonym has been considered as a factor that can make words more difficult to learn.

Webb's (2007) research indicated that synonym may facilitate word acquisition. The students' scores for words with known synonyms were significantly higher than those without. The productive tests of paradigmatic association and syntagmatic association were accompanied with higher scores. Nattinger and Decarrico (1992), found that teaching words in chunks can largely improve the range of the words one can apply in the process of meaning negotiation. In line with this finding, Willis and Willis (2006) expressed that native speakers' fluency is related to the fact that their vocabulary is a part of phrases and larger chunks, which can be retrieved from memory as a whole and reducing processing difficulties. It is not stored only as isolated words. Thus, learners who only learn individual words will need a lot more time and effort to express themselves (Rahimi & Momeni, 2012).

The development of EFL learners' communicative abilities can be affected by a good command of collocation use (Ellis, 1997; Nation, 2001; Nattinger & Decarrico, 1992; Schmitt, 2000; Shooshtari & Karami, 2013). This means that language learners are required to develop their knowledge base of word combinations. That is, to know which words are used together and in what patterning. Faghih and Sharafi (2006) in their studies investigating the role of collocation on Iranian EFL learners' interlanguage found that most of errors committed by the learners in their productions were deep-rooted in their lack of proficiency in collocations. They arrived at this conclusion that it is not the grammatical or lexical knowledge of learners which result in their difficulty in spoken and written product but it is their lack of knowledge of the words, in particular collocation knowledge, that usually makes this problem. Koosha and Jafarpoor (2006) claimed that mastery over collocations can affect EFL learners' fluency as well as accuracy in productive skills. They further added that there is a good correlation between the use of lexical collocations and language proficiency in Iranian EFL leaners.

Assessments development through which the higher and lower level of cognitive skills is measures can be affected by Bloom's taxonomy of educational objectives. Since it is important to assess how well students gain the information within the levels of the taxonomy, this study sought to investigate the

effect of horizontal and vertical axes on Iranian EFL learners' vocabulary learning regarding the cognitive domain levels. As the present researchers will discuss in details in coming sections, this domain is grouped under six subsequent thinking levels: as "knowledge, comprehension, application, analysis, synthesis and evaluation" (Koksal & Ulum, 2018, p. 104). "The first three levels which refer to the lower order thinking skills include remembering, understanding, and applying, while the next three levels refer to the higher-order thinking skills that contain analyzing, evaluating, and creating" (Orey, 2010, p. 35). Bloom's taxonomy is graded. That is, each step is presented at the upper steps as well. For instance, if someone is performing in the analysis level can also function in lower order steps as comprehension or application (Assaly & Smadi, 2016).

To fulfill the purpose of this study, the following research question was formulated:

How different are the horizontal and vertical axes in Iranian EFL learners' vocabulary learning regarding the components of cognitive domain levels?

Method
Participants

The main participants of the present study were 83 Iranian high school homogeneous students, selected out of initial 100 students based on their performance on a piloted version of Preliminary English Test (PET). The researchers piloted the test prior to final administration for its reliability index with a group of 30 Iranian EFL learners similar to the main study participants in term of age, background knowledge and the proficiency level. Finally, the test was administered to 100 intermediate EFL learners and 83 participants whose scores fell within one standard deviation below and above the mean were selected as the main study participants. It is worth mentioning that all the participants were within the age range of 15 to 18. The participants of the study were randomly divided into three homogenous groups as horizontal axis group (HAG) (n=28), vertical axis group (VAG) (n=24), and the control group (CG) (31).

Materials and Instruments

To fulfill the purpose of the current study, a Preliminary English Test (PET) and the researchers-made vocabulary test (pretest and a vocabulary posttest were used.

Preliminary English Test (PET)

The PET test was piloted on a group of 30 students in order to probe the reliability of the sub-sets of the test. The results of the Pearson correlation (Table 1)

indicated that there was significant agreement between the two raters who rated the subjects on the writing (r (28) = .81, p = .000, representing a large effect size) sections of the PET.

Table 1.
Inter-Rater Reliability of Writing Sub-Sets of PET

		WRR2
	Pearson Correlation	.818**
WRR1	Sig. (2-tailed)	.000
	N	30

**. Correlation is significant at the 0.01 level (2-tailed).

Also, the KR-21 reliability indices for the listening and reading sections of the piloting PET were .68 and .73, respectively (see Table 2). The construct validity of the test has been already reported by the Cambridge University Press (https://www.ef.com/wwen/english-tests/cambridge-exams/pet/). The study participants answered the test in 100 minutes.

Table 2.
Reliability Indices; Listening and Reading Sections of Piloting PET

	N	Mean	Std. Deviation	Variance	KR-21
RC	30	25.13	3.471	12.051	.68
LC	30	16.03	3.222	10.378	.73
Valid N (listwise)	30				

Test of Vocabulary

The researchers-made test of vocabulary which was administered as both pre-test and posttest in the present study included multiple-choice items, matching, production items, recognition forms, true/false items, and sentence completion and was developed by the researchers based on the target words which were taught during the treatment.

In the present study, vocabulary achievement was determined by the scores of the participants of this study on the piloted teacher-made vocabulary test based on Bloom's (1965) taxonomy. Prior to the administration of this instrument, it was pilot tested for the purposes of clarity, simplicity, time allotment, and estimating its reliability. However, the test was piloted on a group of 30 students similar to the main participants of the study and six faulty items were removed after item analysis leaving 40 items in the test. The results of piloting process revealed that the mean was 20.80, standard deviation equaled (SD=8.99) and the reliability index based on Kuder-Richardson 21 equaled (KR-21=.89). The allotted time to answer this test was 45 minutes.

The piloted sample PET was utilized to choose a homogenous sample of participants based on their level of proficiency prior to the study, while a validated researchers-made test of vocabulary was administered as both pretest and posttest in the present study. Based on Bachman (2002, p. 454) "in case the interval between two administrations of a test is four weeks or so, the practicing effect is highly minimized". This test which included multiple-choice items, matching, production items, recognition forms, true/false items, and sentence completion was developed by the researchers based on the words in the target words which were taught during the cognitive treatment which will be discussed in details in procedure section.

It is worth mentioning that to predict the efficacy of this instrument and to make sure that it covers the content that was supposed to measure, four TEFL professors were requested to judge this instrument. As a result, they acknowledged this test for this purpose. It is also worth mentioning that the test items covered the areas of Bloom's (1965) domain levels including knowledge (students remember previously learned information), comprehension (students demonstrate an understanding of the facts), application (students apply knowledge to actual situations), analysis (students break down objects or idea into simpler parts and find evidence to support generalizations), evaluation (students compile component ideas into anew whole or propose alternative solutions), and synthesis (students make and defend judgments based on internal evidence or external criteria). In this study, vocabulary achievement was determined by the scores of the participants of this study on the piloted researchers-made vocabulary test based on Bloom's (1965) taxonomy as previously described.

Table 3.
Descriptive Statistics for the Pre/Posttest

	N	N of Items	Mean	Std. Deviation	Variance	KR-21
Vocabulary Test	30	40	20.80	8.995	80.905	.89

Procedure

Once the three groups (Horizontal, Vertical Axes, and the Control group) were divided as described above and the vocabulary pretest was administered, the treatment commenced. It seems worth mention that before starting the treatment, through a pilot test, 30 out of 60 words were chosen as the appropriate and unknown words to the participants of this study. All three groups were taught by the same teachers (the researchers), and they used the same course book (Iranian High school book, vision 2). Moreover, they received the same hours of treatment (six weeks, five words each week) and teaching aids in the same physical environment; therefore, the most significant point of departure in the three groups in the present study was the form of training and vocabulary teaching techniques presented in the classroom. That is, the processes of

treatment, types of examples and the type of questions in all three above-mentioned groups were to some extent different. For the horizontal group, the new words were taught through the techniques or strategies recommended by horizontal axes as collocations, fixed expressions and idioms, for the vertical group, the participants were provided with the new words through synonyms, antonyms and etc. The control group went through learning the items by means of definitions or Persian equivalents.

Before focusing on what was presented in the classroom, a brief review of the syntagmatic vs. paradigmatic axes for word combinations and vocabulary development (Chandler, 2007) which was followed in the study seems necessary. In the horizontal (syntagmatic) axis group, the learners were firstly familiarized with the concept of syntagmatic relations-like *collocations, fixed expressions* and *idioms* and they were trained to develop English vocabularies with the focus on such word combinations. Then they were encouraged to look the target words of each session in the dictionary and find the collocations each vocabulary item taught can make. Also, the students in the horizontal (syntagmatic) axis group were asked to find specific expressions, phrasal verbs, idiomatic expressions, and even the proverbs related to each specific word item taught. Hence, the focus of the classroom session in the 20 minutes devoted to the experiment in each session was on the practice of such syntagmatic segments. Subsequently, they were asked to say how much they were ready for the coming steps and procedures. They were also asked to practice the new expressions and idioms they had found at the end of each session of the classroom and see how well they had learned the vocabularies taught. Of course, they received relative feedback by the teacher, something which was decreased as the learners increased in the quality of their development. Various quizzes and classroom discussions were presented in the intervention sessions. An example might clarify the issue:

The first topic in the first lesson was taking about food passions, make an excuse to decline food, discuss lifestyle, describe local dishes and the covered vocabularies were nutrition terminology, food passions, excuses for not eating something and food descriptions. Also, the students were to cover a text about giving advice and find the collocations, idioms, and expression used in the text. The group participants were very interested in this issue, so the researchers decided to use it for a conversation topic. Furthermore, each student wrote a letter to their friends and received responses. They were supposed to use as many idioms, expressions, collocations, phrasal verbs and proverbs as possible. In this regard the students used the sentences of their book and similar ones form the Longman Dictionary and sometimes from the net.

In the vertical (paradigmatic) axis group, the teacher informed the learners of the role they had to play in the classroom, almost every session, to facilitate their vocabulary development. The students were trained to focus on "paradigmatic relations-such as synonyms, antonyms and hyponyms" (De Waard, 2010, p. 41). The learners were trained to develop word lists for the word items they learned and were asked to find the synonyms, antonyms, and lexemes

(word families) for each new vocabulary they encountered with. Just like the horizontal group, the first topic in the first lesson was taking about food passions, make an excuse to decline food, discuss lifestyle, discuss life style changes you have made, describe local dishes and the covered vocabularies were nutrition terminology, food passions, excuses for not eating something and food descriptions. Also, the students were to cover a short text about giving advice. These students were also very interested in this issue. The learners were divided into small groups of four to six and each group worked together in the instruction phase. Each group of students wrote a letter to their friends and received responses; they cooperated with each other and provided each other with synonyms, anonyms, and word lexemes.

In the control group (CG), the learners went through the process of instruction with no emphasis on vertical or horizontal factors. Meanwhile, they followed the conventional learning system followed by the mentioned course book which was communicating based language teaching (CBLT).

It is worth mentioning that in all the three groups, the teacher herself provided the feedback and assessed the students' process of learning. In the first intervention sessions, the students were encouraged to take part in the class discussions and they were informed that the teacher would assess them almost every session and in case they felt they had been weak one session, they could compensate for that weakness in the coming sessions. Throughout the instruction process, the teacher monitored the students' progress and provided feedback on their strengths and weaknesses.

The researchers in this study provided the same hints for all learners and gave feedback from the most implicit to the most direct and explicit based on the needs of the learners in each of the three groups. Moreover, the researchers assessed the learners' vocabulary through the quizzes that were taken every other session to enable them to be aware of their process. At the end of the treatment all the groups took the same vocabulary test as the posttest.

Data Analysis

Based on the normality of data, homogeneity of variances of groups and homogeneity of covariance matrices, to answer the mentioned research questions, multivariate analysis of variance (MANOVA) as a procedure for comparing multivariate sample means and independent t- test, as an inferential statistical test that determines whether there is a statistically significant difference between the means in two unrelated groups were of great help in this study.

Results and Discussion
Results

As assumptions of normality were retained, the parametric analysis was taken into consideration. MANOVA assumes. Based on the results displayed in Table

4, the assumption of normality was retained. The absolute values of the ratios of skewness and kurtosis were lower than 1.96.

Table 4.
Descriptive Statistics; Testing Normality of Data

Group		N	Skewness			Kurtosis		
			Statistic	Statistic	Std. Error	Ratio	Statistic	Std. Error	Ratio
Horizontal	Knowledge	28	.329	.441	0.75	-.333	.858	-0.39
	Comprehension	28	-.463	.441	-1.05	-.907	.858	-1.06
	Application	28	-.801	.441	-1.82	.043	.858	0.05
	Analysis	28	.371	.441	0.84	-.618	.858	-0.72
	Synthesis	28	-.802	.441	-1.82	-.056	.858	-0.07
	Evaluation	28	-.316	.441	-0.72	-.503	.858	-0.59
Vertical	Knowledge	24	.671	.472	1.42	-.640	.918	-0.70
	Comprehension	24	.347	.472	0.74	-.273	.918	-0.30
	Application	24	.352	.472	0.75	-.270	.918	-0.29
	Analysis	24	-.404	.472	-0.86	-.757	.918	-0.82
	Synthesis	24	-.830	.472	-1.76	-.416	.918	-0.45
	Evaluation	24	.276	.472	0.58	-1.350	.918	-1.47
Control	Knowledge	31	.273	.421	0.65	-.408	.821	-0.50
	Comprehension	31	.473	.421	1.12	-.183	.821	-0.22
	Application	31	.387	.421	0.92	-.778	.821	-0.95
	Analysis	31	-.311	.421	-0.74	1.206	.821	1.47
	Synthesis	31	-.037	.421	-0.09	-.912	.821	-1.11
	Evaluation	31	.555	.421	1.32	.108	.821	0.13

Table 5 displays the results of the Levene's test of homogeneity of variances. The non-significant results of the tests indicated that the assumption of homogeneity of variances was met on six cognitive domains. That is, knowledge (F = .994, p > .05), understanding (F = .686, p > .05), application (F = .856, p > .05), analysis (F = 2.12, p > .05), synthesis (F = 1.38, p > .05) and evaluation (F = 1.31, p > .05).

Table 5.
Levene's Test of Equality of Error Variances

		Levene Statistic	df1	df2	Sig.
Knowledge	Based on Mean	1.143	2	80	.324
	Based on Median	.994	2	80	.375
	Based on Median and with adjusted df	.994	2	78.255	.375
	Based on trimmed mean	1.093	2	80	.340
Comprehension	Based on Mean	1.070	2	80	.348
	Based on Median	.686	2	80	.506
	Based on Median and with adjusted df	.686	2	76.664	.506
	Based on trimmed mean	1.064	2	80	.350
Application	Based on Mean	1.461	2	80	.238
	Based on Median	.856	2	80	.429
	Based on Median and with adjusted df	.856	2	59.033	.430
	Based on trimmed mean	1.298	2	80	.279
Analysis	Based on Mean	2.705	2	80	.073
	Based on Median	2.126	2	80	.126
	Based on Median and with adjusted df	2.126	2	77.068	.126
	Based on trimmed mean	2.583	2	80	.082
Synthesis	Based on Mean	1.825	2	80	.168
	Based on Median	1.387	2	80	.256
	Based on Median and with adjusted df	1.387	2	71.086	.256
	Based on trimmed mean	1.748	2	80	.181
Evaluation	Based on Mean	1.840	2	80	.165
	Based on Median	1.313	2	80	.275
	Based on Median and with adjusted df	1.313	2	67.288	.276
	Based on trimmed mean	1.834	2	80	.166

Finally, the results displayed in Table 6 (Box's M = 58.45, p > .05) indicated that the assumption of homogeneity of covariance matrices was met.

Table 6.
Box's Test of Equality of Covariance Matrices

Box's M	58.453
F	1.239
df1	42
df2	17420.221
Sig.	.138

Table 7 displays the results of MANOVA used to analyze the data to answer the research question of the study. Based on these results (F (12, 152) = 5.61, p **<=** .05, partial eta squared **=** .307 representing a large effect size) indicated that there were significant differences between the horizontal, vertical and control groups' means on cognitive domains. Thus, the null-hypothesis as "there is no significant difference between the effect of horizontal and vertical axes on Iranian EFL learners' vocabulary learning regarding the components of cognitive domain", was rejected.

Table 7.
Multivariate Tests; Cognitive Domains by Groups

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.956	272.8416		75	.000	.956
	Wilks' Lambda	.044	272.8416		75	.000	.956
	Hotelling's Trace	21.827	272.8416		75	.000	.956
	Roy's Largest Root	21.827	272.8416		75	.000	.956
Group	Pillai's Trace	.614	5.611	12	152	.000	.307
	Wilks' Lambda	.448	6.169	12	150	.000	.330
	Hotelling's Trace	1.092	6.732	12	148	.000	.353
	Roy's Largest Root	.945	11.965	6	76	.000	.486

As displayed in Table 8, horizontal group had the highest means on comprehension, application, synthesis and evaluation; however, the vertical group had the highest mean on knowledge, while there were not any significant differences between the three groups' means on analysis.

Table 8.
Descriptive Statistics; Cognitive Domains by Groups

	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Horizontal	3.714	4.098	4.080	3.036	7.911	2.777
Vertical	4.125	2.021	1.990	2.927	4.740	1.677
Control	3.250	2.194	2.024	2.774	5.121	1.484

Table 9 displays the results of the Between-Subjects Effects. Based on these results, it can be concluded that there were significant differences between the three groups' means on; knowledge (F (2, 80) = 4.78, p **<=** .05, partial eta squared **=** .107 representing a moderate effect size), comprehension (F (2, 80) **=** 22.97, p **<=** .05, partial eta squared **=** .365 representing a large effect size), application (F (2, 80) **=** 15.94, p **<=** .05, partial eta squared **=** .285 representing a large effect size), synthesis (F (2, 80) **=** 19.37, p **<=** .05, partial eta squared **=** .322 representing a large effect size) and evaluation (F (2, 80) **=** 14.39, p **<=** .05,

partial eta squared **=** .265 representing a large effect size). However, there were not any significant differences between the three groups' means on analysis (F (2, 80) **=** .361, p **>** .05, partial eta squared **=** .009 representing a weak effect size).

Table 9.
Tests of Between-Subjects Effects; Cognitive Domains by Groups

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
	Knowledge	10.483	2	5.242	4.781	.011	.107
	Understanding	73.146	2	36.573	22.971	.000	.365
Group	Application	79.616	2	39.808	15.944	.000	.285
Group	Analysis	1.020	2	.510	.361	.698	.009
	Synthesis	164.112	2	82.056	19.037	.000	.322
	Evaluation	27.608	2	13.804	14.394	.000	.265

Table 10 displays the results of the post-hoc comparison tests: The results indicated that;

1. *The vertical group (M **=** 4.12) had a significantly higher mean than the control group (M **=** 3.25) on knowledge (MD **=** .875, p **<=** .05).
2. The horizontal group (M **=** 4.09) had a significantly higher mean than the vertical group (M **=** 2.02) on comprehension (MD **=** 2.07, p **<=** .05).
3. The horizontal group (M **=** 4.09) had a significantly higher mean than the control group (M **=** 2.19) on comprehension (MD **=** 1.90, p **<=** .05).

Table 10.
Pairwise Comparisons; Cognitive Domains by Groups*

Dependent Variable	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
Knowledge	Vertical	Control	.875*	.285	.003	.308	1.442
Comprehension	Horizon-tal	Vertical	2.077*	.351	.000	1.379	2.776
		Control	1.905*	.329	.000	1.250	2.559
Application	Horizon-tal	Vertical	2.091*	.440	.000	1.216	2.965
		Control	2.056*	.412	.000	1.236	2.876
Synthesis	Horizon-tal	Vertical	3.171*	.578	.000	2.022	4.320
		Control	2.790*	.541	.000	1.713	3.867
Evaluation	Horizon-tal	Vertical	1.100*	.272	.000	.558	1.642
		Control	1.293*	.255	.000	.785	1.801

*The mean difference is significant at the .05 level.

1. The horizontal group (M = 4.08) had a significantly higher mean than the vertical group (M = 1.99) on application (MD = 2.09, p <= .05).

2. The horizontal group (M = 4.08) had a significantly higher mean than the control group (M = 2.02) on application (MD = 2.05, p <= .05).
3. The horizontal group (M = 7.91) had a significantly higher mean than the vertical group (M = 4.74) on synthesis (MD = 3.17, p <= .05).
4. The horizontal group (M = 7.91) had a significantly higher mean than the control group (M = 5.12) on synthesis (MD = 2.79, p <= .05).
5. The horizontal group (M = 2.77) had a significantly higher mean than the vertical group (M = 1.67) on evaluation (MD = 1.10, p <= .05).
6. The horizontal group (M = 2.77) had a significantly higher mean than the control group (M = 1.48) on evaluation (MD = 1.29, p <= .05).

It can be concluded that in terms of the cognitive domain components, horizontal training of foreign language vocabulary was more significant than the vertical one and there was no significant difference between the vertical training method and the conventional one introduced to the control group.

An independent t-test was also run to compare the horizontal and vertical groups' means on the posttest of vocabulary in order to probe the null-hypothesis in general, without the focus on the components. Based on the results displayed in Table 11 it was claimed that the horizontal group (M = 26.30, SD = 3.93) had a higher mean than the vertical group (M = 22.37, SD = 4.22) on the posttest.

Table 11.
Descriptive Statistics; Posttest of Vocabulary by Groups

	Group	N	Mean	Std. Deviation	Std. Error Mean
Posttest	Horizontal	28	26.30	3.932	.718
	Vertical	24	22.37	4.226	.813

The results of the independent t-test (t (50) = 3.67, p < .05, 95 % CI [1.76, 6.09], r = .444 representing a moderate to large effect size) (Table 12) indicated that the horizontal group significantly outperformed the vertical group on the posttest of vocabulary.

Table 12.
Independent Samples t-test; Posttest of Vocabulary by Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.026	.872	3.637	50	.001	3.930	1.081	1.764	6.095
Equal variances not assumed			3.623	53.293	.001	3.930	1.085	1.754	6.105

*It should also be noted that the assumption of homogeneity of variances was met (Levene's F = .026, p > .05). That is why the first row of Table 12, i.e. "Equal variances assumed" was reported.

Discussion

The results of data analysis indicated that there was a significant difference between the effects of horizontal and vertical axes on Iranian EFL learners' vocabulary learning regarding the components of cognitive domain. Likewise, the horizontal group significantly outperformed the vertical and control groups in vocabulary reading regarding steps of cognitive domain including understanding, application, analysis, synthesis, and evaluation. The only exception was knowledge in which vertical group slightly outperformed the other two groups. As the knowledge level is the lowest level in the cognitive domain and the difference was not significant, this notion can be ignored at the cost of huge and significant differences between the effects of horizontal and vertical axes on the vocabulary learning of EFL learners taking part in this study. This finding is in line with the results of previous research studies which have studied syntagmatic and paradigmatic relations of lexical items such as Schutze and Pedersen (1993) who studied a vector model for syntagmatic and paradigmatic relatedness, found that syntagmatic (horizontal) axis of words in combination" could restrict the right neighbors of verbs that are counted in the matrix to their arguments"(p.104). This, in turn helps the software produce a good number of utterances while using restricted number of word combinations. This signifies the fact that idioms, collocations, and phrasal verbs which are frequently used in the daily conversations are enriched through horizontal relations which, linguistically speaking, are supported by syntagmatic issues of descriptive linguistics (Chandler, 2007).

Likewise, the present finding is in line with Jacquemin's (1999) study on syntagmatic and paradigmatic representations of term variation, which found that "there are as many types of morphological relations as pairs of syntactic categories of content words"(p. 343). Since the syntactic categories of content words are noun (N), verb (V), adjective (A), and adverb (Adv.), there are potentially sixteen different pairs of morphological links. Hence, associations of identical categories must be taken into consideration. For example, "Noun-Noun associations correspond to morphological links between substantive nouns such as agent/process: promoter/promotion" (Jacquemin, 1999, p. 343.)

The priority of horizontal axis of words to the vertical axis, as found in the present study, can also take support from Haruki's (2006) study on principles of representation in Japanese, asserting that syntagmatic relations facilitate the development of vocabularies in the agglutinative languages which not only are synthetic in nature, but also they rare enriched with morphology that primarily uses agglutination. In this respect, as "words may contain different morphemes to determine their meanings, but all of these morphemes (including stems and affixes) remain, in every aspect, unchanged after their unions" (Dhanalakshmi et al., 2009, p. 433). Horizontal word relations are significant as they deal with morphological analysis and this analysis type "is concerned with retrieving the structure, the syntactic and morphological properties or the meaning of a morphologically complex word"(Dhanalakshmi et al., ibid).

The present study finding can also take support from De Waard's (2010) study on a syntagmatic/paradigmatic analysis of scientific text, which revealed that in scientific texts, "there is no *story grammar* defined" (p. 42). Instead, it seems that a syntagmatic analysis of scientific text is quite straightforward. This feature also might lie in the fact that in the scientific texts the passive structures support the jargons and scientific collocations.

The present finding takes support from Abbassi et al.'s (2018) study on the effect of teaching memory strategies on Iranian EFL learner's vocabulary retention in terms of learners' multiple intelligences. As they reported "memorizing new vocabularies revealed that word list as a kind of rehearsal strategy could not succeed in enhancing the retention of learners' vocabulary knowledge" (p. 8). It signifies that vertical or paradigmatic relations stressing synonyms, lexemes, and word lists are not enough to support the retention of L2 vocabulary in the learners' mentality. Another feature of the present study which is worth mentioning is the presence of Bloom's (1965) taxonomy in the vocabulary test. It seems that both paradigmatic and syntagmatic relations have helped the development of foreign language vocabularies tested in different levels of the aforementioned taxonomy. As such, the descriptive linguistics giving value to the syntagmatic/paradigmatic relations gains priority and attention in terms of foreign language vocabulary development. This conviction can take support from Faber and Uson's (2012) study on constructing a lexicon of English verbs which found that higher levels of cognitive thought require implication of more complex word combinations and syntactic variations.

Conclusion and Implications
Conclusion

The results of data analysis firstly indicated that there was a significant difference between the effects of horizontal and vertical axes on Iranian EFL learners' vocabulary learning regarding the cognitive domain. In fact, the horizontal group significantly outperformed the vertical and control groups on the posttest of vocabulary. Secondly, it was revealed that all the components of cognitive domain except knowledge were significantly impacted by the horizontal training method. Likewise, vertical training method was more effective than the conventional method employed in the control group, though this effect was partially significant. Therefore, syntagmatic relations or horizontal axis can be considered successful in helping learners improve their vocabulary knowledge in the second language. Based on the literature on morpho-semantic theory in descriptive linguistics (Juilland & Roceric, 2019) and its applications (Croft,1991; De Waard, 2010; Haruki, 2006; Schlesinger, 2006; Schutze & Pedersen, 1993; Yatbaz, et al., 2012), employing syntagmatic axis, as a successful technique, could promote second language development in general, and vocabulary development, in particular.

It also could be concluded that syntagmatic and paradigmatic axes techniques of L2 vocabulary training both can help the learning of L2 vocabularies

considering Bloom's (1965) taxonomy of cognitive domain including remembering, understanding, applying, analyzing, evaluating, and creating. However, the syntagmatic relation takes the lion's share in this regard.

Pedagogical Implications

The present study demonstrated that both vertical and horizontal axes can influence the EFL learners' vocabulary development concerning the cognitive domain. For a native like performance, EFL learners are advised to know native like vocabularies, syntactic structures and dictions. Therefore, according to the results of the present study, some implications for teaching and learning lexical items through syntagmatic and paradigmatic vocabulary relations within the cognitive domain can be suggested:

Language teachers should employ syntagmatic relations to raise the learners' awareness of what they are dealing with and learners must be recommended to pay attention to the features of input they are exposed to and notice the difference between the target like forms and the current state of their linguistic knowledge. A kind of cognitive comparison which has been seen as one of the crucial processes in language acquisition can be of great help in this regard (Vlaar et al., 2017).

English teachers and learners could employ vertical and horizontal word relations to familiarize their learners with meaningful function of L2 vocabulary. They can help them develop specific collocations, expressions, phrasal verbs, and idioms within the syntagmatic axis, while make them ready to learn synonyms, word families, lexemes, and polysomic words. Therefore, the classroom interactions could be improved and would help the learners go further in terms of vocabulary learning and retention.

The findings of the present study can be fruitful to material developers in the ELT domain and also those who present tasks in which learners' awareness toward learning is enhanced. Such tasks may help the learners benefit from syntagmatic word relations, text analysis, autonomy, and meaningful learning.

The central aim of this research was to bring awareness toward syntagmatic and paradigmatic word relations to the EFL classroom. The researchers hope that the results of the present study could shed lights into blurred issue of this area, and teachers would hopefully apply what has been discussed and confirmed here to their own situations in order to improve the L2 vocabulary development of their students.

Limitation of the Study

Since the larger the sample size, the more precise the results will be, therefore, it should be confessed that the present study suffers from insufficient sample

size for statistical measurement, research result validation and generalization of the results to the larger population.

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