# The Effect of ZPD-activated Instruction on EFL Learners' Vocabulary Knowledge and Written Lexical Density

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## ABSTRACT

Vygotsky's Sociocultural Theory (SCT, 1978) of human learning focuses on human cognitive development and its origination in social interaction. One of Vygotsky's notions is the zone of proximal development (ZPD). This study sought to examine the effect of the ZPD-activated vocabulary instruction (i.e., collaborative dialogue and scaffolding) on Iranian EFL learners' vocabulary knowledge, their written lexical density, and their domain-specific vocabulary use in writing outputs. Forty male and female EFL students from language institutes in Isfahan (Iran) took part in the study in the form of a pretest-posttest-comparison-group design. A pretest was administered to the first 2 groups (i.e., vocabulary and lexical density groups) to ensure their homogeneity in the control and experimental groups. Afterwards, the control group was taught using their EFL textbooks without any use of ZPD-activated vocabulary instruction, whereas the second group was taught through ZPD-activated vocabulary instruction and received scaffolding. The experimental and control groups also performed 3 writing tasks related to their use of domain- specific vocabulary that was taught to them previously in order to check the effect of ZPD-activated vocabulary instruction on domain-specific vocabulary use. After the instructions, the first 2 groups received a posttest to check the participants' vocabulary achievement and their lexical density improvement in their writing. The ANCOVA and independent samples t-test results for all groups showed that the experimental group developed great gains of vocabulary, lexical density and domain-specific vocabulary in their writing output, whereas the control group, which was taught using conventional techniques in vocabulary teaching showed a small development in their vocabulary knowledge, lexical density and domain-specific vocabulary knowledge. Further, the results showed that scaffolding was most effective in improving learning. The findings have implications for implementing ZPD-based activities in L2 classrooms...

**Keywords:** ZPD-activated instruction; Collaborative dialogue; Scaffolding; Vocabulary knowledge; Written lexical density; Domain-specific vocabulary use.

## 1. Introduction

Vocabulary is an important facet in language. To learn a language, learners should master the vocabulary of that language. Using a language without having enough knowledge of vocabulary of that language is impossible. According to Lehr et al. (2004), vocabulary is knowledge of words and words meaning in both oral and print language and in productive and receptive forms which is used in listening, speaking, reading, and writing.

Vocabulary is generically defined as the knowledge of words and word meanings (Kamil & Hiebert, 2005).

Since the importance of vocabulary in language teaching, psychologists, linguists and language teachers have been focusing on vocabulary learning approaches and techniques for long time. Vocabulary knowledge plays an undeniable role in learning and using a language. It becomes really challenging when vocabulary learning should happen in a foreign language in which learners have restricted exposure to the language and not having enough chance to use the words they have already learned in real life. Psychologists, linguists, and language teachers have long tried to study vocabulary learning strategies. There are also so many studies about teaching words that are results of applying different vocabulary strategies; this shows the effects of various strategies on teaching vocabulary (Yongqi Gu, 2003). According to Pikulski and Templetion (2004), words are essential part of life; they can alter the knowledge of the world and will continue to do so. Vocabulary is the significant way for learning a language. Words are very fundamental in learning a language. Vocabulary is a central component of language use.

Vygotsky's sociocultural theory (SCT, 1978) of human learning views learning as a social, dialogic process. The main theme of Vygotsky's idea is that cognitive development is mainly influenced by human's active engagement into social interactions. According to Vygotsky (1978), learning happens on two levels; first, through interaction with other people, and then inside the learner's mind.

The second facet of Vygotsky's theory (1978) is that potential for human's cognitive development is confined to the zone of proximal development (ZPD). This zone is the area of exploration for which the student is cognitively prepared but requires help and social interaction to fully develop (Briner, 1999). Vygotsky (1978) believed that learners should be exposed to a socially rich environment. In other words, learner's skill development and knowledge acquisition should be supported by a teacher or more skillful peer.

### 2.Literature Review

Nowadays, ZPD-activated vocabulary instruction that is based on Vygotsky's sociocultural theory (SCT) by which students encounter with words in real situation and interact with each other by the help of a superior guide can be considered as a useful way to help students get autonomy or self-regulation ( Lantolf & Thorne, 2006).

### 2.1. Sociocultural Theory

Vygotsky's SCT (1978, 1986) theorized that social and collaborative interaction plays a very important role in language learning. To put it another way, learning is a social enterprise that can be achieved only socially not in isolation. Vygotsky (1978, 1987), then, focused on the relationship between thought and language and believes that individuals interact with each other through mediating tools of the mind (i.e., writing, collaborative production, and verbalization) and speaking is one of these mediating tools. Speaking, firstly, is both physical and mental activity for any individual, but any individual's physical and mental behavior is then controlled and regulated by others. That is, human beings, thus, do not just depend on physical world directly to communicate meaning, but they also rely on symbolic tools (i.e., numbers, arithmetic systems, music, art, and language) to mediate their relationships with others. Language is the most important symbolic tool through which individuals establish an indirect or mediated relationship with others (Lantolf, 2000).

### 2.2. ZPD

ZPD has certainly been Vygotsky's most important legacy to education. As a matter of fact, it is one of the notions of Vygotsky's sociocultural theory which is famous to most researchers and, consequently, it is believed to explain teaching forms that appear to be entirely  not in the harmony with the theory as a whole (Wells, 1999).

Vygotsky introduced ZPD as a part of general assessment of child development. This concept was not the main construct of his theory of child development, but an important stage and moment in the process of child development. According to this view, development is considered as moving a learner from other-regulated to self-regulated functioning (Chaiklin, 2003).

Vygotsky defined the ZPD as following: "ZPD is the distance between the actual developmental level as determined by the independent problem solving and the level of potential development as determined through problem solving under adult guidance or in the collaboration with more capable peer (Vygotsky, 1978, p. 86)."

Psychologists and educators have paid a lot of attention to ZPD and have conducted and oriented their research, hypotheses, and educational work toward the new grounds. Besides a psychological and pedagogical term, ZPD provides an instrument whose use will lead scholars to a renewal of theory (Daniels, Cole, & Wertsch, 2008).

According to Wells (1999), ZPD is taken into account as the reference for education and teaching in most of the areas and subjects (e.g., language, second language education, science, social science, etc.). It is applied in both special and normal education for both disabled and gifted children in different ages, even in new technology, mediated education; higher education in general, including teacher training.

### 2.2.1. Locating the ZPD

The term ZPD is one of the most famous and widely used concepts associated by Vygotsky's specific production (Chaiklin, 2003). The term now appears in most developmental and educational psychology textbooks, as well as some general psychology textbooks. Within educational research, the concept is now used widely (or referred to) in studies about teaching and learning in many subject-matter areas, including reading, writing, mathematics, science, second-language learning (Dunn & Lantolf, 1998; Lantolf & Pavlenko, 1995).

Wertsch (1985, p. 7) believed that if this theoretical concept was not enlarged further, then there would be a risk that "it will be applied carelessly and imprudently, therefore; it would become so unstructured and useless that it loses all explanatory power." First of all, the ZPD should be interpreted and explained meticulously and carefully so as to be used effectively.

### 2.3. Scaffolding

The explanation and definition of the scaffolding metaphor in educational research is really different and "is sometimes used loosely to refer to rather different things" (Hammond, 2002, p.2). This term refers to the support of a teacher or a more knowledgeable peer to a less knowledgeable person in learning. Hammond et al. (2002) emphasized the necessity understanding of scaffolding in language and literacy education.

An important study was conducted by Donovan and Smolkin (2002) on scaffolding. They analyze and consider scaffolding critically in children's writing. They evaluate the effect of different levels of scaffolding in children's learning and demonstration of their knowledge of genre. Tasks vary from those with minimal or low level support to those with middle or high levels of support (contextual and visual support). As a result, the highest support level of scaffolding is described as a "direct instruction with revision" (Donovan & Smolkin, 2002, p. 435). Their research showed that whereas scaffolding can be helpful for children it may also, sometimes, prevent children in conveying their full range of genre knowledge (Donovan & Smolkin, 2002, p.428). According to Verenikina (2003), this finding proves the concern that scaffolding, when proved as direct instruction, might have the opposite result.

### 2.4. Relationship between Scaffolding and ZPD

There is an agreement that ZPD and Vygotskian sociocultural theory are closely related to the concept of scaffolding (Berk, 1997; Daniels, 2001; Krause et al., 2003; McDevitt & Ormrod, 2002; Wells, 2001). Nevertheless, the operationalisation and definition of the precise ways that scaffolding

connects to it have been divers. These vary from considering scaffolding as a direct instruction and interpretation of Vygotsky's concept of teaching in the ZPD (Wells, 1999), to the point of view that the concept of scaffolding only partly indicates the effectiveness of Vygotsky's ZPD (Daniels, 2001). In addition, there are restrictions with the metaphor scaffolding to explain the ZPD (Stone, 1998).

Wells (1999) regarded scaffolding as a way to interpret the notion of working in ZPD introduced by Vygotsky (1987). He considered three important characteristics that give educational scaffolding its particular character: 1) "the essentially dialogic nature of the discourse in which knowledge is co-constructed;" 2) "the significance of the kind of activity in which knowing is embedded" and 3) "the role of artifacts that mediate knowing" (Wells, 1999, p. 127).

### 2.5. Empirical Studies

According to Carson (1994), vocabulary learning happens when learners are involved in purposeful talks with others that embeds the target words and displays their uses. Conversation and discussion are needed to provide the necessary elaboration to master rules of words across context (Kowal & Swain, 1994). The context in which learners should interact is very important. Meaningful contexts must be provided for functional use of language along with opportunities for practice and application  (Dutro & Moran, 2003).

Another study was conducted by Day and Condon (1993) on the effect of scaffolding on students' performance while learning a task. The results showed that providing support when students need it and applying it while students are becoming more skillful are two crucial components of faster learning and better transfer. This was also supported by the research done by Renkl et al. (2002). The study sought the impact of scaffolding on students' while doing a solving problem task. The results showed that scaffolding contributed in students' performance better in near-transfer tasks.

A study conducted by Azevedo, Cromley, and Thomas  (2003) sought the effect of scaffolding on students' performance and self-regulation behavior in hypermedia learning environment. They randomly assigned undergraduates students into experimental and control groups. Students in experimental group received supports by the teacher during their learning but the students in the control group did not receive any scaffolding. Students in the experimental group got support from the teacher to regulate themselves with the different learning phases. The results showed that students in the experimental group effectively improved their mental model and self-regulation behavior while the students in the control group were less improved in their mental model and self-regulation.

An important study was conducted by Donovan and Smolkin (2002) on scaffolding. They analyze and consider scaffolding critically in children's writing. They evaluate the effect of different levels of scaffolding in children's learning and demonstration of their knowledge of genre. Tasks vary from those with minimal or low level support to those with middle or high levels of support (contextual and visual support). As a result, the highest support level of scaffolding is described as a "direct instruction with revision" (Donovan & Smolkin, 2002, p. 435). Their research showed that whereas scaffolding can be helpful for children it may also, sometimes, prevent children in conveying their full range of genre knowledge (Donovan & Smolkin, 2002, p.428). According to Verenikina (2003), this finding proved the concern that scaffolding, when proved as direct instruction, might have the opposite result

Mirzaei and Eslami (2013) investigated whether ZPD-activated collaborative dialogue, or 'languaging' has any significant effect on Iranian L2 learners' learning process and, specifically, their accuracy in use of metadiscourse to address content, organization and audience issues in writing. They assigned the students into EFL writing classes at two universities to four different instructional conditions, namely, ZPD-activated collaborative, ZPD-free collaborative, fine-tuned L2-input provision and prevalent teacher-fronted approaches. The results showed the ZPD-activated collaborative writing instruction significantly mediated the learners' accurate use of metadiscourse and EFL students can benefit from ZPD-activated instruction and collaborative writing tasks to become more self-regulated. This study also demonstrated the significant effect of scaffolding on students' learning.

A study by Jahangiri and Abilipour (2014) examined impacts of both collaboration and exercise type on learning vocabulary. Twenty seven Iranian students of English were provided by meaning and illustrative examples of the new target words through mini-dictionaries prepared for the study and practiced them both individually and collaboratively through two types of exercise: writing original sentence and a two-fill-in-the-blank. Their retention of the vocabulary was assessed by vocabulary knowledge scale (Paribakht & Wesche, 1997). Repeated measure ANOVA were the method by which data were analyzed. The result shows that exercise type does not have any significant effect on vocabulary retention and the effect of collaboration depends on the type of exercise.

Another study was conducted by Rassaei (2014) on the effect of scaffolded feedback and recasts on L2 development. The study consisted of 78 Iranian EFL learners who were divided into either a control group or one of two experimental groups. Students in the experimental groups were provided by either recasts or scaffolded feedback for their errors during task-based interactions with their interlocutors while students in the control group carried out the same task without any feedback. An untimed grammaticality judgment test and an oral production task were administered as pretests and posttests to test students' achievements in the two experimental groups, in comparison with control group, results Showed that scaffolded feedback contributes to higher level of development than recasts.

Another research administered by Khaliliaqdam (2014) attempted to examine the role of scaffolding through communicative activities in terms of development of basic speech on foreign language adult learners. At first, six students were provided by main words of the sentences and then they were required to make sentences. Each time the number of main words of the sentence in an activity has been decreased, thus the learners had to make the sentences with the help of the teachers. Then, a series of pictures were provided for the learners and they had to tell a story according to the pictures. The teacher provided few guided words with them if needed. At the end of the course, the learners' speech level had been improved surprisingly. The result of this study shows that scaffolding and collaborative mood have a significant impact on learners' speech level and scaffolding in ZPD has an important role in students' basic speech development and learning.

It seems almost impossible to overstate the power of words; they literally have changed and will continue to change the course of world history (Pikulski & Tempelton, 2004). The importance of vocabulary development is that if EFL learners do not improve their vocabulary adequately, they cannot understand others or express their ideas. Moreover, vocabulary cannot be addressed just as single words. Recent vocabulary studies draw on an understanding of lexis, the Greek for word, which in English "refers to all the words in a language, the entire vocabulary of a language" (Barcroft, Sunderman, & Schmitt, 2011, p. 571). Therefore, vocabulary can also refer to phrases of two or more words. Unfortunately, vocabulary development poses a challenge to lots of EFL learners. There are lots of strategies and techniques for teaching vocabulary like ZPD-activated vocabulary instruction. This study is expected to provide some evidence on the effect of ZPD-activated vocabulary on Iranian EFL learners' vocabulary development, lexical density, and domain-oriented vocabulary use. The present study aimed at investigating the role of ZPD-activated vocabulary instruction on Iranian EFL Learners' vocabulary knowledge. The effect of ZPD-activated instruction will also be delved into EFL Learners' lexical density. The last area of investigation in this study investigated the impact of ZPD-activated instruction on EFL learners. This study sought to address the following hypotheses:

- $H_{01}$: ZPD-activated vocabulary instruction has no significant effect on Iranian EFL learners' vocabulary knowledge.
- $H_{02}$: ZPD-activated vocabulary instruction has no significant effect on Iranian EFL learners' domain-oriented vocabulary on their writing outputs.
- $H_{03}$: ZPD-activated vocabulary instruction has no significant effect on Iranian EFL learners' written lexical density over time.

### 3. Method

### 3.1. Participants

This study included 40 participants, 20 male and 20 female EFL participants who were studying in pre-TOEFL preparation classes in upper-intermediate level in an English institute in coeducational systems in Iran and their L1 was Persian. The participants were in the age range of 18-25. The participants were randomly divided into one experimental and one control group. The first 20 participants (i.e., ZPD-experimental group) male and female participants were placed into three groups (i.e., vocabulary, lexical density, and domain-specific groups), and another 20 female and male participants were assigned to the control group. They attended their pre-TOEFL classes two days a week, receiving 4 hr of instruction each week. They attended this class to be prepared for TOEFL PBT course. Their English language proficiency was the main subject of attention in this course and they were aimed to reach advanced level in English proficiency; therefore, four English language skills (e.g., listening, speaking, reading, and writing) were mainly focused together with vocabulary and grammar (see table 3.1).

Table 1 *A Summary of Groups*

| Experimental Group(Z-PD) | ZPD-Vocabulary Group | ZPD-Lexical Density Group | ZPD-Domain-Specific Group |
|---|---|---|---|
| Control Group(non-ZPD) | Non-ZPD-Vocabulary Group | Non-ZPD-Lexical Density Group | Non-ZPD-Domain- Specific Group |

### 3.2. Instruments and Materials

### 3.2.1. Proficiency test

In order to ensure about the homogeneity of the participants' general language proficiency in the experimental and control groups, an ETS TOEFL PBT test was given to the two groups and the homogeneity of all participants in both groups (i.e., control and experimental groups) was ensured by running an independent samples *t*-test.

### 3.2.2. Vocabulary knowledge pretest and posttest

A teacher-made vocabulary pretest including 40 items was administrated to measure the participants' prior lexical knowledge. The vocabulary items were chosen from those supposed to be taught to the participants later in ZPD-experimental group. The test items were a combination of the lexical items chosen from the book *Essential Words for TOEFL*. The constructed test was, then, examined for reliability and validity. The validity of the test was ensured basically through assessing the correlation between the test administered for the pretest and the TOEFL PBT vocabulary test. The correlation value between these two tests was .87 which is preferable. The reliability of the test was estimated by Cronbach's alpha coefficient, reported for the pretest .89 that suggested a very good reliability estimate.

### 3.2.3. Lexical density writing pretest and posttest

To assess the efficacy of ZDP-activated vocabulary instruction, a writing task was assigned to the participants in the experimental and control group as pretest before the instruction to measure the participants' prior lexical knowledge in their writing outputs. The lexical density was calculated by a formula suggested by Laufer and Nation (1995). After running the ZPD-activated vocabulary (i.e., collaborative dialogue and scaffolding) and traditional (memorizing and translation) instructions in both the experimental and control groups, respectively, a writing task as a posttest was provided to the participants to evaluate the effect of ZPD-activated vocabulary instruction on their lexical density improvement. The same formula as the one used for the pretest was applied to assess the writing posttest.

### 3.2.4. Domain-specific writing tasks

One more objective of the study was to address the participants' use of domain-specific vocabulary in their writings after ZPD-activated vocabulary instruction. First, a TOEFL PBT vocabulary test was given to participants to check their homogeneity in both the control and experimental groups. The vocabulary items related to a specific domain (i.e., friendship) was taught to the participants in both the experimental and control groups using ZPD-activated vocabulary instruction and the conventional instruction, respectively. The vocabulary items in this stage were chosen all from an online Web site. The same indicator as the one that was used for lexical density calculation that was suggested by Laufer and Nation (1995) was applied to calculate domain-specific vocabulary use in participants' output in their writings.

### 3.3. Procedure

Before commencing the study, a TOEFL PBT vocabulary proficiency test was administered to the participants to fulfill the criterion of homogeneity. Then an independent samples *t* test was run to check the homogeneity of the participants according which all members of the participants were proved homogeneous. According to the result of the test, 40 participants were selected as the target participants of the study. Then they were equally assigned to a control group and experimental group, each including 20 participants. Because gender was not in the focus of the study, the male and female participants were equally assigned to both groups.

In the vocabulary group, the pretests were administered to both the experimental and the control groups in the second session of the course and, as a consequence, there were no significant differences between the groups in terms of their prior L2 vocabulary knowledge as they have already been proven to be homogeneous. The pretest included 20 multiple choice items from the vocabulary that students were going to be taught chosen from *Essential Words for TOEFL*. As mentioned before in this chapter, the reliability and validity of the pretest were ensured by Cronbach's alpha coefficient and correlation value that were .89 and .87, respectively.  Without awareness of the experimental group's condition, the control group was taught through traditional instruction (i.e., translation, memorizing) in Iranian EFL classes in 10 sessions each lasted for 90 minutes.

With the experimental group, new vocabulary chosen from the book using ZPD-activated collaborative dialogue or languaging was taught in 10 sessions each lasted for 90 minutes.  Using their metacognitive to speak about their learning experience, the participants tried to consolidate and internalize their understanding of the target lexis.

In order to teach ZPD-activated collaborative dialogue to experimental group, First, the teacher introduced a topic, and the key vocabularies (i.e., chosen from the book *Essential Words for TOEFL*) were addressed. Second, the teacher read a text at normal speed, twice or three times to fulfill the second stage (i.e., dictation). The first time, the students just listened to and the second time, they wrote down some words that could help them remember the text. In the third stage that was reconstruction: The participants combined their ideas to rebuild the text from their joint notes and write a final version. It was during this reconstruction phase that participants produced language-related episodes as they were searching for correct words or forms they needed to convey their intended meaning, and the final stage involving analysis and correction, the students analyzed and compared their text with the reconstruction of their group. The participants discussed the differences, the texts and then compared their text with the original ones and notes or made necessary correction. Next, the teacher made participants in experimental group talk together using the new vocabulary they just learned and worked in collaborative dialogue and use their metacognitive to talk about their learning experiences. During all stages, participants were scaffolded by the help of teacher. The same procedure was followed for the list of domain-specific words that were chosen from an online website.

By the end of each 10 sessions to both the experimental and control groups, a posttest including 20 multiple choice items was provided to assess the effect of the instruction on participants. The reliability and validity of the test was proven by Cronbach's alpha coefficient and correlation value

that were .86 and .88, respectively.

The same procedure was followed for the second group (i.e., lexical density). A writing task was given to both groups as the pretest in order to check their prior lexical richness (Laufer & Nation, 1995). Having had participants take the pretest, vocabulary was taught to participants by ZPD-activated vocabulary instruction (i.e., collaborative dialogue and scaffolding) and traditional instructions (i.e., memorizing, translation) in the experimental and control groups, respectively.

After receiving ZPD-activated and conventional instructions by experimental group and control groups respectively in domain-specific vocabulary group, a writing task was given to participants in both experimental and control group as posttest to check the effect of ZPD-activated vocabulary on participants' lexical density.

In the third group (i.e., domain-specific), a list of vocabulary related to a specific domain (e.g., descriptive adjectives) including 20 words were selected from an online website and then the participants in both experimental and control groups, after receiving ZPD-activated and conventional instructions; respectively, (i.e., using collaborative dialogues and scaffolding for experimental group and translation and memorizing for control group), were asked to talk to their peers using those words (i.e., descriptive adjectives). The participants were monitored and scaffolded by the teacher during the whole stage. Finally, the teacher provided a writing task about a topic (e.g., a good friend) and asked the participants in experimental and control groups to use all the domain-specific words (i.e., descriptive adjectives) in their writing task to assess the effect of ZPD-activated vocabulary instruction on participants' domain-specific vocabulary growth.

### 4. Results

In order to measure the effects of ZPD-activated instruction on L2 participants' lexical achievement (i.e., vocabulary growth, lexical density, and domain-specific vocabulary), a one-way between-groups ANCOVA and independent samples *t* test were conducted to see whether there were significant differences in the mean scores on the dependent variable among the groups.

### 4.1. Descriptive Statistics for Groups

In order to ensure the normality distributions of the pretest and posttest scores and also have general estimates of the groups' vocabulary achievements, descriptive statistics (i.e., the means, minimal and maximum scores, standard deviations, skewness, and kurtosis) of the groups' performances were first computed. Table 2 shows the results:

Table 2. *Descriptive Statistics for Groups' Pretest Posttest*

| Vocabulary Group | Group | Test | N | Min | Max | Mean | SD | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| | ZPD-Activated | Pretest | 20 | 10 | 15 | 12.50 | 1.73 | -.13 | -1.31 |
| | | Posttest | 20 | 14 | 20 | 17.25 | 1.48 | -.26 | -.04 |
| | Non-ZPD | Pretest | 20 | 9 | 15 | 12.75 | 1.51 | -.93 | .66 |
| | | Posttest | 20 | 10 | 17 | 14.35 | 2.03 | -.61 | -.58 |
| Lexical Density Group | ZPD-Activated | Pretest | 20 | 15 | 50 | 26.75 | 2.16 | .80 | .03 |
| | | Posttest | 20 | 40 | 90 | 65.50 | 1.16 | -.05 | -.36 |
| | Non-ZPD | Pretest | 20 | 15 | 50 | 26.75 | 1.79 | .58 | -.52 |
| | | Posttest | 20 | 35 | 70 | 49.50 | 1.11 | .36 | -.80 |

As displayed in Table 2, the Kurtosis and Skewness values of the participants' scores on both pretests and posttests were well within the range of ±1.5 which indicated an acceptable normality distribution. Regarding the participants' vocabulary pretest scores (Min = 9 and Max =50), the mean scores were 12.50 for the experimental ZPD group and 12.75 for the control group, and in terms of written lexical density 26.75 for the ZPD group and 26.75 for the control group. This initial similarity was reassuring in the sense that the groups were homogeneous in terms of prior L2 vocabulary knowledge and belonged to the same learner population. However, regarding the groups' posttest scores, the difference between their mean scores looked rather large, 20, for the ZPD-activated vocabulary group, 17, for the non-ZPD vocabulary group, 90 for the ZPD-activated group's lexical density, and 70 for the control group, which was submitted to further statistical analysis.

Table 3.*Descriptive Statistics for Domain-Specific Vocabulary*

| Domain-Specific Vocabulary Group | Group | N | Min | Max | Mean | SD | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|
| | ZPD-Activated | 20 | 40 | 90 | 65.50 | 14.31 | -.11 | -.88 |
| | Non-ZPD | 20 | 20 | 75 | 44.75 | 17.43 | .12 | -1.21 |

As displayed in Table 3, the Kurtosis and Skewness values of the participants' scores on domain-specific vocabulary group were well within the range of ±1.5 which indicated an acceptable normality distribution. Regarding participants' domain-specific vocabulary in ZPD-activated group (Min = 40 and Max = 90), while in non-ZPD group the Min score was 20 and the Max score was 75. As Table 3 shows, the mean scores were 65.50 for ZPD-activated group, and 44.75, for non-ZPD group, respectively. The difference between mean scores looked rather large.

### 4.2. One-Way ANCOVA Results for the Participants' Vocabulary and Lexical Density Group

Subsequently, a one-way analysis of covariance (ANCOVA) was conducted to compare the longitudinal effects of two instruction types on the participants' vocabulary posttest performances (i.e., dependent variable in the ANCOVA), while, at the same time, controlling for pretest differences as the covariate in the analysis. The grouping, or independent variable, in the analysis was type of instruction (i.e., ZPD-activated, and non-ZPD). Particularly, the ANCOVA examined whether the difference among posttest mean scores of the groups was statistically significant or not. The ANCOVA analysis was preferred for this situation because it allows to probe group-mean differences (i.e., posttests) while simultaneously controlling for the pre-existing differences between the groups (as measures by the pretests). Moreover, based on Pallant (2010), ANCOVA is very useful in situations where there are rather small sample sizes and it is not possible to randomly assign participants to the different groups. Initially, preliminary analyses were calculated to ensure no violation of the assumptions of normality, linearity, and homogeneity of variances.

Table 4 *ANCOVA Results for the Groups' Vocabulary Achievements*

| Source | Type III Sum of Squares | df | Mean Square | f | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Corrected Model | 198.234(a) | 2 | 99.117 | 100.36 | .00 | .84 |
| Intercept | 14.654 | 1 | 14.654 | 14.83 | .00 | .29 |
| Pretest | 17.609 | 1 | 17.609 | 17.83 | .00 | .35 |
| Group | 174.702 | 1 | 174.702 | 176.89 | .00 | .87 |
| Error | 36.541 | 37 | .988 | | | |
| Total | 10379.000 | 40 | | | | |
| Corrected Total | 234.77 | 39 | | | | |

The ANCOVA results in Table 4 demonstrated that the evidenced difference between the

groups' post-instruction vocabulary test scores was statistically significant, $F$ (1, 37) = 176.89, $p <$ 0.0005. Further, the obtained partial eta squared (0.827) was sufficiently high, indicating that the variance in the dependent variable (posttests) is explainable by the type of instruction employed for the groups. The table illustrated that there was a significant difference (Sig. < .05) between the experimental group and non-ZPD group, which meant that ZPD-activated instruction had a significant effect on Iranian EFL learners' vocabulary knowledge. Therefore, the first null hypothesis of the study was rejected:

- $H_{01}$: ZPD-activated vocabulary instruction has no significant effect on Iranian EFL learners' vocabulary knowledge.

Table 5. *ANCOVA Results for the Groups' Written Lexical Density*

| Source | Type III Sum of Squares | df | Mean Square | f | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Corrected Model | 6535.01(a) | 2 | 3267.50 | 95.52 | .00 | .83 |
| Intercept | 5025.01 | 1 | 5025.01 | 146.98 | .00 | .79 |
| Pretest | 3975.01 | 1 | 3975.01 | 116.27 | .00 | .79 |
| Group | 2560.00 | 1 | 2560.00 | 74.88 | .00 | .69 |
| Error | 1264.98 | 37 | 34.19 | | | |
| Total | 140050.00 | 40 | | | | |
| Corrected Total | 7800.00 | 39 | | | | |

The ANCOVA results in Table 5 illustrate that the evidenced difference between the groups' post-instruction written lexical density was statistically significant, $F(1, 37) = 74.87$, $p < 0.0005$. Further, the obtained partial eta squared (0.66) was sufficiently high, indicating that the variance in the dependent variable (posttests) is explainable by the type of instruction employed for the groups. Thus, the table showed that there was a significant difference ($p < .0005$) between the ZPD group and non-ZPD group, which meant that ZPD-activated instruction had a significant effect on Iranian EFL learners' written lexical density as well. Therefore, the second null hypothesis of the study was also rejected:

- $H_{02}$: ZPD-activated vocabulary instruction has no significant effect on Iranian EFL learners' domain-oriented vocabulary in their writing outputs.

### 4.3. *t*-Test Results for the Participants' Domain-Specific Vocabulary

Table 6. *Independent Samples t-Test Results for Domain-Specific Vocabulary*

| | | 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 | |
| Dependent | Equal variances assumed | 1.46 | .23 | 4.11 | 38 | .00 | 20.75 | 5.04 | 10.53 | 30.96 |
| Dependent | Equal variances not assumed | | | 4.11 | 36.61 | .00 | 20.75 | 5.04 | 10.52 | 30.97 |

As shown in Tables 5 and Table 6, an independent samples t test was conducted to compare the mean scores for ZPD-activated and non-ZPD groups in terms of their use of domain-specific vocabulary improvement. There was significant difference in scores in favor of ZPD group as shown in Table 4.2 (M = 65.50, SD= 14.31) and non-ZPD, M = 44.75, SD = 17.43; t (38) = 4.11. The magnitude

of the differences in the means (mean difference = 20.75) was very large (eta squared = .30). Thus, the table showed that there was a significant difference (Sig. < .0005) between the ZPD group and non-ZPD group, which meant that ZPD-activated instruction had a significant effect on Iranian EFL learners' domain-specific vocabulary growth. Therefore, the third null hypothesis of the study was rejected:

- $H_{03}$: ZPD-activated vocabulary instruction has no significant effect on Iranian EFL learners' written lexical density.

The results showed that applying ZPD-activated instruction including collaborative dialogue together with scaffolding had a significant impact on Iranian L2 learners' vocabulary growth. The second area that was examined was whether Iranian L2 learners' lexical density can be influenced by ZPD-activated vocabulary instruction and, as a result, ZPD-activated vocabulary instruction had a significant impact on the L2 learners' lexical density. The last stage was assessing the impact of the instruction on Iranian L2 learners' lexical density and it was also proven that the instruction had a significant impact on the learners' lexical density. Consequently, all of three null hypotheses were rejected

### 5.Discussion

This study was first set to implement the ZPD-activated instruction in Iranian EFL classrooms to compare its effect on L2 vocabulary knowledge with that of ZPD-free instruction. Two L2 vocabulary knowledge test were developed and presented to both groups (i.e., the experimental and control groups). During the sessions, scaffolding was employed together with techniques and approaches theoretically endorsed in ZPD-activated instruction. The results showed a great development in EFL learners' vocabulary knowledge. This improvement can be seen as important from a sociocultural view. This noticeable increase in EFL learners' vocabulary knowledge supports Vygotsky's concept of ZPD-activated instruction which is based on the idea that development is defined both by what a learner can do independently and by what the learner can do when assisted by an adult or more competent peer (Wertsch, 1991).

On a psychological basis, vocabulary knowledge, lexical density and domain-specific vocabulary development for students receiving ZPD-activated instruction, scaffolding, and collaborative instruction (i.e., collaborative dialogue) support the claim that collaborative tasks and interactions by which students are required to produce outputs collaboratively make students to reflect on their language use (i.e., internal feedback) and provide further opportunities for peer feedback and modified output (i.e., external feedback), all of which contribute to the development of L2 learners' interlanguage (Long & Robinson, 1998; Swain & Lapkin, 1995).

Moreover, EFL learners' greater accuracy in collaborative production of language (in the present study) supports Long and Porter's (1985) claims that collaborative tasks open up effective opportunities for collaborative interaction, students' high motivation, students' form-focused production, and a positive atmosphere in L2 classrooms. In Conrad and Donaldson's (2004, p. 5) terms, "activities that require student interaction and encourage a sharing of ideas promote a deeper level of thought." This way, learning is more interactive because learners are actively engaged in a variety of activities, and along with their peers and teacher, they co-construct language (Chamberlain & Vrasidas, 2001).

These findings concur with the claim made by Freund (1997). According to Freund (1997), Vygotsky's theories also feed into collaborative learning, suggesting that group members should have different levels of ability so scaffolding by more knowledgeable peers can help students operate within their ZPD.

These results also showed the usefulness of collaborative activities used in this study for the L2 learners' development of vocabulary knowledge. Students interacted with teacher or more knowledgeable peers to read a text and deal with new vocabulary which was presented to them. In this study, the effect of ZPD-activated instruction and scaffolding was considerably large.

The findings concur with other research attempts which have sought to make a case for scaffolding (e.g., Day & Condon, 1993; Renkl et al., 2002). For example, Day and Condon (1993) claimed that providing support when students need it and applying it while students are becoming more skillful are two important factors of faster learning and better transfer. This also is confirmed by a study from Renkl et al. (2002), who sought the impact of scaffolding in problem finding and found that providing support helped students perform better in near-transfer tasks.

Scaffolding allows learners become more responsible during time and provides opportunities for learners to increasingly conform to their learning regulation, which helps them become more self-regulated. Conforming to one's learning regulation (i.e., self-regulation) is a vital feature of life-long independent learners and is particularly important to distance learners who need to plan and monitor their own learning. This study together with other researches confirmed this argument (e.g., Azevedo, Cromley, Thomas, Seibert, & Tron, 2003). For example, Azevedo et al. (2003) probed the impact of different scaffolding interventions on students' performance and self-regulation behavior in hypermedia learning environment. They randomly put students to experimental and control groups. Students in experimental group received scaffolding during their learning while the students in control group did not get any scaffolding. Students in the experimental group got support from the teacher to regulate themselves with the different learning phases. The results showed that students in the experimental group effectively improved their mental model and self-regulation behavior while the students in the control group were less improved in their mental model and self-regulation.

The second part of this study aimed to probe the effect of ZPD-activated vocabulary instruction (i.e., collaborative dialogue) and scaffolding on EFL learners' written lexical density. Lexical density is a term used to address the proportion of content words (e. g, noun, verb, adjective, and often some adverb) to the total number of words. The difference between Halliday's (1985) and Ure's (1971) definitions of lexical density is that Halliday (1985) counts some adverbs as lexical items. This article followed Halliday's (1985) definition of lexical density and considered nongrammaticalized adverbs (including all adverbs derived from adjectives) as lexical items. Development of lexical density is very crucial. According to Johansson (2008, p. 12), "By investigating different texts, we receive a notion of *information packaging;* a text with a high proportion of content words contains more information than a text with a high proportion of function words (prepositions, interjections, pronouns, conjunctions and count words)."

Participants received ZPD-activated vocabulary instructions like collaborative writings with the help of more knowledgeable peers or teacher (i.e. scaffolding). After receiving the treatment, students showed a great improvement in their lexical density in their writing outputs and the number of lexical words in their writing outputs increased that shows a development in their cognition.

Participants in the control group received traditional instructions (i.e., translation, memorizing) with no scaffolding and teacher got them to work individually on writing tasks. After posttest, all learners did not show a huge improvement in lexical production in their writing outputs. Comparing to the production of experimental group, the control group had less improvement on learning domain-specific vocabulary using ZPD-free and conventional instructions.

Using ZPD-activated vocabulary instruction in this study helped student to learn new words and expand their vocabulary knowledge together with an increase in the use of content words and, in other words; students developed their cognition by interacting with teacher and other more knowledgeable peers in the class and getting involved in collaborative tasks like collaborative writing.

ZPD-activated instruction motivated participants' language production, especially in the form of collaborative dialogue, through negotiation of meaning or metalinguistic talks while they were performing on various output tasks in pairs. The efficiency of collaborative tasks in output production was determined by how successfully the learners make their pretest-posttest writing outputs and also through performance on a pretest-posttest vocabulary test. The results illustrated that ZPD-activated vocabulary instruction, eliciting collaborative production of the target

vocabulary, led to L2 participants' considerable vocabulary improvement and the dense of lexical word that they used in their writing outputs.

The third part, which was examined in this study, was the effect of ZPD-activated vocabulary instruction and different types of scaffolding on EFL learners' domain-specific vocabulary use in their writing outputs. The results showed that students receiving ZPD-activated vocabulary instruction with the help of scaffolding used more domain-specific vocabulary that was taught to them by the instruction in their writing outputs which supported the idea that collaborative tasks originating from ZPD and help of more competent peers can widely increase their ability in learning domain-specific vocabulary and using them in their outputs. Using the instruction helps students to learn and internalize domain-oriented vocabulary and also use them in their production.

The control group received vocabulary through conventional techniques and approaches, and all participants got involved into each writing task individually. After taking part in the test (i.e., writing outputs), they showed a little improvement in their domain-specific vocabulary use, which was not comparable to that of the experimental group that received ZPD-activated vocabulary instruction; they were less successful in applying specific words in their writing outputs.

Teaching within a group's ZPD caused deeper, more conceptual understanding of L2 vocabulary. This is an important finding as it can have different psychological and pedagogical implications for the SCT view that the collaborative acquisition of language is a key to the higher levels of linguistic competence.

From a pedagogical aspect, the improvement that occurred in the experimental group's vocabulary knowledge receiving ZPD-activated instruction can be considered as evidence to further support, first, the use of the ZPD approach as a useful methodological framework and, second, the interface of ZPD-activated lexical instruction.

There has been some research conducted to compare the effect of collaborative and individual instructions on L2 learners. Nassaji and Tian (2010), for example, compared the efficiency of cloze tasks and editing tasks in learning English phrasal verbs. Then, they probed the effect of performing the tasks collaboratively versus individually. The results showed that learning which is acquired by collaborative tasks has greater accuracy than the participants who were taught individually.

In line with the findings of this study, considering the role of input- and output-based instructions on the effect of different modes of vocabulary learning, different studies (e.g., Ellis & He, 1999) have been done. Ellis and He (1999), for example, probed the efficacy of pre-modified input, and input and output that are collaboratively modified on L2 receptive and productive vocabulary learning. The results illustrated that the negotiated output group had more improvement in vocabulary learning than the other groups. Then, they concluded that the tasks which involved learners in collaborative problem-solving interactions and gave them more autonomy to be responsible for their own language production were more effective in improvement of learners' vocabulary learning.

This study aimed to find the effect of ZPD-activated vocabulary instruction on the vocabulary production of EFL learners. The results in their tests and their writing outputs supported the idea that ZPD–activated vocabulary instruction can have noticeable effects on L2 learners' vocabulary knowledge, written lexical density, and use of domain-specific vocabulary.

## 6. Conclusion

This study sought to investigate the effect of ZPD-activated vocabulary instruction, scaffolding on Iranian EFL learners' vocabulary knowledge, written lexical density, and domain- specific vocabulary use. The findings showed that using ZPD-activated vocabulary instruction to teaching vocabulary could be really effective to a considerable degree, increasing learners' awareness of occurrence of lexical items in real language use. Using collaborative tasks and also scaffolding mediated EFL learners' improvement in increasing their lexical density and domain- specific vocabulary in their writing outputs. In sum, if ZPD-activated vocabulary instruction finds its suitable place in L2 teaching using appropriate types of scaffolding and collaborative tasks it can be really effective and make a great difference in L2 learners' improvement of vocabulary knowledge and

their written lexical density and provide the opportunity to use them and also increase their accuracy in producing them.

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