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ORIGINAL RESEARCH

The Effect of Reading and Vocabulary Intervention within the Test Validity on Depth and Breadth of Vocabulary Knowledge among Iranian EFL Learners

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Abstract

Because intervention within the test validity as a dynamic assessment (DA)-laden procedure has been newly proposed by scholars in the field, research scarcity is there with respect to this procedure within EFL studies. This study examines the effect of vocabulary and reading intervention within the test validity on depth and breadth of vocabulary knowledge among EFL learners through a quasi-experimental pre-test post-test control group design. Three intact groups of intermediate female EFL learners, each composed of 30 learners, participated in this investigation from a private language institution in Tehran through convenience sampling. Data were gathered through the administration of the Quick Placement Test (QPT), the Vocabulary Levels Test (VLT), and the Depth of Vocabulary Knowledge Test (DVKT). To analyze the data, ANOVA was used. It was shown that reading and vocabulary intervention within the test validity had a significant impact on Iranian EFL learners' depth and breadth of vocabulary knowledge. Moreover, there was a significant difference between the effectiveness of reading and vocabulary intervention within the test validity on depth and breadth of vocabulary knowledge in favor of the vocabulary intervention within the test validity. The findings carry implications for EFL instructors, learners, and curriculum developers.

Keywords: Depth and Breadth of Vocabulary Knowledge; Reading intervention within the test validity; Vocabulary intervention within the test validity; Zone of Proximal Development (ZPD)

1. Introduction

Learning English in different contexts such as English as a Foreign Language (EFL) settings is inevitable with emergence of globalization. This is why researchers and scholars have undertaken several studies to investigate different methods of learning, teaching, and assessing various English language skills. The process of conducting and reporting such research requires a systematic understanding of academic writing conventions (Fatehi Rad et al., 2023). Among the main aspects of EFL learning, vocabulary learning can be stated. In fact, there is agreement among scholars that vocabulary development has a pivotal effect on EFL students' English achievement (Ramzan, 2021). According to Wahyudin et al. (2021), vocabulary learning is defined as the acquisition of a range of words from a particular language used in specific contexts. Similarly, Yanagisawa et al. (2020) defined this concept as acquiring a set of vocabulary items and applying some techniques to process familiar or unfamiliar words.

Furthermore, vocabulary learning consists of breadth of vocabulary, referring to how many words an individual understand (Kojic -Sabo & Lightbown, 1999), and depth of vocabulary, indicating the scope of a person's understanding of a word or a collection of words (Zhang & Lu, 2015). Indeed, breadth and depth of vocabulary knowledge are considered unambiguous measures of lexis learning (Qian, 2002).

However, these two concepts are not formed easily for EFL learners and the need for interventive procedures to help learners in this regard has been empirically documented (Hayatbakhsh Abbasi et al., 2023). As revealed by the literature, different instructional and assessment methods can mitigate the complexities of acquiring an average degree of vocabulary breadth and depth among EFL learners. Among these procedures, dynamic assessment (DA) can be referred to. DA emerges from Vygotsky's Sociocultural Theory of Mind (SCT) explaining that learning is inherently social, first occurring at the intermental (social) level before being internalized at the intramental (individual) level (Vygotsky, 1978).

Vygotsky (1987) argued that cognitive functions emerge via a process in which the capabilities move from interpersonal interaction to intrapersonal functioning within the zone of proximal development (ZPD). ZPD is the range separating what a person can manage independently from what becomes possible through help from a more capable other. According to Lidz, learning and cognitive growth occur within ZPD through collaborative social interaction. or the use of cultural tools, which eventually gives way to self-regulation.

Previous research (e.g., Hessamy & Ghaderi, 2014; Mardani & Tavakoli, 2011; Pishghadam et al., 2011) have documented the constructive impact of DA on vocabulary learning. However, since DA does not have a fixed and static administration procedure, recently, some departures from its original forms and models have been made to develop new procedures for administering DA in local contexts.

A transformative method emerged in this regard in the context of Iran is intervention within the test validity. According to Daftarifard and Birjandi (2017), intervention within the test validity reflects the point that static or unassisted tests cannot represent the present level of learners' knowledge and simultaneously predict their future development. Therefore, static tests should be changed into their assisted or mediated versions to help learners become independent gradually. Considering the effect of intervention within the test validity on reading comprehension of EFL learners (Daftarifard, 2016; Rayani & Fatehi Rad, 2023), it probably

may have an effect on other aspects of the English language. A potential candidate for this hypothesis can be depth and breadth of vocabulary. This hypothesis strength is reinforced by empirical evidence which indicate significant interactions between vocabulary development and reading comprehension. (Fatehi Rad & Atashdast, 2023; Rahmasari et al., 2023).

However, since intervention within the test validity has been just recently proposed (Daftarifard & Birjandi, 2017), research paucity is there as far as this procedure is concerned with in EFL research. This is while intervention within the test validity may serve as a ladder for development of EFL learning and compensate for learners' knowledge deficiencies. The successful implementation of such innovative approaches heavily depends on teachers' professional development and their ability to adapt to new pedagogical challenges (Ashrafi & Alimohammadi, 2025). To bridge this paucity, this investigation examines the effect of reading and vocabulary intervention within the test validity on EFL learners' depth and breadth of vocabulary. Accordingly, the following research questions are addressed:

Does the reading-based intervention aligned with test validity significantly influence EFL learners' depth of vocabulary knowledge?

Does the vocabulary-focused intervention aligned with test validity significantly affect EFL learners' depth of vocabulary knowledge?

Does the reading-based intervention aligned with test validity produce a significant effect on EFL learners' breadth of vocabulary knowledge?

Does the vocabulary-focused intervention aligned with test validity have a significant impact on EFL learners' breadth of vocabulary knowledge?

2. Literature Review

2.1. Theoretical Framework

This investigation's theoretical foundation is DA. DA, as mentioned before, is a form of interactive evaluation based on Vygotsky's SCT and ZPD. These theoretical bases form a strong conceptual ground for understanding and supporting writing skill development in web-based contexts. SCT suggests that human growth is fundamentally a socially mediated process, deeply embedded in the cultural context. This framework highlights the influence of interaction and culture on the growth of cognition and learning. According to Vygotsky, cognitive functions are initially co-constructed in social interactions before being internalized by the individual (Vygotsky, 1978). This perspective contrasts with traditional views of cognitive development, which often emphasize the individual's independent acquisition of knowledge. The concept of ZPD is fundamental to SCT. It refers to the range of activities that a person can accomplish with the help of a more knowledgeable individual but is not yet able to complete on his/her own. (Fani & Ghaemi, 2011). The ZPD illustrates Vygotsky's belief that learning leads development; the potential for cognitive growth exists within this zone, and effective teaching aims to scaffold learners through it (Vygotsky, 1978). Scaffolding refers to offering momentary assistance to learners which is progressively withdrawn as they gain competence. This method shows the significance of social interaction in learning, as learners internalize the cognitive processes demonstrated and supported by others (Ikawati, 2020). DA has been widely used across different educational settings, such as cognitive development, language learning and special education, and. In language learning, DA is particularly effective in diagnosing and

promoting learners' communicative competence (Alsaadi, 2021). Traditional language assessments frequently fall short in reflecting the dynamic and interactive aspects of real-world language use. Through incorporating mediation and feedback into the assessment process, DA provides a more precise and thorough understanding of a learner's language skills and their potential for growth. (Hasson, 2017). Research has shown that DA can significantly enhance language learners' performance by identifying specific areas of difficulty and providing targeted support to address these challenges (Ableeva, 2010).

2.2. Intervention within the Test Validity

According to Daftarifard (2016), intervention within the test validity means that static unassisted tests cannot reveal the present state of learners and simultaneously predict their future development. Therefore, static tests should be turned into their assisted or mediated equivalents to help learners reach independence gradually. Intervention within the test validity is a newly designed mediation through which static tests are manipulated to help learners take the test independently and anticipate their development. Such interventions can take different forms including making questions simpler, incorporating scaffolded tasks in the tests, adding more distractors to choices, maximizing the number of hints, etc. (Daftarifard & Birjandi, 2017).

2.3. Breadth of Vocabulary Knowledge

This concept pertains to “the set of words a person recognizes but understands only at a basic or minimal level” (Qian, 2002, p. 515). It is crucial because having adequate knowledge of vocabulary forms and meanings is deemed essential for comprehending spoken or written language independently. Vocabulary knowledge has been categorized by some scholars into disjointed (reactive) and integrated (active) types (Laufer & Goldstein, 2004). Disjointed vocabulary information involves recalling word information during reading and listening, while integrated information entails using word meanings in speaking and writing, where linguistic elements are effectively employed (Nation, 2001). Later, Laufer and Goldstein (2004) classified four different types of breadth information in dictionaries. Active recall involves generating L2 concepts associated with a given vocabulary item. Passive recall involves assigning meaning to a given L2 word. Active recognition entails identifying L2 structures from a provided meaning, while in passive recognition a student understands what an L2 word means. Schmitt (2010) utilized the following concepts to label these groups: semantic recognition (passive recognition), which represent distinct cognitive processes, semantic recall (passive recall), conceptual recognition (active recognition) and conceptual recall (active recall).

Laufer and Goldstein (2004) suggested that the different types of lexical breadth vary according to the strength of association between form and meaning. In that regard, form recall produces the strongest form–meaning link, then semantic recall and form recognition, with semantic recognition being the weakest. Additionally, the dominance of these four categories of information presents specific challenges. For instance, understanding what a word means is easier than grasping its semantic nuances (Laufer & Goldstein, 2004). Vocabulary estimation indicates the number of words that an EFL student has in their repertoire. Nation (1990, 2001)

analyzed vocabulary usage of young native speakers and native speakers' academic texts, finding that approximately 87% of texts' vocabulary corresponded to the most common 2,000 English words (core words). Academic vocabulary appeared frequently across various types of academic texts, with specialized and rare words comprising 8%, 3%, and 2% of the text, respectively. It was determined that knowledge of about two to three thousand word items is essential for proficient English usage. Without knowledge of these words, it becomes challenging for learners to comprehend complex sentences that contain frequently occurring words.

In summary, the findings suggest that a vocabulary of approximately 2,000 high-frequency words is sufficient for proficient daily language use, while a range of 3,000 to 5,000 words is necessary for effective text comprehension. However, when learning English, the question arises about the optimal number of words to learn. Various researchers have explored this topic, with some suggesting a minimum of 2,000 phrases (Nation, 2005), while others argue for 5,000 words to achieve better proficiency (Schmitt, 2010). Some advocate for a minimum of 3,000 words, while a comprehensive mastery of English may require learning up to 8,000 words. High school Japanese students typically know around 5,000 words, whereas Japanese university students have a vocabulary of around 10,000 words (Nation, 2006).

2.4. Depth of Vocabulary Knowledge

Vocabulary depth is frequently observed as a critical issue in determining an EFL learner's proficiency with a particular vocabulary (Qian, 2002). While vocabulary knowledge depth and breadth are related, they represent distinct aspects of vocabulary knowledge (Vermeer, 2001). Considering the intricate nature of lexical depth, various perspectives have been proposed for assessing this aspect of vocabulary knowledge, like the linguistic properties of words (Pigada & Schmitt, 2006), the relationship between syntax and morphology, and syntactic information (Webb, 2005). The Word Association Test, proposed in 1993, has been identified as a valuable tool for measuring vocabulary knowledge depth, assessing synonyms and collocations. The test is extensively employed in investigations exploring vocabulary depth and it has been shown to precisely show accurate lexical knowledge, particularly in the central score on the rating scale (Stæhr, 2009). Vocabulary knowledge depth, along with vocabulary estimation, is critical in vocabulary development, as Ellis (2008) suggests that depth of information is a significant constituent of building a lexicon. Vocabulary knowledge depth could be understood as the extent of a student's awareness of the diverse linguistic and semantic properties that characterize a word, including its grammatical and collocational characteristics (Henriksen, 1999). An operational definition of vocabulary knowledge depth could be the degree to which a student comprehends a word's meaning, grammatical behavior, and relational associations with other words. (Ellis, 2008).

2.5. Empirical Studies

Sherkuziyeva et al. (2023) explored the impact of rater-mediated assessment and Computerized Dynamic Assessment (C-DA) on EFL students' spoken skill, writing skill and test anxiety. Out of an initial pool of 93 students, 64 intermediate-level students were recruited. Post-intervention tests showed that the experimental class was better than the control class regarding

oral skill and writing achievement, while also demonstrating reduced levels of anxiety. The study highlighted the positive impact of C-DA in improving language skills and reducing test-related anxiety in EFL learners.

Mohammadi and Babaii (2022) explored how EFL teachers' views on Dynamic Assessment (DA) changed after participating in workshops and discussions. 25 teachers were interviewed, with 10 attending additional workshops on DA principles for reading comprehension. Following the workshops, discussions allowed teachers to share experiences and challenges with DA implementation. Classroom observations and teacher reflections were collected to assess if their perceptions aligned with their practices. The teachers found the workshops informative and discussions helpful. They viewed reflective journals as beneficial for improving their use of DA.

Shokri and Khodareza (2021) addressed the impacts of peer-assisted mediation and teacher intervention under the framework of intervention-based dynamic assessment on EFL students' reading development. Sixty learners were recruited and assigned to two experimental classes, one experienced peer mediation and one received tutor intervention. A control group also existed. All groups underwent a pre-test, followed by 12 treatment sessions with separate proficiency and post-tests. Results indicated that both peer-mediation and tutor-intervention significantly improved reading comprehension. These findings suggest that involving learners in peer-mediated discussions or tutor-led interventions can enhance reading comprehension.

Zare et al. (2021) examined the effects of critical thinking-oriented dynamic assessment (CT-DA) on reading comprehension in Iran. The study involved 21 participants with comparable language proficiency and critical thinking abilities, who were assigned to one of two groups of CT-DA and DA. There was a control group too. The CT-DA group underwent mediation focused on developing critical thinking, whereas the DA group experienced traditional dynamic assessment. It was found that learners in the DA and CT-DA classes achieved higher performance than those in the control group, suggesting comparable gains in reading comprehension.

Malmir (2020) investigated the effect of intervention and interactionist DA on the pragmatic comprehension of 60 advanced EFL students. Learners were allocated to a control class and two DA classes. A listening-based pragmatic comprehension assessment was administered in both pretest and posttest. Over 14 sessions, the interactionist DA class underwent metapragmatic teaching and engaged in teacher-led interactions, while the intervention DA group followed the intervention model. The control group only experienced metapragmatic teaching. Results showed that both DA classes had significantly better performance than the control class in pragmatic comprehension, with the intervention DA class attaining better accuracy, though no difference in comprehension speed was noted.

Daftarifard (2018) explored the impact of task-based and response-based mediations on EFL learners' reading. The study involved 185 learners in two mediation classes and a control one, chosen through convenience sampling. Experimental groups received different forms of mediation during reading tasks. Results from independent samples t-tests indicated varying effects of mediation types on reading performance. Specifically, learners trained with Bruner's scaffolding principle outperformed the students in the Vygotsky-inspired class. Additionally,

the students in the response-based class struggled to apply their learning to new contexts, indicating limited transferability.

Daftarifard and Birjandi (2017) investigated the influence of task-based and response-based mediations on reading comprehension strategies. They assessed 104 Iranian lower-intermediate EFL learners through convenience sampling, using a cognitive and metacognitive questionnaire (Phakiti, 2003) and the First Certificate in English's reading section (2010) before and after mediation sessions. Results revealed changes in learners' monitoring metacognitive strategies following interventions. Those in the task-based mediation class outperformed the ones in the response-based mediation class.

3. Method

3.1. Design

A pre-post quasi-experimental design with a control group was implemented to test whether reading and vocabulary interventions had an effect on the validity of the tests assessing the EFL learners' vocabulary breadth and depth (Ary et al., 2014).

3.2. Participants

Three intact classes of intermediate female EFL learners, each composed of 30 learners, participated in this investigation. They were currently learning English at a private language institution in Tehran and selected through convenience sampling. They were assigned into three groups including vocabulary intervention group, reading intervention group and control group. Sample homogeneity was checked through Quick Placement Test (QPT). The native language of the sample was Persian. Their age range was 16-24.

3.3. Instruments

3.3.1. *Quick Placement Test (QPT)*

To confirm that the learners began the study with a uniform degree of English proficiency, the standardized Quick Placement Test (QPT), created and validated by Cambridge ESOL Examination Syndicate and Oxford University Press, was administered. The QPT includes 40 multiple-choice items covering grammar, vocabulary, and cloze test items.

3.3.2. *Vocabulary Levels Test (VLT)*

Participants' vocabulary breadth was assessed using the Vocabulary Levels Test (VLT) developed by Schmitt et al. (2001). This tool has been validated as an effective instrument for estimating EFL learners' vocabulary breadth at different levels, as confirmed by expert evaluations (Schmitt et al., 2001). The test reliability index, as reported by Schmitt et al. (2001), is .89. They also confirmed its validity. VLT consists of five subtests, each evaluating learners' receptive knowledge of 30 words drawn from distinct frequency or academic levels, amounting to a total of 150 target items. The test covers frequency levels of 2000, 3000, 5000, and 10,000, with each level corresponding to the number of most frequent words (e.g., the 2000 level includes the 2000 most commonly used words, the 3000 level includes words ranked from 2001 to 3000, and so on). In each section, 30 target words are grouped into 10 sets. Each set presents three target words and three distractors plus with three definitions. individuals are

tasked with matching definitions to the correct words. The correct word for each is scored 1 point, and totally becomes 30 for any of the sections and a total of 150 for the whole test.

3.3.3. *Depth of Vocabulary Knowledge Test (DVKT)*

Vocabulary depth was measured through the Depth of Vocabulary Knowledge Test (DVKT) developed by Read (2000). Read designed the DVKT to reliably measure vocabulary depth, reporting a reliability index of .80. The test is comprised of forty blocks, each covering a target adjective and two sections. The left section presents four words that are synonyms of the adjective, while the right section also provides four synonyms. An elevated test score indicates greater depth of vocabulary. The test validity was confirmed through expert evaluation (Schmitt et al., 2011).

3.4. Procedure

To collect the data, after sampling, the participants' homogeneity was checked using the QPT. Then, all the three groups took the DVKT and the VLT as the pre-test. Then, the treatment began wherein all the three groups attended 14 regular sessions at the institute, held twice weekly, each lasting 90 minutes. However, the two experimental groups benefited from intervention within the test validity in the last 40 minutes of each class session.

One experimental group enjoyed reading intervention within the test validity and the other one was exposed to vocabulary intervention within the test validity. Intervention within the test validity was operationalized through developing the mediated versions of reading and vocabulary sections of TOEFL. The mediated versions maintained the same content and items as the original TOEFL. However, to enhance the hints, different interventions were made into the tests. For instance, each item's options were expanded by adding two or more extra distractors so that the learners could identify the correct choice more easily. Moreover, the tests were enhanced by giving some hints at the sentence-, phrase- or word level in the prompts. For instance, if the right choice began with a vowel, before the blank 'an' would be used. Or if the answer of the item was in the 10th line of the essay, a parenthesis was provided in the prompt, saying that seek the answer in the lines 10 to 12. Also, the correct choices were presented at the first choice in some random items. Besides, the technical and difficult words in the prompts or essays were replaced with easier ones. Last but not least, the complex structures were broken into simple and short structures.

The mediated versions of reading and vocabulary sections of TOEFL were broken into short quizzes each of which was used in each treatment session as complementary to educational materials of the institute which was occupied as the setting of the research. Upon completion of the treatment, all the three groups again took the DVKT and the VLT as the post-test. Data analysis involved a one-way ANOVA with assumption testing.

4. Results

4.1. Results of the First and Second Research Questions

To respond to the first research question about whether reading intervention within test validity significantly impacts EFL learners' vocabulary depth, and the second, whether vocabulary intervention within test validity has a significant effect on the same variable, the normality of

all data sets was tested. Table 1 reports the skewness and kurtosis indices that were obtained to check data normality. As shown in Table 1, both the kurtosis and skewness indices were within the threshold of ± 2 , Therefore, data did not deviate significantly from a normal distribution.

Table 1. Skewness and kurtosis indices of normality

Group		N	Skewness		Kurtosis	
		Statistic	Statistic	Std. Error	Statistic	Std. Error
	PreDepth	30	-0.594	0.427	-0.758	0.833
	PreBreadth	30	-0.181	0.427	-0.568	0.833
	PostDepth	30	-0.829	0.427	0.862	0.833
	PostBreadth	30	0.357	0.427	-0.504	0.833
	PreDepth	30	-0.692	0.427	1.781	0.833
	PostDepth	30	-0.053	0.427	-0.805	0.833
	PostBreadth	30	-0.250	0.427	0.590	0.833
	PreDepth	30	-0.155	0.427	0.090	0.833
	PostDepth	30	-1.057	0.427	0.809	0.833
	PostBreadth	30	0.643	0.427	0.347	0.833

Then, to compare the three groups' scores, a one-way ANOVA was conducted on the pretest measuring depth of vocabulary knowledge. Before presenting the findings, It should be noted that variance homogeneity was met, as indicated by Levene's test. The test had non-significant results, $F(2, 87) = 0.803$, $p > 0.05$ (see Table 2) and confirmed that the groups showed similar variance levels in their pretest scores for depth of vocabulary knowledge.

Table 2. Test of homogeneity of pretest of variances of depth of vocabulary knowledge by groups

		Levene Statistic	df1	df2	Sig.
PreDepth	Based on Mean	0.463	2	87	0.631
	Based on Median	0.803	2	87	0.451
	Based on Median and with adjusted df	0.803	2	84.187	0.451
	Based on trimmed mean	0.458	2	87	0.634

Table 3 presents the mean pretest scores for depth of vocabulary knowledge in all groups. As can be seen, the vocabulary intervention group ($M = 18.33$, $SD = 0.711$), the reading intervention group ($M = 18.47$, $SD = 0.819$), and the control group ($M = 18.63$, $SD = 0.669$) received practically identical mean scores which indicates that participants showed no significant differences in their initial performance.

Table 3. Descriptive statistics of depth of pretest of vocabulary knowledge by groups

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Vocab Intervention	30	180.33	0.711	0.130	18.07	18.60
Reading Intervention	30	180.47	0.819	0.150	18.16	18.77
Control	30	180.63	0.669	0.122	18.38	18.88
Total	90	180.48	0.738	0.078	18.32	18.63

Table 4 summarizes the ANOVA results. The analysis produced $F(2, 87) = 1.25$, $p > 0.05$, $\eta^2 = .028$ that shows a weak effect size. The findings showed no significant differences among the three groups in their means on the pretest of vocabulary depth and supported that all groups were similar in this variable before intervention.

Table 4. One-way ANOVA of depth of pretest of vocabulary knowledge by groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.356	2	0.678	1.252	0.291
Within Groups	47.100	87	0.541		
Total	48.456	89			

Vocabulary depth scores for the posttest were compared for the three groups by using a one-way ANOVA. First, the data met the homogeneity assumption, as revealed by Levene's test. The test yielded non-significant results, $F(2, 87) = 1.67$, $p > 0.05$ (see Table 5), meaning the groups had comparable posttest variances.

Table 5. Test of homogeneity of variances of posttest of depth of vocabulary learning by groups

		Levene Statistic	df1	df2	Sig.
PostDepth	Based on Mean	3.800	2	87	0.026
	Based on Median	1.675	2	87	0.193
	Based on Median and with adjusted df	1.675	2	59.3650	0.196
	Based on trimmed mean	3.392	2	87	0.038

Table 6 shows the groups' posttest mean scores for depth of vocabulary knowledge. The results show that the vocabulary intervention group had the highest mean on posttest of depth of vocabulary learning, $M = 30.73$, and $SD = .980$. This was followed by the reading intervention, $M = 25.10$, $SD = 1.12$, and the control group, $M = 19.47$, $SD = 1.71$ groups.

Table 6. Descriptive statistics of posttest of depth of vocabulary knowledge by groups

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Vocab Intervention	30	30.73	.980	0.179	30.37	31.10
Reading Intervention	30	25.10	1.125	.205	24.68	25.52

Control	3019.47	1.717	.313	18.83	20.11
Total	9025.10	4.804	.506	24.09	26.11

The one-way ANOVA findings in Table 7 reveal a significant difference, $F(2, 87) = 552.05$, $p < .05$, $\eta^2 = .927$, and a large effect size. The result reveals that the mean posttest scores of vocabulary depth were significantly different across the three groups. Since the omnibus test was statistically significant, Tukey's post-hoc tests were performed (see Table 8) to determine which particular groups differed.

Table 7. One-way ANOVA of posttest of depth of vocabulary knowledge by groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1904.067	2	952.033	552.057	.000
Within Groups	150.033	87	1.725		
Total	2054.100	89			

As shown by the Tukey comparisons in Table 8, and means presented in Table 6, two main findings were obtained. First, the reading intervention group ($M = 30.73$) outperformed the control one ($M = 19.47$) in the posttest vocabulary depth with a mean difference of 11.26, $p < .05$. This indicates that reading-based instruction within test validity supports the development of learners' vocabulary depth. Second, the vocabulary intervention class ($M = 25.10$) outperformed the control class in the same measure, with a mean difference of 5.63 at a $p < .05$ significance level, confirming that vocabulary-focused intervention within the test validity framework effectively increased EFL learners' depth of lexical knowledge.

Table 8. Multiple comparisons for posttest of depth of vocabulary learning by groups

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Vocab Intervention	Reading Intervention	5.633*	.339	.000	4.82	6.44
	Control	11.267*	.339	.000	10.46	12.08
Reading Intervention	Vocab Intervention	-5.633*	.339	.000	-6.44	-4.82
	Control	5.633*	.339	.000	4.82	6.44
Control	Vocab Intervention	-11.267*	.339	.000	-12.08	-10.46
	Reading Intervention	-5.633*	.339	.000	-6.44	-4.82

*. The mean difference is significant at the 0.05 level.

4.2. Results of the Third and Fourth Research Questions

To answer the third and fourth research questions regarding the impact of reading and vocabulary interventions within test validity on EFL learners' vocabulary breadth, a similar step was undertaken. Before treatment administration, the groups' pretest vocabulary breadth scores were subjected to a one-way ANOVA to establish initial equivalence. Levene's test was used to examine variance homogeneity, which was nonsignificant, $F(2, 87) = 2.20$, $p > .05$ (Table 9), showing that the variances across the classes were similar.

Table 9. Test of homogeneity of pretest of variances of breadth of vocabulary knowledge by groups

	Levene Statistic	df1	df2	Sig.
Based on Mean	3.822	2	87	.026
Based on Median	2.207	2	87	.116
Based on Median and with adjusted df	2.207	2	51.430	.120
Based on trimmed mean	3.461	2	87	.036

The descriptive statistics for the pretest in Table 10 reveals that the vocabulary intervention group reached highly similar mean scores with the reading intervention group, $M = 55.40$, $SD = 1.69$, and the control group, $M = 55.97$, $SD = 3.28$, and $M = 56.03$, $SD = 2.09$, respectively. Therefore, a homogeneous level of vocabulary breadth at baseline can be seen.

Table 10. Descriptive statistics of pretest of breadth of vocabulary knowledge by groups

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Vocab Intervention	30	55.40	1.694	.309	54.77	56.03
Reading Intervention	30	55.97	3.285	.600	54.74	57.19
Control	30	56.03	2.092	.382	55.25	56.81
Total	90	55.80	2.441	.257	55.29	56.31

The subsequent ANOVA results (Table 11) confirmed this, $F(2, 87) = 0.604$, $p > .05$, $\eta^2 = .014$, meaning that the effect size was weak and the groups were statistically similar prior to the treatment.

Table 11. One-way ANOVA of pretest of breadth of vocabulary knowledge by groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.267	2	3.633	.604	.549
Within Groups	523.133	87	6.013		
Total	530.400	89			

A one-way ANOVA was run to examine the posttest performance of the classes for vocabulary breadth after the interventions. However, Levene's test produced a significant result, $F(2, 87) = 3.66$, $p < .05$ (Table 12) which suggests variances across the groups were unequal. Given equal sample sizes in all groups, this violation was not considered to be problematic.

Table 12. Test of homogeneity of variances of posttest of breadth of vocabulary learning by groups

	Levene Statistic	df1	df2	Sig.
Based on Mean	3.849	2	87	.025
Based on Median	3.666	2	87	.030
Based on Median and with adjusted df	3.666	2	76.438	.030
Based on trimmed mean	3.843	2	87	.025

Table 13 presents the means at posttest. The vocabulary intervention group had the highest score with $M = 138.23$ and $SD = 3.98$, followed by reading intervention with $M = 92.13$ and $SD = 4.15$, while the control class had $M = 69.83$ with a SD of 2.29.

Table 13. Descriptive statistics of posttest of breadth of vocabulary learning by groups

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Vocab Intervention	30	138.23	3.980	.727	136.75	139.72
Reading Intervention	30	92.13	4.150	.758	90.58	93.68
Control	30	69.83	2.291	.418	68.98	70.69
Total	90	100.07	28.859	3.042	94.02	106.11

The ANOVA results, as presented in Table 14, were significant, $F(2, 87) = 2858.65$, $p < .05$, $\eta^2 = .985$, which was indicative of a large effect size and a statistically significant group difference.

Table 14. One-way ANOVA of posttest of breadth of vocabulary learning by groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	73010.600	2	36505.300	2858.651	.000
Within Groups	1111.000	87	12.770		
Total	74121.600	89			

In order to locate the source of the differences, Tukey post-hoc tests were performed (Table 15). The results showed that vocabulary intervention group ($M = 138.23$) outperformed the control one ($M = 69.83$) on the posttest of vocabulary breadth significantly ($MD = 68.40$, $p < .05$). Therefore, the positive contribution of reading intervention within the test of validity to learners' vocabulary expansion is confirmed. Correspondingly, reading intervention group ($M = 92.13$) attained a score significantly higher than that for control group ($M = 69.83$) ($MD =$

46.10, $p < .05$), which proved that intervention with a focus on vocabulary also contributed meaningfully to the enhancement of vocabulary breadth among EFL learners.

Table 15. Multiple comparisons for posttest of breadth of vocabulary learning by groups

(I) Group	(J) Group	Mean (I-J)	Difference Std. Error	Sig.	95% Interval	Confidence
					Lower Bound	Upper Bound
Vocab Intervention	Reading Intervention	46.100*	.923	.000	43.90	48.30
	Control	68.400*	.923	.000	66.20	70.60
Reading Intervention	Vocab Intervention	-46.100*	.923	.000	-48.30	-43.90
	Control	22.300*	.923	.000	20.10	24.50
Control	Vocab Intervention	-68.400*	.923	.000	-70.60	-66.20
	Reading Intervention	-22.300*	.923	.000	-24.50	-20.10

*. The mean difference is significant at the 0.05 level.

5. Discussion and Conclusions

It was found that both intervention types, reading and vocabulary, when implemented within the framework of test validity, significantly influenced EFL learners' vocabulary breadth and depth.

To compare the findings with previous studies, the researchers could not find any study on the effect of interventions within the test validity on depth and breadth of vocabulary knowledge among EFL learners. However, some researchers including Hasani et al. (2024), Jafari (2019), and Jafarigohar and Haghighi (2016) showed that different types of scaffolding significantly affected the process of learning vocabulary by EFL students.

The findings can be justified with the argument that probably manipulation of the test has reduced the learners' anxiety and this, in turn, encourages the participants to plan and follow their plans for vocabulary learning (Alimohammadi et al., 2026). Eventually, their vocabulary breadth and depth are enhanced.

Also, the effect of vocabulary and reading intervention within the test validity can be attributed to the issue that and vocabulary intervention within the test validity orients learners toward problem-solving and seeing words as problems to be solved. This activates their mind and generates a sense of agency in them. As a result, they become more autonomous and this enhances their vocabulary breadth and depth.

As another possible justification for the findings, enhanced feelings of satisfaction under the influence of enhanced autonomy make learners happier. Happiness is associated with higher success in vocabulary learning. In this way, learners' vocabulary breadth and depth are enhanced.

Furthermore, vocabulary and reading intervention within the test validity makes learners more engaged. When they are more engaged in learning process, they also will be more involved in other affairs such as management of their emotions. Emotion regulation is strongly tied to language learning success and vocabulary learning.

Additionally, enhanced autonomy and feelings of agency make learners activated in coping feelings and this is helpful for them in developing their vocabulary depth and breadth. In other words, reading and vocabulary intervention within the test validity equips learners with the strategies required for coping with the problems. This leads to their empowerment in developing their depth and breadth of vocabulary knowledge.

The findings will serve as an indication that reading and vocabulary interventions, while implemented under conditions of test validity, support the improvement of both depth and breadth of vocabulary knowledge in EFL settings. As these two dimensions are considered critical indicators of vocabulary acquisition, such interventions would substantially foster learners' vocabulary development. Moreover, with regard to the significant role that depth and breadth of vocabulary have in general English achievement, these improvements are likely to have a strong positive influence on the proficiency and performance of EFL learners.

It may also be inferred that in conditions where reading intervention within the test validity and vocabulary intervention within the test validity are practical for the purpose of enhancement of learners' depth and breadth of vocabulary knowledge, it is recommended to use such interventions instead of traditional vocabulary teaching methods or as complements to them. It does not mean rejecting the effectiveness of traditional methods on depth and breadth of vocabulary knowledge, but it just implies supporting the superiority of vocabulary and reading intervention within the test validity over traditional methods in equal conditions.

Last but not least, because of closed ties between depth and breadth of vocabulary knowledge and vocabulary learning strategies, it may be inferred that the implementation of reading and vocabulary interventions within the test validity leads to learners' improvement of strategies of vocabulary learning in EFL settings.

As a result of this study, EFL teachers, learners and curriculum planners take invaluable insights which can be practically applied with useful contributions to teaching and learning depth and breadth of vocabulary knowledge. EFL teachers can benefit from reading and vocabulary intervention within the test validity in teaching English vocabulary so that learners can enhance their breadth and depth of vocabulary knowledge. They can train students on reading and vocabulary intervention within the test validity using different viable strategies.

Learners can take advantage of reading and vocabulary intervention within the test validity in solving the problems and challenges they face in acquisition of depth and breadth of vocabulary knowledge. Curriculum planners can inject reading and vocabulary intervention within the test validity into English curricula with the aim of familiarizing teachers and students with these ZPD-based under-investigated techniques and helping learners enhance their breadth and depth of vocabulary knowledge.

Authors Contributions

All the authors have participated sufficiently in the intellectual content, conception, and design of this work or the analysis and interpretation of the data (when applicable), as well as the writing of the manuscript.

Availability of data and materials

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

Conflict of interest

The author states that there is no conflict of interest.

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