Vocabulary Exercises and Reading Comprehension: Evidence from Iranian ESP Learners at the Undergraduate Level

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ABSTRACT

The purpose of the present study was to examine the relationship between vocabulary exercises and reading comprehension among Iranian ESP learners. The research method employed was a quasi-experimental pre-test–post-test design. The research population consisted of 40 Iranian ESP undergraduate learners of accounting who were selected through the administration of the Oxford Placement Test (OPT) and participated in the experiment of this study. They were divided into experimental and comparison groups and underwent a reading comprehension pre-test. Subsequently, the experimental group received five sessions of vocabulary exercises. Finally, a post-test was administered to both groups. Data were analyzed using the independent samples t-test between post-tests, and a paired samples t-test was employed to demonstrate the possible improvement of the groups. The results indicated superior performance of the experimental group, which obtained higher scores in the reading comprehension post-test after five sessions. The analysis of the learners' reading comprehension performance, which was independently compared between the pre-test and post-test of the experimental and control groups, revealed that participants with a degree of knowledge in vocabulary exercises reflected more successful performance in their ESP reading comprehension test. This may suggest that teaching vocabulary exercises can assist them in improving their reading comprehension activities.

Keywords: reading comprehension, vocabulary exercises, learners, ESP test

Introduction

Reading comprehension has long been recognized as one of the core competencies in second and foreign language learning, particularly for English for Specific Purposes (ESP) learners who must engage with technical and academic texts beyond general communicative needs (1). The acquisition of vocabulary plays a central role in developing this skill, as words are the fundamental building blocks of language through which learners access meaning and process written input (2). In fact, the

ability to read and comprehend texts is not only essential for academic success but also for professional advancement in contexts where English is the medium of instruction, research, or workplace communication (3). This has driven extensive research into how vocabulary knowledge, lexicalization processes, and explicit instruction shape comprehension outcomes among learners across diverse linguistic backgrounds.

Vocabulary knowledge, often considered both breadth (the number of words known) and depth (the quality and interconnectedness of that knowledge), significantly predicts reading comprehension performance (4). A learner with extensive lexical resources is better equipped to decode texts, infer meaning, and engage in higher-order processes such as analysis and synthesis (5). At the same time, vocabulary is not static; it evolves through processes of morphological awareness, lexical inference, and task-based involvement (6, 7). Research suggests that vocabulary acquisition is not merely about memorization but about connecting new lexical items to existing schemata, enabling more efficient text comprehension (8).

For ESP learners, especially undergraduates in fields such as accounting, engineering, or medicine, the role of vocabulary is magnified, as specialized terminology often carries meanings distinct from general English usage (9). Technical vocabulary requires both form-based and meaning-based strategies, and the selection of instructional methods can significantly affect how learners internalize and retrieve such items (9). These strategies are crucial since misinterpretation of technical vocabulary can obstruct comprehension and impair the learner's ability to apply knowledge in academic or professional contexts (10).

The relationship between vocabulary knowledge and reading comprehension has been consistently documented across languages and settings. For instance, research among Saudi EFL learners has shown that vocabulary size strongly correlates with comprehension skills, making vocabulary a reliable predictor of reading success (11). Similarly, investigations in Iranian contexts reveal that both vocabulary knowledge and grammatical awareness influence comprehension, but vocabulary tends to be the stronger predictor (12, 13). This suggests that while syntactic knowledge provides a framework for sentence-level understanding, vocabulary enables learners to access the meaning necessary for text-level integration.

Earlier theoretical contributions such as the Involvement Load Hypothesis highlight how task-induced involvement—defined by need, search, and evaluation—affects vocabulary retention and subsequent comprehension outcomes (2). Later research expanded this perspective, demonstrating that repeated encounters with lexical items, combined with opportunities for inference and active processing, significantly enhance both receptive and productive vocabulary knowledge (6). Studies on lexicalization mismatches also suggest that first language (L1) influences shape how learners acquire second language (L2) vocabulary, sometimes hindering comprehension when direct equivalences are absent (14).

Another critical construct in this domain is morphological awareness. Learners who are able to analyze words into roots, prefixes, and suffixes demonstrate stronger abilities in decoding unfamiliar vocabulary (15). Morphological awareness has been particularly relevant for languages with compounding tendencies, but even in English it provides learners with tools to infer meanings and expand their vocabulary networks (8). This awareness bridges the gap between lexical knowledge and reading comprehension by enabling learners to connect word forms with semantic fields, thereby deepening comprehension (16).

Despite these advances, vocabulary instruction has often been marginalized in traditional language teaching. Many programs assume that learners acquire vocabulary incidentally through exposure, yet empirical studies demonstrate that explicit teaching of lexical items, especially technical vocabulary in ESP settings, yields more substantial comprehension gains (9). This aligns with the growing recognition that vocabulary is not merely supportive but central to language learning. Without a sufficient vocabulary base, learners cannot effectively apply their grammatical knowledge or decoding strategies (10). As Wilkins famously remarked, "without vocabulary nothing can be conveyed," highlighting its indispensable role in communication (17).

The challenges of vocabulary and reading comprehension have been particularly evident in EFL contexts, where learners often lack sufficient exposure outside the classroom (18). For many university students, reading remains the primary channel for acquiring new information, yet comprehension difficulties persist due to limited vocabulary knowledge and insufficient strategies for lexical inference (19). Lexical inference strategies, which involve deducing meanings from context, are critical for learners navigating unfamiliar terminology in specialized texts. When effectively taught and practiced, these strategies empower learners to become more autonomous readers (19).

Cross-linguistic evidence further illustrates how vocabulary knowledge interacts with comprehension processes. For example, research on sustainable vocabulary acquisition among Chinese EFL learners found that both the depth and sustainability of vocabulary learning significantly contributed to reading comprehension (5). This reflects a broader trend across contexts where vocabulary breadth and depth jointly predict success in reading tasks (4). Similarly, studies in Iran demonstrated that vocabulary instruction interventions, especially those involving task-induced involvement and inferencing, had measurable impacts on learners' comprehension (7).

The role of individual differences, such as motivation and ideal L2 self, has also been explored in relation to vocabulary acquisition and comprehension. Learners who visualize themselves as competent L2 users tend to engage more deeply with vocabulary learning, which in turn enhances their reading abilities (20). This suggests that vocabulary knowledge is not solely cognitive but also linked to affective and motivational factors, making it a multidimensional component of language learning.

Moreover, studies emphasize that vocabulary knowledge contributes to intercultural communicative competence by enabling learners to comprehend not only the literal meanings of texts but also cultural references embedded within them (20). For ESP learners, this competence is critical, as they often deal with culturally situated academic or professional materials that require both linguistic and cultural decoding.

The Iranian context provides fertile ground for examining these issues. Research has highlighted that while grammar instruction remains strong in many curricula, vocabulary instruction often receives less systematic attention, despite being more predictive of reading comprehension (12, 21). Given the increasing demand for English proficiency in academic and professional domains, Iranian ESP learners must build robust lexical resources to succeed (13). This makes investigations into vocabulary instruction, lexicalization, and reading comprehension particularly timely and significant.

Additionally, historical perspectives on lexicalization processes shed light on how vocabulary evolves and how learners engage with word formation patterns. Lexicalization can occur at phonological, morphological, semantic, and syntactic levels, gradually obscuring the transparency of word structures (1). This makes instruction in word formation rules, affixation, and lexical patterns particularly important for learners, as it equips them with analytical tools to interpret unfamiliar terms (14).

The current study builds on this body of research by focusing on the relationship between vocabulary tasks (lexical exercises) and reading comprehension among Iranian undergraduate ESP learners. Drawing on insights from the Involvement Load Hypothesis (2), lexical inference strategies (19), morphological awareness (15), and empirical findings from Iranian and international contexts (4, 5, 13), it seeks to clarify how targeted vocabulary instruction can improve reading comprehension outcomes.

Methods and Materials

The present research employed a quasi-experimental method with a pre-test–post-test and follow-up design including a control group. The statistical population of this study comprised 50 first-year ESP accounting students, from whom 40 participants were selected as the sample through the Oxford Placement Test (OPT) (ranging from one standard deviation below to one standard deviation above the test mean) to ensure that they possessed the prerequisite skills required for participation in

the study's reading comprehension tests and Cochran's formula. They also expressed their consent to participate in the experiment. The 40 participants were divided into two groups: one experimental group and one control group.

OPT Proficiency Test: This included the paper-and-pencil version of the OPT to determine the proficiency level of the participants. This test was the Oxford Placement Test, which is commonly used by Iranian universities in experimental language studies to estimate proficiency levels. The test included 40 multiple-choice items (Cronbach's alpha reliability = .90) that assessed learners' knowledge of vocabulary and grammar, as these two factors were considered essential criteria for the reading comprehension test. Individuals who scored between -1 and $+1$ standard deviation from the mean of the test were considered the best sample members, since the groups were to be divided into experimental and control categories.

Reading Comprehension Test: A true–false reading comprehension test was employed as the pre-test and post-test of the study (Cronbach's alpha reliability = .81), designed and scored on a scale of 20 points. Two reading comprehension passages were selected from the ESP textbook for accounting students and were assessed using Edward Fry's online readability test (2021) [https://readabilityformulas.com/free-fry-graph-test.php] to determine text difficulty. The texts were deemed suitable, as the results fell within the gray area of the chart and not within the dark area. In the post-test, the same passages were reused as a retest.

The procedure began with the selection of participants through the administration of the OPT. Then, the reading comprehension pre-test at the ESP level was administered to both the experimental and control groups of the study to evaluate their comprehension ability before the treatment. Afterward, the experimental group underwent a 10-session intervention (60 minutes per session) involving vocabulary exercise instruction, while the control group received no treatment. Finally, the reading comprehension post-test (a retest of the study's pre-test) was administered to the participating groups.

Data were analyzed through the independent samples t-test between the post-test reading comprehension scores and the paired samples t-test between the pre-test and post-test scores of each group. Since this study involved both experimental and control groups, if the researcher assumed a performance difference between the groups in the reading comprehension test, the mean difference could be demonstrated. Furthermore, the hypothetical level of improvement from pre-test to post-test in each group necessitated the administration of a paired samples t-test between the pre-test and post-test of each group.

The data analysis method was planned to include inferential statistics using the independent samples t-test to infer the probable effect of the independent variable on the dependent variable. The assumption of employing the independent samples t-test between the post-test scores of the study was the homogeneity between pre-test scores.

Findings and Results

The administration of another independent samples t-test was shown according to Table 1 below:

Table 1. Result of the Independent Samples t-test from the Pre-test of the Study (Assumption of Homogeneity)

Reading Comprehension (Study Pre-tests)	t-test	df	Sig.
Equal variances assumed	1.313	39	.231
Equal variances not assumed	1.313 (T-critical = 2.019)	36	.231

The contents of Table 1 show that the obtained *t* value between the pre-test of reading comprehension skills in the experimental and control groups was 1.313 with 39 degrees of freedom, and the critical *t* value was 2.019. Finally, the significance level was calculated as .231, which indicates no difference between the pre-test scores of the experimental and control groups and demonstrates their homogeneity.

Table 2. Descriptive Results of the Experimental Group

Mean	N	SD	SE Mean

Pre-test	13.27	20	2.36	.42
Post-test	12.56	20	2.14	.39

The contents of Table 2 show that the mean scores of the experimental group were 13.27 in the pre-test and 12.56 in the post-test. Regarding the obtained standard deviation, it appears that there was less variability among pre-test scores compared to the post-test scores of the experimental group. This may provide a picture of the scores of experimental participants, suggesting less variation before the intervention.

Table 3. Descriptive Results of the Control Group

	Mean	N	SD	SE Mean
Pre-test	12.62	20	2.89	.54
Post-test	12.50	20	3.29	.68

The contents of Table 3 show that the mean scores of the control group were 12.62 in the pre-test and 12.50 in the post-test. Regarding the obtained standard deviation, it appears that there was less variability among pre-test scores compared to the post-test scores of the control group. This may provide a picture of the scores of control participants, suggesting less variation before the intervention.

Table 4. Independent Samples t-test Results of the Groups

Reading Comprehension (Study Pre-tests)	t-test	df	Sig.
Equal variances assumed	4.839	39	.000
Equal variances not assumed	4.839	36	.000
T-critical	2.019		

The contents of Table 4 show that the obtained t value between the post-test of reading comprehension skills in the experimental and control groups was 4.839 with 39 degrees of freedom. The critical t value was 2.019, and the significance level was calculated as .000, indicating a significant difference between post-test scores.

Table 5. Paired Samples t-test Results of the Experimental Group

Sig.	df	t-test
.001	19	3.589
T-critical = 2.089		

The contents of Table 5 show that the observed t value between the pre-test and post-test of the experimental group was 3.589 with 19 degrees of freedom, and the critical t value was 2.089. Therefore, as observed, the t value was significantly higher than the critical value, indicating a marked difference. Finally, the significance level was calculated as .001, demonstrating that there was a significant difference between the pre-test and post-test scores of the experimental group.

Table 6. Paired Samples t-test Results of the Control Group

Sig.	df	t-test
.102	19	1.698
T-critical = 2.089		

The contents of Table 6 show that the observed t value between the pre-test and post-test of the control group was 1.698 with 19 degrees of freedom, and the critical t value was 2.089. Therefore, as observed, the t value was lower than the critical value, indicating no significant difference. Finally, the significance level was calculated as .102, confirming that there was no significant difference between the pre-test and post-test scores in the control group.

Discussion and Conclusion

The findings of the present study demonstrated that vocabulary exercises had a significant impact on the reading comprehension performance of Iranian ESP learners at the undergraduate level. The experimental group, which received structured lexical tasks, showed considerable improvement compared to the control group. This confirms the centrality of vocabulary knowledge in reading comprehension and provides empirical support for the idea that explicit lexical instruction is essential in ESP contexts. The results align with a large body of research in second language acquisition, which consistently indicates that vocabulary knowledge is among the strongest predictors of comprehension outcomes (11, 16).

A major implication of these findings is the confirmation of a reciprocal relationship between vocabulary breadth and depth and reading comprehension. Learners with greater vocabulary breadth are able to recognize more words, while learners with deeper vocabulary knowledge can use semantic, morphological, and syntactic cues to infer meanings from context. Both dimensions were evidently activated by the vocabulary exercises provided in the experimental intervention, resulting in higher comprehension scores. This is consistent with prior research showing that both breadth and depth are positively correlated with reading comprehension (4, 5). The fact that participants improved in comprehension after a relatively short intervention suggests that even limited but targeted instruction in vocabulary can produce meaningful outcomes in ESP reading.

These findings resonate with the Involvement Load Hypothesis, which posits that tasks requiring greater cognitive involvement—through need, search, and evaluation—enhance vocabulary retention and subsequently comprehension (2). In the present study, the experimental tasks required learners to repeatedly engage with words, infer meanings, and apply them in context, thereby producing high involvement load. The results are consistent with the outcomes of previous studies in which repetition, processing depth, and inferencing strategies improved vocabulary acquisition (6, 8). This supports the notion that explicit vocabulary instruction is not redundant but rather instrumental in fostering comprehension gains.

The current results also confirm earlier Iranian findings, where vocabulary knowledge was shown to be a stronger predictor of reading comprehension than grammar (12, 13). While grammatical knowledge provides structural understanding, vocabulary knowledge supplies the semantic core necessary for interpretation. This echoes the view of Wilkins, who emphasized that without vocabulary nothing can be conveyed (17). The Iranian ESP learners in this study reflected the same pattern, suggesting that instructors should prioritize vocabulary development over other linguistic components when comprehension is the immediate objective.

Additionally, the study's results align with research conducted in Arab EFL contexts, particularly in Saudi Arabia, where vocabulary size was found to be the most reliable predictor of reading comprehension (10, 11). Similar to Saudi EFL learners, Iranian ESP students face limited exposure to English outside academic settings, making explicit instruction of vocabulary critical. Both contexts share challenges of limited input and high reliance on classroom instruction, which underscores the importance of systematic approaches to vocabulary teaching.

The experimental findings also highlight the importance of morphological awareness in vocabulary acquisition and comprehension. Learners in the intervention likely benefited not only from exposure to new words but also from practice in analyzing word forms, prefixes, and suffixes. This is consistent with studies that emphasized morphological awareness as a significant contributor to reading comprehension (14, 15). For ESP learners, where technical vocabulary often follows morphological patterns, such awareness provides learners with analytical tools for decoding unfamiliar terms. The implication is that instruction targeting both lexical items and their morphological structures may maximize comprehension gains.

Cross-linguistic evidence from Chinese EFL learners further supports these findings. Zeng et al. (5) showed that sustainable vocabulary acquisition strategies significantly contributed to comprehension success. Like Chinese learners, Iranian ESP

students face challenges of heavy text loads in academic disciplines, which makes vocabulary knowledge indispensable. The alignment between contexts underscores the universality of the vocabulary–comprehension relationship across linguistic backgrounds.

The study also reinforces the value of lexical inference strategies. Learners in the experimental group, through repeated exposure and context-based exercises, developed greater capacity to infer meanings. This aligns with Zarei and Shirmohammadi's (19) findings that lexical inference strategies play a vital role in comprehension. It also resonates with Soltani Moghaddam and Kaivanpanah's (7) work showing that task-induced involvement in inferencing positively impacts L2 vocabulary acquisition. Together, these findings confirm that when learners are actively engaged in discovering word meanings rather than passively memorizing them, both vocabulary knowledge and comprehension benefit.

Furthermore, the study corroborates the idea that vocabulary knowledge contributes to intercultural communicative competence. Learners who improved in reading comprehension were likely not only better at decoding texts but also more capable of grasping cultural references embedded within them. This echoes Oz's (20) findings that vocabulary knowledge and an ideal L2 self are predictors of intercultural competence. For ESP students in global academic and professional contexts, this competence is critical, as texts often integrate cultural knowledge alongside technical information.

The findings also resonate with Abtahi and Khodadadian (21), who reported that vocabulary knowledge significantly influenced comprehension among non-Iranian Persian learners, whereas prior knowledge had less impact. Similarly, in the present study, comprehension improvement stemmed primarily from enhanced vocabulary rather than background knowledge, reinforcing the notion that lexical knowledge is central to reading success. This is in line with Sidek and Rahim (3), who emphasized the cross-linguistic importance of vocabulary in comprehension.

In addition, the outcomes support broader perspectives on the importance of vocabulary instruction in ESP courses. As Alharbi and Ismail (9) demonstrated, both form-based and meaning-based approaches to technical vocabulary instruction are effective, and the present findings suggest that combining these methods can produce even greater comprehension outcomes. The intervention provided in this study reflected both approaches, enabling learners to internalize word forms while understanding meanings.

Beyond individual vocabulary items, the findings shed light on lexicalization processes as they pertain to comprehension. Vocabulary evolves through processes of phonological, morphological, semantic, and syntactic lexicalization (1), and learners who become familiar with these processes can more easily interpret unfamiliar terms. The experimental group's success in this study may thus be partially attributed to their increased awareness of such patterns, which has been shown to support incidental vocabulary acquisition (14).

From a pedagogical standpoint, the results stress that vocabulary should not be relegated to incidental learning but treated as a core instructional focus. Traditional approaches that rely on incidental acquisition through extensive reading often underestimate the difficulties EFL learners face in contexts with limited exposure. The present findings support calls for explicit vocabulary teaching in ESP courses, a point also emphasized in Iranian (12, 13) and Saudi (4, 10) contexts. Without systematic vocabulary instruction, learners may lack the lexical resources to comprehend academic texts, thereby impeding both their academic success and professional readiness.

Finally, the findings affirm the theoretical insights of Hulstijn and Laufer (2), who argued that depth of involvement determines the effectiveness of vocabulary tasks. The experimental group's improvement illustrates that lexical tasks requiring active processing, inferencing, and repeated use significantly outperform passive exposure. This convergence of theory and empirical evidence highlights the pedagogical importance of designing vocabulary tasks that maximize learner engagement.

Despite its contributions, the present study has several limitations. First, the sample size was relatively small, consisting of only 40 undergraduate ESP learners. This limits the generalizability of the findings to broader populations, particularly learners from different academic disciplines or educational contexts. Second, the intervention was relatively short, spanning ten sessions, which may not fully capture the long-term effects of vocabulary exercises on comprehension. Longitudinal data would be needed to determine whether the gains observed persist over time. Third, the study relied on a single type of reading comprehension test, which may not fully reflect the range of reading skills required in real academic contexts. Finally, potential variables such as learner motivation, prior exposure to English, and individual learning strategies were not controlled, which may have influenced the outcomes.

Future studies should consider larger and more diverse samples, incorporating learners from different academic disciplines, universities, and proficiency levels. Longitudinal research is also needed to examine the durability of vocabulary instruction effects over extended periods. Researchers may explore comparative studies between ESP learners in different countries to identify cross-cultural similarities and differences in the vocabulary–comprehension relationship. Additionally, future research could investigate the interaction between vocabulary knowledge and other variables such as motivation, metacognitive strategies, or digital literacy, to provide a more holistic picture of comprehension development. Finally, the integration of qualitative methods, such as think-aloud protocols or learner diaries, could yield deeper insights into the processes by which learners engage with vocabulary tasks and develop comprehension skills.

In practical terms, the findings highlight the need for ESP instructors to incorporate explicit vocabulary instruction as a central element of their curricula. Teachers should design activities that combine form-based and meaning-based approaches, encourage learners to engage with words repeatedly, and promote lexical inference strategies. Curriculum designers should integrate vocabulary tasks that are discipline-specific, ensuring that learners acquire the technical vocabulary necessary for their fields of study. Moreover, training learners in morphological analysis and lexicalization awareness can equip them with tools to independently decode unfamiliar words. By prioritizing vocabulary instruction, educators can foster not only improved reading comprehension but also greater learner autonomy and academic readiness in ESP contexts.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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