Contributions of the Keyword Method, Thematic Clustering and Developing Morphological Awareness to the Iranian EFL learners' Mastery of Low Frequency English Words

Farahman Farrokhi

Department of English Language & Literature, University of Tabriz, Iran
ffarrokhi20@yahoo.co.uk

Fatemeh Gholami (Corresponding Author)

Department of English Language & Literature, University of Tabriz, Iran
fatemeh78gholami@gmail.com
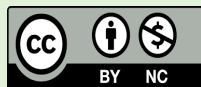
Abstract

This study investigated the effects of three vocabulary development strategies of keyword method, thematic clustering and developing morphological awareness on the Iranian EFL learners' vocabulary repertoire. Adopting a quasi-experimental design, sixty high-intermediate to advanced Iranian EFL learners were randomly assigned to three experimental groups and partook six online sessions of vocabulary instruction during a week. Using a pre-test and three post-tests, the vocabulary repertoire of the subjects was measured. The pre-test was administered a week before the commencement of the treatment sessions; the first post-test was administered immediately after each treatment; the second post-test was held 24 hours after each treatment and the third post-test was held one week after the end of the treatment sessions. Paribakht and Wesche (1993) model of measuring vocabulary enhancement was used to quantify the vocabulary repertoire of the subjects. Split-plot ANOVA test revealed that the subjects in the keyword group outperformed the subjects in the other two groups in all the three post-tests. Moreover, it was revealed that the thematic clustering group outperformed the developing morphological awareness group. The findings of this research may have pedagogical implications for English teachers, learners and material developers.

Introduction

Doubtlessly developing a good vocabulary repertoire is a determining factor in learning a foreign language. This issue gains more prominence when it comes to learning English because "the chief characteristic of English vocabulary is that it is very large" (Schmitt, 2019, 48). Therefore, vocabulary knowledge can be considered as a critical tool for the EFL learners because limited vocabulary impedes their successful function in listening, speaking, reading and writing skills. In fact, there is a strong relationship between the learners' vocabulary size and their overall linguistic ability. Furthermore, learning vocabulary is intrinsically a never ending and demanding task (Gu, 2018). Language learners even at the highest levels of proficiency never stop learning new words; therefore, the process of vocabulary learning may even last a life time. Moreover, vocabulary knowledge is the most unordered and unmanageable aspect in the process of acquiring any language, that is why vocabulary learning is considered as the greatest source of EFL learners' failures (Oxford, 1990).

In the area of teaching and learning L2 vocabulary, frequency is a dominant view (Lessard-Clouston, 2021). It is believed that the teachers should work on high frequency words in class and the learners need to learn low frequency words in their own time either incidentally or deliberately (Teng, 2014). In fact, the limited time of the class does not allow the allocation of time to teach low frequency words in class and consequently the burden of the arduous task of learning low frequency words is put on the shoulders of the students themselves. Furthermore, Schmitt (2019) argues that high frequency words are used frequently and make up a manageable group; however, low frequency words make up a very large group and are not used so frequently; therefore, it is useful for both teachers and students to work on high frequency words in class. So far, many scholars have introduced high frequency vocabulary lists that can be used by the teachers in class (Browne, 2014; Coxhead, 2000). Frequent updates of the high frequency vocabulary lists demonstrate the importance of choosing frequent L2 words to teach in class. However, this simultaneously raises the question that after mastering high frequency words, how and when the EFL learners should master the low frequency words. The reason why the development of L2 low frequency words gets more prominence is that in the area of SLA, only a person who has a good command of both low frequency and high frequency words can be called a master in that language.

Scholars have proposed a myriad of vocabulary development strategies for acquiring English vocabulary. However, the gap that is still present in the literature is that little research has tried to compare and contrast the effectiveness of these strategies on enabling EFL learners to acquire low frequency English words. Three of the prevailing strategies that can lead to the increment of the EFL learners' vocabulary repertoire are keyword method, thematic clustering strategy and developing morphological awareness. All these three strategies are explicit and direct vocabulary learning strategies. So far, no study has tried to investigate the effects of these three strategies on the acquisition of low frequency L2 words by the Iranian EFL learners. Therefore, this study adopting a quasi-experimental design, aims to find out whether there are significant differences among the effects of thematic clustering, keyword method and developing morphological awareness on learning low frequency English vocabulary items by

the Iranian EFL learners. To this end, the following research question was posed in order to fill in the identified gap in the literature. It is worth mentioning that this research examines one dependent variable (vocabulary learning) and three independent variables (key word method, thematic clustering strategy and developing morphological awareness strategy).

Are there any significant differences among the effects of thematic clustering strategy, keyword method and developing morphological awareness on learning low frequency L2 words by the Iranian EFL learners?

Literature Review

Significance of Vocabulary Knowledge

Teachers, students and all the stake holders in the field of ELT are aware of the importance of teaching and learning vocabulary. Vocabulary is the building block of language because it labels ideas, objects and actions (Rezvani & Khanzade, 2022). Moreover, vocabulary mastery has a direct effect on the mastery of the four skills of reading, writing, listening and speaking. According to Zohrabi et al. (2018), L2 learners' vocabulary repertoire determines their accuracy and fluency in speech. Now, a precise definition of vocabulary knowledge can be illuminating. Vocabulary knowledge is an efficient reflection of all the words that are used by the individuals to express their opinions, to construct their background knowledge, to identify new concepts and finally to communicate effectively (Sedita, 2005). Highlighting the significance of vocabulary knowledge, Nation and Nation (2001) describes the relationship between the vocabulary knowledge and language use as complementary maintaining that knowledge of vocabulary enables language use and language use leads to the increment of the vocabulary knowledge.

Frequency Perspective of Vocabulary Knowledge

Over the years, the research that used corpora to analyse English vocabulary have introduced three main levels of frequency for English vocabulary items. These three kinds of vocabulary items are addressed as, high-frequency, low-frequency and mid-frequency English vocabulary items (Lessard-Clouston, 2021). The basis for having a well-thought plan for helping learners with English vocabulary learning is an awareness of how to deal with high-frequency, mid-frequency and low-frequency words (Schmitt, 2019).

It is believed that teachers should work on high-frequency words in class because they are used frequently and make up a manageable group (Schmitt, 2019). Mid-frequency vocabulary items need to be learned by EFL learners if they want to read for pleasure, watch L2 TV programs or understand most of the textbooks written in English (Lessard-Clouston, 2021). Low-frequency words makeup a large group and are not used so frequently, therefore, the learners need to learn them in their own time either incidentally or deliberately (Schmitt, 2019). The expansive nature of the low-frequency vocabulary items and the fact that learners have to master low-frequency vocabulary items on their own in their own time have made the scholars to recommend the EFL students to develop vocabulary learning strategies (Lessard-Clouston, 2021).

Vocabulary Development Strategies

In the past, the important role of vocabulary learning in developing a second or a foreign language had not been recognized (Goundar, 2019). During 1940s to 1960s due to the dominance of structural linguistic approach proposed by Fries in 1945 and generative transformational linguistics proposed by Chomsky in 1957, it was assumed that in case learners master grammatical rules of a second or a foreign language, they will be able to fill in the lexical gaps as required (Noor & Amir, 2009).

Nowadays, vocabulary is identified as a vital element and an essential part of mastering a second or a foreign language. Consequently, there has been attempts to help L2 learners in developing L2 vocabulary items. Considering the fact that the teachers should teach the students "how to learn" rather than merely transmitting the pieces of knowledge to them, some skills and strategies should be taught to the students so that they can take more control of their own learning and be more responsible for their studies. According to Zohrabi et al. (2018), learning strategies augment the L2 learners' ability to learn autonomously by enabling them to decide the strategies that suit their learning. Furthermore, O'malley and Chamot (1990) maintain that learning strategies are special thoughts or behaviours used by the individuals to comprehend, learn or retain new information. Among the most significant learning strategies are the vocabulary development strategies which gained considerable attention since 1970 (Rubin, 1975). Vocabulary learning strategies are deliberate, dynamic and iterative processes which make the learning process more efficient and pleasant (Gu, 2018). Language learners are aware of the importance of L2 vocabulary learning, but they may not be aware of the fact that vocabulary development strategies can help them in successful learning of L2 vocabulary items. In addition, the teachers themselves find the instruction of vocabulary items a demanding task because they are unsure about the best vocabulary teaching practice (Zohrabi & Tahmasebi, 2020). Furthermore, there is not any general theory on how the vocabulary items of a language should be learned or acquired; therefore, the teachers need to introduce and model different vocabulary learning strategies in class and encourage the students to use them in order to learn new L2 vocabulary items (Lessard-Clouston, 2021). All these discussions make conspicuous the significance of vocabulary learning strategies in the field of ELT.

Thematic Clustering Strategy

It has been proved that explicit and direct instruction enhances vocabulary learning drastically (Khayef & Khoshnevis, 2012). In the present study, three direct vocabulary development strategies of key word method, thematic clustering and developing morphological awareness will be investigated. Thematic clustering is a type of lexical grouping in which L2 vocabulary items have the characteristics of a theme. Over the years, many scholars have proposed justifications for the helpfulness of thematic clustering method in L2 vocabulary development. Most of these justifications are proposed by psychologists (Tinkham, 1997; Waring, 1997; Violi, 2001). These justifications are based on how lexical items are organized in the mental lexicon of the learners.

The first justification is the semantic frames theory. Semantic frames theory maintains that the areas that organize lexical items in the brain are not fixed and defined sets. In fact, these

areas are segments that have blurred boundaries; therefore, lexicon appears to be a list of lexical items that are thematically related (Violi, 2001). According to Fillmore and Atkins (1992), lexical items are not linked to one another directly. Rather they are linked to a common background frame, experience, belief or practice and they are connected to one another through their link to these common background frames, experiences, beliefs or practices. In simple terms, "frames" are the specific backgrounds to which different lexical clusters that have the same thematic characteristics are connected.

Another justification for the helpfulness of thematic clustering in L2 vocabulary development is schemata theory. Schemata help us to comprehend current experiences and new situations by reminding us of the previous similar experiences and previously faced similar situations. In the case of L2 vocabulary learning, students can learn the new L2 vocabulary items by connecting them to their previously learned words (Cui, 2016). The connection between the learners' previously acquired vocabulary items and how they learn the new L2 vocabulary items makes clear the usefulness of the thematic clustering method (Zargosh et al., 2013). When a learner faces a cluster of words that are thematically related, the recall of one of the words in the cluster can stimulate the recall of the rest of the words; this way the vocabulary development of the learner is enhanced. All in all, the schemata theory helps the learner to organize and recall the thematically related L2 lexical items easier.

Another piece of evidence that supports the usefulness of the thematic presentation of L2 vocabulary clusters is the interference theory. Interference theory is a psychological concept which talks about the reasons why the individuals forget things in a long run (Jonides & Nee, 2006). According to this theory, forgetting is caused by memory interfering. In clustering L2 vocabulary items, if the clustered words are too closely related to one another, as in the semantic clustering, the effect of interference can be seen in learning those words. To put it in simple terms, the students might confuse the vocabulary items which are too similar to one another. Learners learn vocabulary items that are distinct but at the same time thematically related much easier (Waring, 1997).

Similar to the interference theory, distinctiveness hypothesis also maintains that the distinct pieces of information are learned and recalled faster and easier. Therefore, the more distinct the new L2 lexical items, the easier they will be learned. In other words, this hypothesis maintains that variation plays a facilitative role in learning and recall (Wilcox, 2011). The words that are semantically clustered are too similar and this similarity impedes learning; however, thematically related lexical items are distinct enough and can be learned easier and faster. Therefore, distinctiveness hypothesis also supports the thematic clustering method.

Several studies were carried out concerning the effect of thematic clustering strategy on the EFL learners' vocabulary development; for instance, Zargosh et al. (2013) in a quasi-experimental study, investigated the facilitative role of thematic clustering on vocabulary learning of Iranian monolingual and bilingual EFL learners. Each of the monolingual and bilingual groups of students were divided into two groups, an experimental and a control group. The experimental groups of both bilinguals and monolinguals worked on the thematically related words; however, the control groups followed the institute instruction. The results demonstrated that thematic clustering can have a facilitative role on the vocabulary learning of

both bilingual and monolingual EFL learners. In addition, Allahverdizadeh et al. (2014) investigated the effects of lexical training using semantically and thematically related vocabulary sets on 80 Iranian EFL learners. The results demonstrated that the participants who were instructed through thematically related vocabulary sets recalled a higher number of vocabulary items compared to those who were trained through semantically related vocabulary sets.

Keyword Method

Keyword method is a type of mnemonic vocabulary development strategy. Mnemonics are defined as the art of improving memory through artificial aids. In all the mnemonic strategies, the new concepts are learned by creating a mental image that connects these new concepts to the previously learned knowledge. These mental images are created using some cues. In fact, in the keyword method, an association is made between an L2 word and its L1 translation. This association is made in two stages. At first the L2 word is associated with an L1 word that is acoustically or orthographically similar to the L2 word. This L1 word that is acoustically or orthographically similar to the L2 word is called the keyword. Then, in the second stage, a symbolic image of the keyword and the L1 translation of the foreign word are connected to each other (Nation & Nation, 2001).

In simple terms, the keyword method tries to decrease the rate of forgetting of L2 vocabulary items by directly providing a retrieval path using a keyword that is devised externally. In fact, when students learn an L2 word through keyword method, as they subsequently encounter the L2 word, the keyword that was used to teach the L2 word comes to their mind; consequently, the mental image that had been created previously will help the learners to remember the meaning of the L2 word. In the past, it was argued that the presentation of a keyword might hamper the learning of the correct pronunciation and spelling of the new L2 word (Ahmadi Safa & Hamzavi, 2014). However, many scholars have rejected this issue and emphasized the facilitative role of the keyword method (Wang et al., 1992). Keyword method has been proved to be a useful vocabulary development technique in different languages (Miyatsu & McDaniel, 2019).

Previous investigations regarding the effect of keyword method on the EFL learners' vocabulary development have provided converging evidence regarding the positive effect of keyword method on the EFL learners' vocabulary repertoire. For example, Al-khawaldeh and Al-khasawneh (2019) in a quasi-experimental study, investigated the effect of keyword method instruction on the Saudi students' vocabulary learning. Forty students with learning disabilities were divided into two groups; an experimental and a control group. The students in the experimental group received the instruction in key word method; however, the control group received the traditional teaching method. The results of the study demonstrated that keyword strategy effects the vocabulary learning of the students in a positive way. Moreover, Nissa et al. (2021) investigated the effect of keyword technique on the vocabulary mastery of tenth grade students of Tengah. The study was conducted in two cycles and each cycle consisted of three meetings. The results demonstrated that the use of keyword method not only leads to a better vocabulary learning but also improves the students' learning activities in general.

Developing Morphological Awareness

Morphemes are the smallest linguistic units that carry either a meaning or a function (Coates, 2002). Morphology, as its name suggests is the study of the constituent morphemes of different vocabulary items. Linguistically put, morphology is the study of the internal structures of words (Aronoff & Fudeman, 2022). In other words, the operation of the word formation rules on the production of the new lexical items is explained in morphology. According to the stracturalists, memory analyses a complex word by breaking it into its morphemic units (Feldman, 2013).

In fact, we can say that morphology has two components or it can be analyzed from two different approaches. The first component is morpheme identification component which is an analytical approach maintaining that the vocabulary items can be segmented into their meaningful parts to get the meaning of the whole word. The other component is morphological structure component that approaches the vocabulary items synthetically stating that familiar morphemes can be brought together and combined to form new vocabulary items (Arviyolla & Delfi, 2022).

Morphological awareness is a type of metalinguistic awareness. Metalinguistic awareness is the learners' awareness of the segmental nature of language. In the same vein, morphological awareness is the ability to consciously manipulate and analyze the constituent morphemes of the vocabulary items. Morphological awareness helps the students to examine words for their meaningful parts in order to discover the words' meanings; this knowledge will enable students to construct and deconstruct meaning from the morphemes without being dependent on contextual clues and dictionary to get the meaning of the words (Antonacci & O'callaghan, 2011). According to Zhang and Koda (2013), the morphological awareness of the L2 learners has a direct relationship with their vocabulary knowledge. Two of the commonly introduced ways to increase the morphological awareness of L2 learners are via either explicit instruction or language experience (McCutchen & Logan, 2011). In the present study, the researchers tried to increase the Iranian EFL learners' morphological awareness through explicit instruction.

Since vocabulary development has been proved to play a crucial role in learning a second or a foreign language, there has been a growing body of investigation about the effectiveness of the development of morphological awareness as a vocabulary development strategy on the EFL and ESL learners' vocabulary learning. For example, Liu (2014) in an eye tracking study, investigated the effects of morphological instruction on English vocabulary learning. Sixty-eight non-English major sophomores of a university in Taiwan were divided into an experimental and a control group. The experimental group was provided with morphological instruction, whereas the control group received traditional instruction. The results indicated that the participants who received morphological instruction considered morphemes as inferring references; consequently, inferred unknown words with greater success. So, it was concluded that morphological instruction modifies the vocabulary recognition process and aids the formation of an accurate mental model leading to a better vocabulary recognition.

Furthermore, Sukying (2020) in a quasi-experimental research, examined the effects of explicit affix instruction on the acquisition of new L2 words of 92 English major students at a well-established government university in Thailand. The results demonstrated a positive effect

of affix instruction suggesting that this instruction may help EFL learners in understanding L2 vocabulary items and consequently in acquiring these L2 words.

In another study, Arviyolla and Delfi (2022) investigated the correlation between morphological awareness and vocabulary mastery of 39 students studying the fifth semester in the English department of a university in Riau. The results of the study demonstrated a positive and strong correlation between the students' morphological awareness and their vocabulary mastery. Thus, it was concluded that students' vocabulary understanding can be increased by developing morphological awareness as a vocabulary learning strategy.

Although a myriad number of studies have so far supported the fruitfulness of each of the three vocabulary development strategies of keyword method, thematic clustering and developing morphological awareness on the L2 vocabulary development of the EFL learners all over the world, few studies have tried to investigate and compare the effects of these three vocabulary development strategies on learning low-frequency L2 words by high-intermediate to advanced EFL learners. In view of the fact that frequency is a dominant view in the area of teaching and learning L2 vocabulary (Lessard-Clouston, 2021) and being aware of the fact that only the EFL learners with the full command of both high-frequency and low-frequency words can be called a master in English, the administration of this study seemed to have pedagogical implications for the field of ELT. Therefore, the present study, adopting a quasi-experimental design, aimed at comparing and investigating the contribution of keyword method, thematic clustering and developing morphological awareness to the Iranian high-intermediate to advanced EFL learners' mastery of low-frequency English words.

Method

Subjects

Originally, 130 Iranian EFL learners volunteered to participate in this study. Out of these 130 EFL learners, 31 of them were excluded because their proficiency level did not suite the purpose of the study; only subjects with the proficiency levels of high-intermediate to advanced were required for the purpose of this study. The proficiency level of these 31 volunteers was either higher or lower than high-intermediate to advanced level. Out of the remaining 99 EFL learners, the results obtained from 39 learners were not used in data analysis because they either did not participate in all the six sessions of treatment or did not complete all the three post-tests of this study. Therefore, the results obtained from 60 learners (13 male and 47 female) were analyzed at the end of this study. The age range of these 60 subjects was between 18 to 26 years and they were from different cities all over the Iran; they were from Urmia, Tehran, Tabriz, Mashhad, Shiraz, Kashan, Bandar Abbas, Bojnurd, Semnan and Zanjan.

Table 1. *Details of the Participants*

Number of the participants	60
Gender of the participants	13 males and 47 females
General English proficiency level	High-intermediate to advanced
Age range	18-26

Instruments

In order to investigate and compare the effects of the three vocabulary development strategies of key word method, thematic clustering and developing morphological awareness on learning low-frequency L2 words by the Iranian EFL learners, the authors administered a quasi-experimental study which involved three phases: a pre-test, six treatment sessions and three post-tests. A description of the instruments along with the way they were used in this study is provided in the following sub-sections.

Oxford Quick Placement Test

For the purpose of this study, only subjects with high-intermediate to advanced proficiency level were required. So, after the completion of a demographic questionnaire, a placement test was administered to determine the homogeneity of the subjects. The placement test that was used in this study was the Quick Placement Test of Oxford University Press and University of Cambridge Local Examination Syndicate (2001, version 1). The reason why this OPT suited this study best was that in the first place, it is legally photocopiable and it can be legally reproduced as many times as it is needed. Moreover, this placement test is easy to use and can be scored locally and easily. This placement test consists of two parts. The first and the second part of this test jointly consist of 60 questions which are in the format of close tests and multiple-choice questions.

The criteria to determine the proficiency level of the learners based on this OPT are provided in the user manual of the test. The criteria maintain that the learners scoring between 1 to 17 are at the beginner level. The participants who score 18 to 27 are at the elementary level; those with scores between 28 to 36 are at the lower-intermediate level; those scoring 37 to 47 are at the upper-intermediate level; those with scores between 48 to 55 have an advanced proficiency level and those with 56 to 60 as their grade are at the very advanced level. For the purpose of this study the learners scoring between 37 to 55, that is the upper-intermediate to advanced learners, were chosen.

Vocabulary Knowledge Scale (pre-test and post-tests)

Vocabulary knowledge scale is a 5-point scale that demonstrates and calculates the progressive degrees of vocabulary knowledge. It is used to obtain the learners' self-reported and self-perceived knowledge of vocabulary items. Paribakht and Wesche developed this scale in 1993. They checked the validity and the reliability of this scale by conducting an experiment on 93 participants with different proficiency levels. So far, many scholars have adopted this scale to measure the effects of different types of treatments on the enhancement and increment of the vocabulary repertoire of the students (Iqbal & Komal, 2017).

This scale rates the vocabulary knowledge of the subjects from entire familiarity, to little recognition of the word, to little idea of the meaning of the word, to complete awareness of the meaning of the word and finally to the ability to use the word in a sentence. This rating is done using the following 5 options:

1) I don't remember having seen this word before.

2) I have seen this word before, but I don't know what it means.

3) I have seen this word before and I think it means ……... (synonym or translation).

4) I know this word. It means ……. (synonym or translation).

5) I can use this word in a sentence.

Regarding the scoring criteria for this scale, option one receives 1 point; option two receives 2 points; incorrect answers to options three and four receive 2 points; correct answers to options three and four receive 3 points; incorrect answers to option five receive 3 points and correct answers to option five receive 4 points (Iqbal & Komal, 2017).

In the present study, as for the pre-test, the subjects were asked to choose one of the 5 options of the Vocabulary Knowledge Scale (VKS) for each of the 41 target words one week before the commencement of the treatment sessions. This way, the researchers ensured that the target words were not previously known to the subjects and any change in the vocabulary repertoire of the subjects resulted from the treatments. Similarly, as for the three post-tests, the Vocabulary Knowledge Scale (VKS) was administered three times for each of the 41 target words. The first post-test was administered immediately after each treatment session, the second post-test was administered 24 hours after each treatment session and the third post-test was administered one week after the end of the treatment sessions. This way, the changes in the vocabulary development of the subjects were quantified.

Materials

One hundred and twenty-three vocabulary items were chosen as the target words of this study. In each of the experimental groups, forty-one vocabulary items were taught during the six sessions of treatment. In each session, six or seven words were taught to the subjects. The 41 vocabulary items that were taught in the treatment sessions of the morphology group were chosen from the book *Morphology* written by Gholamreza Tajvidi. The 41 vocabulary items that were taught in the treatment sessions of the keyword group were chosen both from the book *1100 words you need to know* and from the words in the MA TEFL university entrance exams held in different years in Iran. The 41 vocabulary items taught in the treatment sessions of the thematic clustering group were chosen from different sources in order to fit in the specific theme that each of the clusters had. One of the main sources in finding these thematically related vocabulary items was the book *Vocabulary for IELTS Advanced*.

As the goal of this study was comparing and investigating the incremental effects of the three vocabulary development strategies of keyword method, thematic clustering and developing morphological awareness on learning L2 low-frequency words by the Iranian EFL learners, the frequency of all the 123 target words were checked against the Corpus of Contemporary American English (COCA) to ensure their low-frequency of occurrence. It is worth mentioning that based on the results obtained from COCA, all of the 123 target words had the frequency of less than twenty times of occurrence per million. See appendices A, B and C for the exact number of occurrences of each of the words per million.

Data Collection Procedures

At first, 130 Iranian EFL learners volunteered to participate in this study. All of these 130 subjects were asked to sign a consent letter, fill in the demographic questionnaire and answer the Oxford Placement Test. Out of these 130 volunteers, only 99 of them had the proficiency level of high intermediate to advanced, so the 31 volunteers whose proficiency level did not suit the aim of this study were left out. The remaining 99 subjects were randomly assigned into three experimental groups; 33 subjects in each group. These three groups were named after the strategies using which the subjects in each group were instructed. Therefore, the three experimental groups were named as keyword group, thematic clustering group and morphology group.

One week before the commencement of the treatment sessions, in order to ensure the unfamiliarity of the subjects with the target words, the subjects of each experimental group were given a pre–Vocabulary Knowledge Scale (VKS) test of the target words which were supposed to be taught to them during the treatment sessions. After the implementation of the pre-test, the subjects of each group participated in six treatment sessions during six days of a week. Each treatment session lasted half an hour. The treatment sessions were held online on the Adobe Connect platform. Immediately after the end of each treatment session the subjects were asked to answer post-test 1 on the words that they had been taught in that session. In each of the sessions, 6 to 7 words were taught in class, so all in all, 41 words were taught during the six sessions of treatment. Twenty-four hours after post-test 1, which was administered right after the treatment session, post-test 2 was given to the subjects. This second post-test was held before starting the next treatment session. This helped the researchers to obtain the answers of the learners on the second post-test simultaneously and exactly 24 hours after the first post test. This procedure of taking post-tests 1 and 2 reiterated for all the six sessions of treatment. Then, after a one-week interval, post-test 3 was administered to measure the long-term effect of the treatment sessions.

Out of the 99 subjects in all the three experimental groups, 39 of them (13 subjects in each group) did not complete all the three post-tests in the required time; therefore, the data obtained from these 39 subjects were put aside and only the data obtained from 60 subjects (20 subjects in each group) were used in data analysis.

Data Analysis Procedures

In order to compare and contrast the incremental effects of the three vocabulary development strategies of keyword method, thematic clustering and developing morphological awareness, the researchers used the Statistical Package for Social Sciences (SPSS) version 26. At first, the normality test of Shapiro-Wilk was run to see whether the results of the present study can be generalized to all the Iranian high-intermediate to advanced EFL learns or not. Secondly, Leven's test was administered in order to check whether the distribution of the grades of the students of different groups in pre-test are the same or not. Thirdly, Box's test of equality of covariance matrices was run to test whether the observed covariance matrices of the dependent variables are equal across groups or not.

Then, a split-plot Analysis of the Variances was adopted in order check the significance of the gathered data from the three experimental groups (between-subject effect) in the pre and post-tests (within-subject effect). In fact, split-plot ANOVA is a type of repeated measures ANOVA that allows the researchers to compare and contrast more than two experimental groups whose performance or knowledge is measured more than two times and the normality test, Leven's test and Box's test of equality of covariance matrices are the prerequisites of the split-plot ANOVA. Finally, descriptive statistics were run in order to see how the scores of subjects in each of the groups differed over time.

Results

This study was held in order to investigate the contributions of the three vocabulary development strategies of keyword method, thematic clustering and developing morphological awareness to the low-frequency L2 vocabulary development of the Iranian high-intermediate to advanced EFL learners. To address this goal, a 3×4 split-plot ANOVA was carried out. The three strategies of keyword method, thematic clustering and developing morphological awareness served as the between-subject effect and the time (pre-test, post-test 1, post-test 2 and post-test 3) served as the within-subject effect.

Partial eta squared was used to report the magnitude of the within and between subject effects. The significance was set at 0.05. Administering split-plot ANOVA using 26th version of SPSS, the between subject effect was revealed to be significant and large (sig.=.004, partial eta squared=.178); indicating that the differences in the scores obtained from the three groups of keyword method, thematic clustering and developing morphological awareness were statistically significant (see table 2). The results of split plot ANOVA also revealed a significant large within-subject effect size for time (sig.=.000, partial eta squared=.935); indicating that the differences between the scores obtained from each of the groups over time is significant (see table 3).

Table 2. *Tests of Between-Subjects Effect*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Group	7142.800	2	3571.40	6.167	.004	.178	12.334	.875

Table 3. *Tests of Within-Subjects Effects*

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
time	Sphericity Assumed	302786.18	3	100928.72	823.07	.000	.935	2469.219	1.000
	Greenhouse-Geisser	302786.18	1.957	154750.20	823.07	.000	.935	1610.435	1.000
	Huynh-Feldt	302786.18	2.096	144426.75	823.07	.000	.935	1725.547	1.000
	Lower-bound	302786.18	1.000	302786.18	823.07	.000	.935	823.073	1.000

It is worth mentioning that before the administration of the split-plot ANOVA, the researchers ensured that the prerequisites of this test were met. The prerequisites of the split-plot ANOVA test are the normality test, Leven's test and Box's test of equality of covariance matrices. Using the normality test of Shapiro-Wilk, the researchers ensured that the results of the present study can be generalized to all the Iranian high-intermediate to advanced EFL learns (see table 4). Using the Levene's test, the researchers ensured that the distribution of the grades of the students of different groups in pre-test are the same (see table 5). Using the Box's test of equality of covariance matrices, the researchers ensured that the covariance matrices of the dependent variables are equal across groups (see table 6).

Table 4. *Shapiro-Wilk Test of Normality for the Three Groups*

group	Statistic	df	Sig.
Key word	.929	20	.146
Clustering	.966	20	.659
Morphology	.911	20	.068

As can be seen in table 4, the calculated significance for the Shapiro-Wilk test is more than 0.05 for all the three groups, so we can say that the distribution of the gathered data by the researcher is the same as the normal distribution of the data.

Table 5. *Levene's Test of Variance*

		Sig.
pre	Based on Mean	.149
	Based on Median	.278
	Based on Median and with adjusted df	.278
	Based on trimmed mean	.163

As can be seen in table 5, the calculated significance for Leven's test is more than 0.05, so the distribution of the students' grades in the three groups in the pre-test are the same. In other words, the grades of the students of the three groups in the pre-test are homogeneous. Leven's test is mostly important in the pre-test because after giving treatments the familiarity of the students with the words will change because of the effect of the treatments. In other words, using Leven's test, the researchers just want to make sure that all the students of all the groups have the same level of familiarity with the target words before receiving the treatments.

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

Box's M	26.7
F	1.2
Sig.	.242

As can be seen in table 6, the calculated significance by the SPSS is more than 0.05, so in this study, the covariance matrices of the vocabulary repertoire of the students in the three experimental groups are the same i.e., the relationship between the vocabulary repertoire of the students of keyword, thematic clustering and morphology groups are the same. In other words, the researchers ensured that the relationship between the dependent variables in different groups of the study are the same.

Descriptive statistics was calculated to see the development of the subjects' vocabulary knowledge of the target words in the three groups of keyword method, thematic clustering and developing morphological awareness over time. They are shown in table 7.

Table 7. *Mean scores of All the Groups in Pre and Post Tests*

	Keyword				Clustering				morphology			
	Pre	Post 1	Post 2	Post 3	pre	post 1	post 2	post 3	pre	post 1	post 2	post 3
Mean	57.5	152.5	147.4	136.1	60.6	149.6	139.3	132.8	54.7	139.4	127.7	120.9
SE	2.4	3.2	3.5	4.2	2.4	3.2	3.5	4.2	2.4	3.2	3.5	4.2
N	20	20	20	20	20	20	20	20	20	20	20	20

As can be seen in table 7, the means of the scores in the pre-tests of all the three groups are quit low and so near to one another; indicating that all the subjects were almost unfamiliar with the words before the commencement of the treatment sessions. Furthermore, the mean scores of the participants in all the three groups raised significantly from the pre-test to the first post-test indicating that all the three strategies of keyword method, thematic clustering and developing morphological awareness led to the increment of the subjects' vocabulary knowledge in post-test 1. However, in the post-test 1, the rise in the mean scores of the keyword group was more than the other two groups and the rise in the mean scores of the thematic clustering group was more than the morphology group. Moreover, a slight fall in the mean scores of all the three groups was witnessed in the second and the third post-tests respectively which was attributed to the negative effect of time. All in all, the mean scores of the keyword group in all the three post-tests were higher than the other two groups; therefore, keyword method can be introduced to have the most incremental effect on the vocabulary repertoire of the Iranian EFL learners. Moreover, in all the three post-tests the mean scores of the thematic clustering group were more than the mean scores of the morphology group, so it can be concluded that thematic clustering strategy has a more incremental effect on the Iranian EFL learners' vocabulary repertoire.

Discussion

In this study, the research question asked whether there are any significant differences among the effects of keyword method, thematic clustering and developing morphological awareness on learning low frequency L2 words by the Iranian EFL learners. The results demonstrated that all the three strategies had an incremental effect on the vocabulary repertoire of the subjects. Furthermore, the findings revealed that the keyword method was the most effective strategy among the three strategies which were the focus of this study. In addition, it was found that the thematic clustering method increased the vocabulary repertoire of the Iranian EFL learners more than the developing morphological awareness strategy.

These results are in consistence with the previous studies that supported the incremental effects of each of the three strategies of keyword method, thematic clustering and developing morphological awareness on the vocabulary repertoire of different EFL learners in different countries all over the world. For instance, regarding the keyword strategy, the results of this study are completely in tune with the findings of the research done by Al-khawaldeh and Al-khasawneh (2019) who investigated the effect of keyword method instruction on the

vocabulary learning of 40 Saudi students with learning disabilities. They reported that the keyword strategy effects the vocabulary learning of the students in a positive way. In addition, Nissa et al. (2021) investigated the effect of keyword technique on the vocabulary mastery of tenth grade students of Tengah and reported that the use of keyword method not only leads to a better vocabulary learning but also improves the students' learning activities in general.

Regarding the thematic clustering strategy, the results of this study are in line with the findings of Zargosh et al. (2013) who investigated the facilitative role of thematic clustering on the vocabulary learning of Iranian monolingual and bilingual EFL learners. Each of the monolingual and bilingual groups of students were divided into two groups, an experimental and a control group. The experimental groups of both bilinguals and monolinguals worked on the thematically related words; however, the control groups followed the institute instruction. The results demonstrated that thematic clustering can have a facilitative role on the vocabulary learning of both bilingual and monolingual EFL learners. The current study also supports Allahverdizadeh et al. (2014) who investigated the effects of lexical training using semantically and thematically related vocabulary sets on 80 Iranian EFL learners and reported that the participants who were instructed through thematically related vocabulary sets recalled a higher number of vocabulary items compared to those who were trained through semantically related vocabulary sets.

Regarding the developing morphological awareness strategy, the results of this study support Arviyolla and Delfi (2022) who investigated the correlation between morphological awareness and vocabulary mastery of 39 students studying the fifth semester in the English department of a university in Riau. The results of the study demonstrated a positive and strong correlation between the students' morphological awareness and their vocabulary mastery. Thus, it was concluded that the students' vocabulary understanding can be increased by developing morphological awareness as a vocabulary learning strategy. Furthermore, the results of this study are in consistence with Sukying (2020) who in quasi-experimental research, examined the effects of explicit affix instruction on the acquisition of new L2 words of 92 English major students at a well-established government university in Thailand and reported a positive effect of affix instruction suggesting that this instruction may help EFL learners in understanding L2 vocabulary items and consequently in acquiring these L2 words.

Conclusion

The present study tried to investigate the contributions of the three vocabulary development strategies of keyword method, thematic clustering and developing morphological awareness to the Iranian EFL learners' development of low-frequency L2 words. The reason why the researchers focused on low frequency words as the target words was that in the field of ELT, it is a fact that the limited time of the class does not allow the teachers to work on both high and low-frequency vocabulary items during the class time; therefore, the teachers have no choice other than working on the high-frequency words in the classroom and put the arduous task of learning low-frequency words on the shoulders of the students themselves. This rises the need for both the teachers and the students to teach and to learn the most effective strategies for developing low-frequency L2 vocabulary items.

The findings of this study revealed that the keyword method leads to the increment of the vocabulary repertoire of the Iranian EFL learners more than the two other strategies of thematic clustering and developing morphological awareness. Moreover, it was found that the thematic clustering method increased the vocabulary repertoire of the Iranian EFL learners more than the developing morphological awareness strategy.

The results of this study suggest a few implications. Firstly, the material developers can use the results of this study in order to design more helpful vocabulary learning tasks for the EFL learners, for example, the tasks that provide keywords for the learners. Secondly, the EFL teachers and learners can benefit from the findings of this research by understanding that when it comes to teaching and learning low frequency words, the keyword method can be more helpful compared to the thematic clustering strategy, and the thematic clustering strategy can be more beneficial compared to developing morphological awareness strategy.

Here are some of the limitations of this study which should be taken care of in the future studies. The first limitation of this study was its low sample size i.e., only 60 subjects took part in this study. The participation of higher number of subjects could have made the generalizations of the results of this study more valid. The second limitation of this study was the limited number of the treatment sessions i.e., 6 treatment sessions during a week. More treatment sessions could have allowed for more valid generalizations to be made based on the results of this study. The future research should continue to compare the effectiveness of different vocabulary development strategies and introduce the most effective ones to the EFL learners so that they can take use of the most effective ones for developing vocabulary items with different frequencies of occurrence.

References

Ahmadi Safa, M., & Hamzavi, R. (2014). The effect of mnemonic key word method on vocabulary learning and long term retention. *Journal of English language teaching and learning*, 5(12), 1-15.

Al-Khawaldeh, M. A., & Al-Khasawneh, F. M. (2019). The Effect of Mnemonic Keyword Strategy Instruction on Vocabulary Retention of Students with Learning Disabilities. *International Journal of English Linguistics,* 9(4), 138-144. http://dx.doi.org/10.5539/ijel.v9n4p138

Allahverdizadeh, M., Shomoossi, N., Salahshoor, F., & Seifoori, Z. (2014). Vocabulary Acquisition and Lexical Training by Semantic and Thematic Sets in Persian Learners of English. *Journal of Applied Linguistics and Language Research,* 1(1), 45-61.

Antonacci, P. A., & O'callaghan, C. M. (2011). *Promoting literacy development: 50 research-based strategies for K-8 learners*. Sage Publications.

Aronoff, M., & Fudeman, K. (2022). *What is morphology?* John Wiley & Sons.

Arviyolla, N. M., & Delfi, S. (2022). The Correlation between Morphological Awareness and Vocabulary Mastery of The Fifth Semester Students of English Department of FKIP Universitas Riau. *J-SHMIC: Journal of English for Academic*, 9(1), 60-72. https://doi.org/10.31849/reila.v5i1.11200

Bromberg & Gordon, (2018). *1100 Words You Need to Know* (7th edition). Barron's Educational Series.

Browne, C. (2014). A new general service list: The better mousetrap we've been looking for. *Vocabulary Learning and Instruction*, 3(2), 1-10. http://dx.doi.org/10.14992/00016222

Coates, R. (2002). *Word structure*. Routledge.

Coxhead, A. (2000). A new academic word list. *TESOL quarterly*, 34(2), 213-238. https://doi.org/10.2307/3587951

Cullen, P. (2012). *Vocabulary for IELTS Advanced*. Cambridge University Press.

Cui, L. (2016). Effect of Schema-Based Instructions on Senior High School Students' Vocabulary Learning Strategies. *International Journal for Innovation Education and Research*, 4(05), 125-129. http://dx.doi.org/10.31686/ijier.vol4.iss5.544

Feldman, L. B. (2013). *Morphological aspects of language processing*. Psychology Press.

Fillmore, C. J., & Atkins, B. T. (1992). *Frames, fields and contrasts: New essays in semantic and lexical organization*. Routledge.

Goundar, P. R. (2019). Vocabulary Learning Strategies (VLSs) Employed by Learners of English as a Foreign Language (EFL). *English Language Teaching*, 12(5), 177-189. http://dx.doi.org/10.5539/elt.v12n5p177

Gu, P. Y. (2018). Validation of an online questionnaire of vocabulary learning strategies for ESL learners. *Studies in Second Language Learning and Teaching*, 8(2), 325-350. http://dx.doi.org/10.14746/ssllt.2018.8.2.7

Iqbal, S. A., & Komal, S. A. (2017). Analyzing the Effectiveness of Vocabulary Knowledge Scale on Learning and Enhancing Vocabulary through Extensive Reading. *English Language Teaching*, 10(9), 36-48. http://dx.doi.org/10.5539/elt.v10n9p36

Jonides, J., & Nee, D. E. (2006). Brain mechanisms of proactive interference in working memory. *Neuroscience*, 139(1), 181-193. http://dx.doi.org/10.1016/j.neuroscience.2005.06.042

Khayef, E., & Khoshnevis, I. (2012). The effect of thematic versus semantic clustering of English vocabulary. *Journal of Basic and Applied Scientific Research*, 2(5), 5007-5016. http://dx.doi.org/10.5861/ijrse.2016.1260

Lessard-Clouston, M. (2021). *Teaching Vocabulary* (Revised edition). TESOL International Association.

Liu, P. L. (2014). Using eye tracking to understand the responses of learners to vocabulary learning strategy instruction and use. *Computer Assisted Language Learning*, 27(4), 330-343. http://dx.doi.org/10.1080/09588221.2014.881383

McCutchen, D., & Logan, B. (2011). Inside incidental word learning: Children's strategic use of morphological information to infer word meanings. *Reading Research Quarterly*, 46(4), 334-349. http://dx.doi.org/10.1002/RRQ.003

Miyatsu, T., & McDaniel, M. A. (2019). Adding the keyword mnemonic to retrieval practice: A potent combination for foreign language vocabulary learning? *Memory & Cognition*, 47(7), 1328-1343. http://dx.doi.org/10.3758/s13421-019-00936-2

Nation, I. S., & Nation, I. (2001). *Learning vocabulary in another language* (Vol. 10). University press Cambridge.

Nissa, R. N., Nurchurifiani, E., & Febriyanti, F. (2021). Improving Students' Vocabulary Mastery Through the Keyword Technique At The Tenth Grade of SMAN 2 Tulang Bawang Tengah. *Journal Corner of Education, Linguistics, and Literature,* 1(2), 139-147. http://dx.doi.org/10.54012/jcell.v1i2.28

Noor, N. M., & Amir, Z. (2009). Exploring the vocabulary learning strategies of EFL learners. *Language and Culture: Creating and Fostering Global Communities. 7th International Confronce by the School of Studies and Lingustics Faculty of Social Sciences and Humanities*, 313-327.

Oxford, R. L. (1990). *Language Learning strategies: What Every Teacher Should Know. Heinle ELT.*

O'malley, J. M. and Chamot, A. U. (1990). *Learning strategies in second language acquisition.* Cambridge university press.

Paribakht, T. S., & Wesche, M. B. (1993). Reading comprehension and second language development in a comprehension-based ESL program. *TESL Canada journal,* 11(1), 09-29. https://doi.org/10.18806/tesl.v11i1.623

Rezvani, R., & Khanzade, M. (2022). A Study of Comparative Effects of Textual Enhancement Techniques on Iranian EFL Learners' Vocabulary Noticing. *Research in English Language Pedagogy*, 10(1), 96-121. http://dx.doi.org/10.5539/elt.v6n1p92

Rubin, J. (1975). What the" good language learner" can teach us. *TESOL quarterly*, 41-51.

Schmitt, N., & Rodgers, M.P.H. (Eds.). (2019). *An Introduction to Applied Linguistics* (3rd ed.). Routledge. https://doi.org/https://doi.org/10.4324/9780429424465

Sedita, J. (2005). Effective vocabulary instruction. *Insights on learning disabilities*, 2(1), 33-45.

Sukying, A. (2020). Word Knowledge through Morphological Awareness in EFL Learners. *TESOL International Journal,* 15(1), 74-85.

Tajvidi, Gh. (2018). *Morphology* (21th edition). Payame noor University.

Teng, F. (2014). Strategies for teaching and learning vocabulary. *Beyond Words*, 2(2), 40-56. https://doi.org/10.33508/bw.v2i2.592

Tinkham, T. (1997). The effects of semantic and thematic clustering on the learning of second language vocabulary. *Second language research*, 13(2), 138-163.

Violi, P. (2001). *Meaning and experience*. Indiana University Press.

Wang, A. Y., Thomas, M. H., & Ouellette, J. A. (1992). Keyword mnemonic and retention of second-language vocabulary words. *Journal of Educational Psychology*, 84(4), 520.

Waring, R. (1997). The negative effects of learning words in semantic sets: A replication. *System*, 25(2), 261-274.

Wilcox, A. (2011). *Category Effects of Vocabulary Presentation in L2 Vocabulary Acquisition in Novice Learners* [Master's thesis, Auburn University].

Zargosh, M., Karbalaei, A., & Afraz, S. (2013). The effect of thematic clustering on enhancing monolingual and bilingual EFL learners' vocabulary acquisition. *European Online Journal of Natural and Social Sciences*, *2*(2s), p. 109-121.

Zhang, D., & Koda, K. (2013). Morphological awareness and reading comprehension in a foreign language: A study of young Chinese EFL learners. *System,* 41(4), 901-913. https://doi.org/10.1016/j.system.2013.09.009

Zohrabi, M., Tadayyon, P., & Dobahkti, L. (2018). The Effects of Rote and Contextualized Memorization on Iranian Intermediate EFL Learners' Vocabulary Development. *Iranian Journal of English for Academic Purposes*, 7(2), 16-31. https://dorl.net/dor/20.1001.1.24763187.2018.7.2.2.7

Zohrabi, M., & Tahmasebi, Z. (2020). A Study of the effect of Dictogloss as a medium of form-focused instruction on vocabulary versus grammar development of Iranian EFL learners. *Applied Research on English Language*, *9*(2), 183-204. https://www.doi.org/10.22108/are.2019.117960.1473

Appendix A

The number of Occurrences of Target Words Addressed in the Morphology Group Per Million:

Target Word	Frequency Per Million	Target Word	Frequency Per Million
Equine	0.67	Carnage	2.59
Equisetum	0.09	Carnivorous	0.67
Equipage	0.05	Carnivora	0.04
Auriferous	0.01	Gradatim	0.001
Auric	0.09	Retrogression	0.07
Aurification	0.00	Exhume	0.24
Aeonian	0.01	Hum drum	0.02
Arboriculture	0.02	Dactylo	0.00
Arborescent	0.01	Dactylus	0.00
Arboreal	0.22	Dactyloscopy	0.00
Arboretum	0.87	Dactylogram	0.00
Arborist	0.16	Pterodactyl	0.33
Increment	0.83	Dactylography	0.00
Accretion	0.80	Deciduous	0.69
Hagiography	0.22	Lapidary	0.13
Hagiographic	0.07	Lapidate	0.00
Hagiographer	0.04	Lapidus	0.18
Albification	0.00	Breviary	0.08
Albiflorus	0.00	Breviate	0.00
Albedo	0.56	Brevity	0.93
Albino	0.79		

Appendix B

The number of Occurrences of Target Words Addressed in the Keyword Group Per Million

Target Word	Frequency Per Million	Target Word	Frequency Per Million
Mangle	0.22	Appalled	3.64
Mar	6.17	Senile	0.85
Sardonic	0.74	Tussle	0.53
Ameliorate	0.78	Nadir	0.60
Scotch	4.19	Avarice	0.49
Serried	0.05	Fledgling	2.48
Ransack	0.13	Rustic	2.75
Succor	0.32	Calumny	0.19
Winnow	0.21	Asinine	0.65
Starling	1.83	Effrontery	0.13
Hefty	3.87	Pittance	0.59
Abjure	0.07	Debacle	3.24
Sobriety	1.60	Refute	2.16
Cache	4.79	Torture	15.30
Futile	3.69	Vivacious	0.54
Mordant	0.26	Acme	0.55
Trek	10.30	Austere	1.39
Derelict	0.69	Beguile	0.13
Carnage	2.59	Facetious	0.40
Dulcet	0.13	Jocose	0.01
Callow	0.33		

Appendix C

The Number of Occurrences of Target Words Addressed in the Thematic Clustering Group Per Million:

Target Word	Frequency Per Million	Target Word	Frequency Per Million
Quirky	3.38	Puncture	1.24
Vacillating	0.23	Convertible	3.33
Cynical	6.10	Fare	9.69
Winsome	0.36	Hub cap	0.02
Egoistic	0.16	Hood	14.72
Credulous	0.35	Fender	1.44
Astute	1.89	Exhaust	4.85
Superfluous	1.40	Dimple	0.57
Austere	1.39	Complexion	2.51
Slogan	4.75	Swarthy	0.36
Hawker	0.22	Callus	0.27
Patron	4.61	Bruise	2.21
Nascent	1.96	Freckle	0.20
Huckster	0.23	Desquamation	0.01
Excursionist	0.01	Nougat	0.18
Wanderlust	0.37	Sorbet	0.76
Safari	3.11	Icing	2.62
Jaunt	0.66	Molasses	1.44
Ferry	7.16	Drage	0.02
Cruise	16.18	Yeast	4.05
Itinerary	1.89		