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The Effects of Receptive and Productive Learning and Teaching on Learning Medical Terminology and Reading Comprehension

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Abstract

The current study was conducted to examine the effect of receptive and productive types of learning medical terminology and vocabulary on medical students' reading comprehension to understand which one is more useful to improve reading comprehension of medical texts. Participants included 70 students (male= 36, female= 34) at the School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, who were assigned into control and experimental groups where medical terminologies and words were taught receptively and productively, respectively. Four standardized tests were administered to measure students' medical reading comprehension as well as receptive and productive medical terminology and vocabulary knowledge. Later, participants were asked to write a short medical report to understand the possible difference in the effects of the two productive and receptive vocabulary teaching strategies on their actual language production. The study concluded that all the participants who completed the productive and receptive tasks had higher scores on the posttest. In other words, the results of the study, following the related descriptive statistics and independent sample t-tests, indicated that both receptive and productive learning can be effective methods of improving reading comprehension skill of medical texts although the productive method was observed to be slightly, but not significantly, more effective.

Keywords: Receptive learning, Productive learning, Reading Comprehension, Medical Terminology, Vocabulary, Writing

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1. Introduction

The reading skill is considered as a central skill because it is a resource to obtain knowledge and to find pleasure, and as Rashidi and Khosravi (2010) put, it is a tool to boost one's knowledge of the language. According to Laufer (1997) and Priebe, Keenan, and Miller (2011), background knowledge together with the knowledge of vocabulary used in a text and the utilization of general reading strategies seem to have noticeable effects on reading comprehension skill. This Yet, vocabulary knowledge is deemed to be the most significant aspect of the reading skill. In fact, one of the key components of language skills is the level of proficiency in language vocabulary. This is greatly illustrated in reading and writing skills and types of texts in particular.

Numerous studies have attempted to corroborate the significant power of vocabulary knowledge as a superior predictor in reading capability and the way to gain new information from texts (Nation, 2001; Qian, 2002). Grabe and Stroller (2001) emphasized the role of vocabulary knowledge in promoting reading comprehension. Likewise, Stahl (2003) named the link between vocabulary and reading comprehension “robust”, stating that vocabulary knowledge has been regarded as the major indicator of text difficulty.

The direction of learning in receptive or passive learning is from written or spoken forms to meaning; we acquire the knowledge of words through encountering them in text and speech. Mostly receptive learning is related to learning language through reading and listening. However, looking up words in a dictionary, matching words with their meanings or definitions, guessing from context, and watching television and movies are some other examples of receptive learning activities and receptive teaching tasks. Receptive knowledge is interpreted as being able to recall the meaning of a word when one is presented with its form (Laufer et al., 2004; Laufer & Goldstein, 2004; Nation, 2001; Schmitt, 2010). Receptive knowledge is therefore often measured by translating from L2 into L1 or by other tests in which test-takers are presented with a word in L2 and have to indicate whether they know the meaning (e.g. by choosing a picture corresponding with the meaning, which is the basis of the Peabody Picture Vocabulary Test created by Dunn and Dunn, 2007, or by choosing the right definition or a synonym).

In contrast, receptive learning is active learning, which is learning language through using it in speech and writing. In productive or active learning, the direction of learning is from meaning to form. Some examples of productive learning activities and teaching tasks are cloze tasks, sentence production

activities, retelling tasks, and writing essays. Productive knowledge is seen as an ability to produce the right form to express the required meaning (Laufer et al., 2004; Laufer and Goldstein, 2004; Nation, 2001; Schmitt, 2010) and productive knowledge is often measured by translating from L1 into L2, by cloze tests or by analyzing vocabulary in learner speech or writing.

Learners may learn vocabulary in many ways and approaches among which are the receptive and productive vocabulary learning tasks. Vocabulary learning more possibly occurs in receptive tasks like using a dictionary to look up words or matching words with the relevant definitions compared with productive tasks including activities such as cloze tests or tasks which require writing. Receptive tasks are possibly more common because, compared with productive tasks, it is easier for both teachers to design and grade and students to complete. Webb (2009) argued that receptive learning was more effective in obtaining higher scores compared with productive tasks. However, previously, it does not seem to be proved that receptive learning was more effective compared with productive learning. As a matter of fact, research demonstrated that even the opposite outcome may be correct (Webb, 2005).

It can be argued that, to a certain extent, a main problem with understanding scientific articles for students is that they are not familiar with technical terms and characteristic textual structure in scientific papers. Since most of the scientific works in non-English speaking countries are written in English, the language barrier is appended to these difficulties. Moreover, the type of strategy to teach vocabulary more effectively is still discussed among teachers and researchers (Malmström, Pecorari, & Warnby, 2023). Thus, the current study was conducted to identify which strategy (receptive or productive) to learn medical terminology and vocabulary would be more effective in improving medical reading comprehension.

2. Literature Review

2.1. Receptive and productive L2 vocabulary learning

Previous studies on learning from word pairs (L1 → L2 and L2 → L1) suggest that various types of learning, such as receptive or productive, will be effective in the knowledge acquired (Griffin & Harley, 1996; Schneider, Healy, Bourne, Jr., 2002). In a study on learning word pairs, Mondria and Wiersma (2004) investigated the effects of receptive and productive learning combined. They reported that the combination of these two methods did not result in higher receptive retention considering that productive learning, i.e. the extra type of learning, by itself can lead to a minimum amount of receptive retention.

On the other hand, Webb (2005) did not utilize word pairs to compare receptive and productive methods. He compared the efficacy of receptive and productive tasks in learning vocabulary. He showed that, after spending the same amount of time on the two tasks, participants in the receptive task performed better than those in the productive task, which is similar to that reported by Schneider et al. (2002), but different from that reported by Mondria and Wiersma (2004) who claimed that receptive learning was more effective than productive learning. He also demonstrated that the productive task proved to be more effective, when the participants were given sufficient time to complete the task.

Also, Younesi and Tajeddin (2014) found no significant differences between learners' receptive and productive knowledge of nominal clauses. Their findings indicated that meaningful output was more effective for enhancing productive grammatical knowledge, whereas processing instruction was more beneficial for improving receptive grammatical knowledge. In another study, Soleimani and Mahmoudabadi (2014) investigated how interactive output tasks affect vocabulary knowledge in Iranian EFL learners. T-test and Mann-Whitney test results indicated that participants in both interactive and non-interactive groups achieved similar scores on the overall vocabulary posttest and productive vocabulary section. Their findings suggest that output facilitates L2 vocabulary acquisition, particularly in enhancing productive vocabulary development.

These few experimental studies which compared receptive and productive strategies have yielded contradictory outcomes and, as a result, opposite implications are presented, which make it confusing to choose between the two.

2.2. Studies on reading comprehension

Some previous studies have demonstrated the effectiveness of various instructional activities in improving reading comprehension skill in Iranian medical students. Mesbah (2016) investigated the effect of task-based language teaching on medical students' reading comprehension. In this quasi-experimental study, task-based instruction (TBI) was used in the experimental group according to Willis and Willis' (2007) framework, whereas conventional Grammar Translation Method (GTM) was implemented in the control group. The findings showed that Task-Based Language Teaching (TBLT) was more useful in improving the students' reading comprehension, confirming the usefulness of tasks as credible tools to teach medical students reading.

Sanders (2013) also confirmed that reading studies have identified a wide variety of strategies. She maintained that these reading strategies range from traditionally recognized reading behaviors like

skimming and scanning to more recently recognized cognitive strategies including recognizing text structure. Moreover, Ashrafzadeh, Mohd Don, and Meshkat (2015) investigated the effect of relevant background knowledge on Iranian medical students' reading comprehension. Participants responded to questions based on two separate texts: one text was an academic one using sub-technical medical terms, for example air ventilation, but the second one included specialized terminology from neurology. The findings suggested that schema has a significant role in reading comprehension among Iranian medical students ($p< 0.05$).

The relationship between the vocabulary knowledge level and EFL reading comprehension has widely been investigated. In general, it seems that vocabulary knowledge has been a major component in reading comprehension and much research has been carried out to examine vocabulary knowledge. One of these studies was conducted by Behzadi and Haji Pour Nezhad (2014) on the effect of two task types (receptive and productive) on learning English words and idioms. This experimental study was encouraged to investigate the popular belief among foreign language teachers that words learned receptively are retained better than those learned productively. They carried out the study on three groups with one group receiving receptive tasks, the second one productive tasks and the third group a combination of the two tasks. The results revealed that both receptive and productive tasks resulted in improvements in receptive tests, yet participants in the productive group had better performance on productive tests. The interesting finding, however, was that the third group with combined tasks demonstrated the optimal learning. Likewise, Shahbazy and Sadegh Oghli (2015) compared the effect of using receptive and productive tasks on upper-intermediate Iranian EFL learners' vocabulary and reported the outperformance of the productive learning group compared with the receptive group although both groups showed improvement in vocabulary learning.

Furthermore, Webb (2009) studied the impacts of learning word pairs using receptive and productive techniques on vocabulary knowledge. The results revealed that the way of learning was a substantial factor in gaining the type and amount of knowledge. Findings showed that productive learning was more effective and it led to more extensive improvement in productive knowledge of meaning, syntax, and grammatical functions as well as both receptive and productive knowledge of orthography. In another study, Webb (2009) recruited 71 Japanese university-level EFL students to learn 15 L2 nonsense words paired with a meaningful Japanese L1 translation. Students were divided into a receptive group (that saw the L2 word and tried to learn the Japanese L1 meaning) and a productive group (that saw the Japanese L1 meaning and tried to learn the new L2 word). Students practiced learning L2 words

and their translations by covering the list of L2 words and trying to remember their translation equivalents. Both groups had 6 minutes to learn the words and then they were assessed receptively and productively. At first, 30 sentences were shown to the students and each of the 15 'words' occurred in two English sentences, and they were asked to say the meaning of each sentence in Japanese. Then, as a second receptive knowledge task, students were asked to identify if each sentence was true or false, requiring an understanding of the key nonsense word. To reduce the effect of guessing and receiving a correct score, students had to give the right answers to both sentences including a specific nonsense word. These tasks, in fact, were measures of vocabulary learning; also, 15 pictures were provided for all students asked to write a sentence in English using one of the new words (a productive knowledge task using writing).

Moreover, Hashemi Shahraki, and Kassaian (2011) investigated the effects of receptive and productive learning tasks on vocabulary acquisition. Findings revealed that the negotiated interaction significantly outperformed the other two groups in acquiring receptive and productive vocabulary. The results also revealed that the productive learning group achieved a higher level of vocabulary than the receptive learning group. Moreover, the outcomes indicated that higher levels of receptive vocabulary, compared with productive vocabulary, were obtained by all groups. This study concluded that students' interaction and their productive use of vocabulary were more effective in acquiring vocabulary.

Yet, little research, if any, has been carried out to examine these two vocabulary learning strategies in the field of medical sciences. Thus, the present study was carried out to examine which strategy (receptive or productive) to learn medical terminology and vocabulary would be more effective in improving medical reading comprehension.

3. Methodology

3.1. Participants

The participants in the present study were 70 (36 male and 34 female) medical students at Shahid Beheshti University of Medical Sciences, Tehran, Iran. They were between 19-22 years old. The participants signed the consent form and were then randomly divided into two experimental and control groups. They were selected from among 160 applicants through a Quick Placement Test (QPT) based on their scores. The QPT was used to determine the level of the participants' overall English proficiency so as to homogenize them. According to the results, the scores ranged between 31-40, meaning that the proficiency of final participants was upper intermediate, i.e. B2, according to the QPT instructions.

3.2. Materials and Procedure

The students first took a pre-test on medical terminology and vocabulary as well as reading comprehension. The terminologies and vocabularies were chosen from "Medical Terminology Systems" (2009) to examine the level of medical terminology and vocabulary knowledge, and the reading texts were selected from specialized medical books to examine participants' proficiency in medical comprehension. The test was previously piloted on 35 identical students, obtaining an acceptable reliability index of 0.79.

After making sure about the homogeneity of the participants, they were randomly divided into two groups of experimental (n= 35) and control (n= 35). The experimental group received a 10-session treatment by one of the researchers, a professor in English Language Teaching, during which they were taught medical vocabulary and terminology productively in 90-minute classes. Accordingly, these students were taught 50 medical vocabularies and terminologies, selected from the "Medical Terminology System" book, by making sentences, telling definitions, reading text, and talking about the topic.

Meanwhile, participants in the control group were taught medical vocabulary and terminology receptively in 10 sessions. They were taught the same medical vocabularies and terminologies by looking at their translations, reading text, answering multiple-choice questions, and filling the blank items. At the end of the 10 teaching sessions, the post-test of medical reading comprehension was administered.

3.3. Data Analysis

SPSS (v. 19) was used to analyze the data. Two paired-samples t-tests were used to compare participants' pre- and post-test scores. Also, two independent-samples t-tests were run to compare the means of experimental and control groups on the post-test with the p-value set at 0.5. Moreover, an ANOVA was run to determine the effect of participants' gender and age. The study was approved by the Ethical Committee at the School of Medicine, Shahid Beheshti University of Medical Science, Tehran, Iran (IR.SBMU. MSP.REC.1396.374).

4. Results

Table 1 provides a comparative list of the scores of the two groups on the four tests. Also, the descriptive statistics (including means, standard deviation, and confidence interval) for the scores of medical reading comprehension, general medical vocabulary, and terminology tests are given in Table 1.

The results showed that both experimental and control groups demonstrated significantly higher scores after learning the vocabularies and medical terminologies receptively and productively.

Table 1

Comparison of pre- and post-test learning scores in total and both experimental and control groups

Scores	**Total groups**				
	Mean (SD)	**t**	**df**	**95% CI**	**P**
Pre-test total	31.5 (7.46)	-6.39	69	-13.15_-6.90	<0.001
Post-test total	41.6 (10.94)				
Pre-test general medical vocabulary	19.3 (7.15)	-5.69	69	-9.58_-4.61	<0.001
Post-test general medical vocabulary	26.4 (7.58)				
Pre-test medical terminology	6.3 (1.81)	-4.02	69	-2.39_-0.80	<0.001
Post-test medical terminology	7.9 (2.83)				
Pre-test reading comprehension	5.9 (1.66)	-2.95	69	-2.22_-0.43	0.004
Post-test reading comprehension	7.2 (3.4)				

Table 2 illustrates the descriptive statistics and the results of comparing participants' pre-test and post-test scores in the control group. It is evident that the control group obtained good results in the post-test.

Table 2

Participants' learning scores on pre-test and post-test in the control group

	Control group				
	Mean (SD)	**t**	**df**	**95% CI**	**P**
Pre-test total	31.2 (4.12)	-2.87	34	-10.91_-1.88	0.007
Post-test total	37.6 (11.61)				
Pre-test general medical vocabulary	19.2 (3.14)	-2.97	34	-7.01_-1.32	0.005
Post-test general medical vocabulary	23.4 (7.79)				
Pre-test medical terminology	6.2 (1.48)	-1.89	34	-2.37_0.85	0.06
Post-test medical terminology	7.4 (3.07)				
Pre-test reading comprehension	5.7 (1.29)	-1.50	34	-2.55_0.38	0.14
Post-test reading comprehension	6.8 (3.93)				

As shown in Table 2, the control group had different performances on medical vocabulary, terminology, and reading comprehension tests in the pre-test and the post-test. In other words, receptive learning of medical vocabulary and terminology had a positive effect on medical students' reading comprehension skill.

Table 3 compares the results obtained from descriptive statistics of the experimental group. Paired-samples t-tests were used to analyze the performance of the experimental group before and after the treatment, i.e. productive learning of medical vocabulary and terminology.

Table 3

Comparison of the results of learning scores in the experimental group

	Experiment group				
	Mean (SD)	**t**	**df**	**95% CI**	**P**
Pre-test total	31.8 (9.79)	-6.62	34	-17.84_-9.46	<0.001
Post-test total	45.5 (8.74)				
Pre-test general medical vocabulary	19.3 (9.69)	-5.10	34	-14.01_-6.04	<0.001
Post-test general medical vocabulary	29.4 (6.14)				
Pre-test medical terminology	6.3 (2.11)	-4	34	-3.10_-1.01	<0.001
Post-test medical terminology	8.4 (2.52)				
Pre-test reading comprehension	6.1 (1.96)	-2.87	34	-2.68_-0.45	0.007
Post-test reading comprehension	7.7 (2.92)				

As shown in Table 3, the experimental group demonstrated a positive correlation between the pre-test and the post-test on productive medical vocabulary and terminology learning.

Moreover, an ANOVA was run to check if participants from different age groups had any significant difference in total scores. The ANOVA revealed no significant differences between different ages ($P>0.05$). Mean and SD scores based on age groups in total participants are illustrated in Table 4.

Table 4

Participants' learning scores in experiment and control group based on different ages

Variables	**Age**			
	19	20	21	22
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Pre-test total	28.9 (7.62)	31.6 (7.43)	34 (6.94)	33.3 (9.71)
Post-test total	43 (13.29)	40.1 (9.57)	44.1 (15.02)	50 (1.73)
Pre-test general medical vocabulary	16.6 (7.19)	19.5 (7.10)	20 (2.55)	23.6 (6.02)
Post-test general medical vocabulary	28.5 (8.4)	25.2 (6.70)	28.3 (10.81)	31 (2)
Pre-test medical terminology	6.6 (1.92)	6.2 (1.75)	6.8 (1.9)	4.6 (1.52)
Post-test medical terminology	8 (3.10)	7.4 (2.86)	9.2 (2.33)	10
Pre-test reading comprehension	5.5 (0.45)	5.8 (1.65)	7.1 (1.16)	5 (2.64)
Post-test reading comprehension	6.5 (3.57)	7.5 (3.48)	6.5 (3.87)	9 (1)

Also, an independent-samples t-test was run to show if there was a statistically significant difference in the mean scores between males and females.

Table 5

Difference in the mean (SD) learning scores of males and females in the pre-test

	Female	**Male**				
	Mean (SD)	**Mean (SD)**	**t**	**df**	**95% CI**	**P**
Pre-test, sum	30.9 (7.28)	32.1 (7.68)	-0.71	68	-4.85_2.29	0.47
Pre-test general medical vocabulary	18.2 (7.13)	20.3 (7.11)	-1.26	68	-5.55_1.24	0.21
Pre-test medical terminology	6.7 (1.92)	5.8 (1.61)	1.99	68	0_1.69	0.05
Pre-test reading comprehension	5.9 (1.80)	5.9 (1.54)	0.06	68	-0.77_0.82	0.94
Post-test, sum	43 (11.92)	40.2 (9.92)	1.06	68	-2.44_7.99	0.29

Table 6

Difference in the mean (SD) scores of males and females in the post-test

	Female	**Male**				
	Mean (SD)	**Mean (SD)**	**t**	**df**	**95% CI**	**P**
Post-test, sum	43 (11.92)	40.2 (9.92)	1.06	68	-2.44_7.99	0.29
Post-test general medical vocabulary	26.6 (8.26)	26.2 (7)	0.21	68	-3.25_4.04	0.82
Post-test medical terminology	8.6 (2.71)	7.1 (2.79)	2.29	68	0.19_2.82	0.02
Post-test reading comprehension	7.7 (3.52)	6.8 (3.41)	1.05	68	-0.78_2.53	0.29

Tables 5 and 6 show that there was no significant difference in the scores of male and females, except that females obtained higher scores in the medical terminology post-test compared with their male counterparts (9.6± 2.25 VS. 7.1± 2.17, P=0.002).

4.1. Writing Test

In order to understand the possible difference in the effects of the two methods of productive and receptive vocabulary teaching on the participants' actual language production, all the students in the two groups were invited to write a short report answering the following subject two weeks after the final session: "Think of a friend or a family member who was recently sick and imagine she/he referred to you as a Family Doctor. Write a brief report on the procedure(s) you went through to diagnose and treat her/his disease."

A total of 70 writings (35 per group) were received and submitted to the Web-based Lextutor on-line analysis tool (Lextutor.ca). This is a powerful online tool for teaching and learning English vocabulary. It emphasizes the primacy of vocabulary by providing applications for testing, improving, and researching vocabulary learning and it can be helpful in the analysis of the word compositions in a corpus through categorizing words into GSL (General Service List), West (1953), AWL (Academic Word List), Coxhead (2000), and off-list words.

Firstly, all writings were collected and read by two authors of the study for grammatical errors and incorrect vocabulary use. All such sentences were removed. Then, all the writings were combined into one document and then all data were incorporated into the on-line Lextutor analysis tool, the vocabulary profile section; the results appeared in an MS Excel document.

The prime list includes 1000 words which are the most frequent words of English, the second list includes the second 1000 most frequent words, and the third includes words which are not in the first 2000 words of English but are frequent in upper secondary school and university texts from an extensive range of subjects. Also, the fourth list shows medical terminologies and vocabularies which were used in this research and the last is the list of words which do not belong to any of the previous base lists.

Table 7 presents a complete picture of the three available word lists regarding word families, tokens, and types. According to Table 7, the reports in the productive group consist of 818 word families. By definition, a word family is the base form of a word that might appear as a headword in a dictionary, together with all its derived and inflected forms. From among these 818 word families, 576 word families are related to word list one (K1 words), 128 word families belong to word list two (K2 words), and 114 word families are related to the list of academic words.

Table 7

Types, tokens, and families of words used in student's written papers in productive group

WORD LIST	**Families**	**Types**	**Tokens**	**Percent**
K1 Words (1-1000)	576	778	4106	**74.28%**
K2 Words (1001-2000)	128	164	374	**6.77%**
Academic words	114	150	268	**4.85%**
Medical Terminologies	…….	86	344	**6.22%**
Off-List Words	…….	282	436	**7.89%**
Total	818	1460	5528	**100%**

Table 7 also illustrates a type and token analysis. A token is defined as any occurrence of a word form in the text, regardless of whether it is occurring for the first or the n^{th} time. As shown in this Table, 4106 of running words are in word list one, which makes up 74.28% of the total words in the text. Also, 374 words are in word list two that comprises 6.77% of the running words in the text. Here, 268 words (4.85% of total words) belong to the academic word list, then 344 words belong to the medical terminology list that makes up 6.22% of total running words in the productive group texts, and 436 words belong to off-list words with 7.89% of the total words, which are not included as they may present words with spelling errors.

As for the type, or any word regardless of how many times it has occurred, Table 1 indicates that there are 1460 word forms in participants' texts in the productive group. Among these 1464 word forms, 778 of them belong to word list one (K1 words). In turn, 164 word forms are in the academic word list, 86 word forms are in the medical terminology list, and 282 word forms do not belong to any of these four lists.

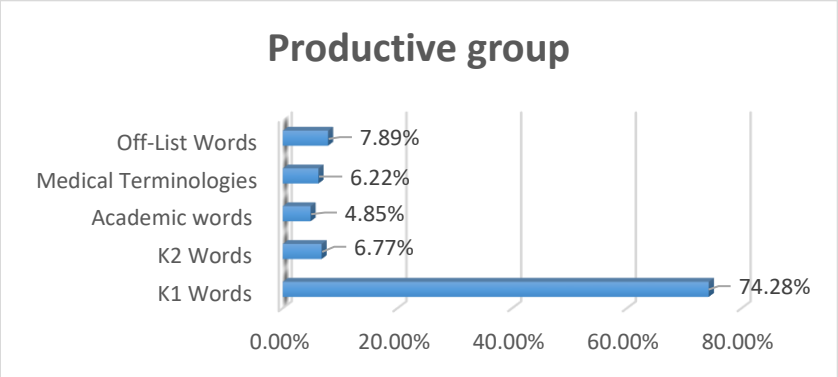

Figure 1. The percentage of the words used in the productive group

Figure 1 shows that the productive group adequately uses words that belong to word list one (K1 words). Moreover, this figure shows that words belonging to word list two (K2 words), the academic word list, and medical terminologies are used more by this group. In other words, it seems that the participants are more familiar with the first 1000 most frequent words compared with the second 1000 high frequency words, the academic word list, and the medical terminology list. The last list presents words that do not belong to any of the other word lists and they are mostly the words with spelling errors.

Table 8

Types, tokens, and families of words used in students' texts in the receptive group

WORD LIST	**Families**	**Types**	**Tokens**	**Percent**
K1 Words (1-1000)	476	612	2480	**71.63%**
K2 Words (1001-2000)	118	144	278	**8.03%**
Academic words	74	82	148	**4.27%**
Medical Terminologies	…….	40	200	**5.78%**
Off-List Words	…….	278	356	**10.28%**
Total	668	1156	3462	**100%**

Table 8 also shows that 3462 words (tokens) exist in the receptive group's texts. Out of this number, 2480 words which make up 71.63% of the words are in word list one (K1 words), 278 words (8.03%) are in word list two (K2 words), 148 words (4.27%) are in the list of academic words, and 200 words (5.78%) are in the list of medical terminologies. Furthermore, 356 words do not belong to any of the four word lists, which comprise 10.28% of all texts.

As for the types, there are 1156 word forms at this stage, out of which 612 belong to word list one (K1 words), 144 word forms are in word list two (K2 words), 82 word forms are in academic word list, and 40 word forms belong to the list of medical terminologies. The rest, i.e. 278 word forms, are not in the lists.

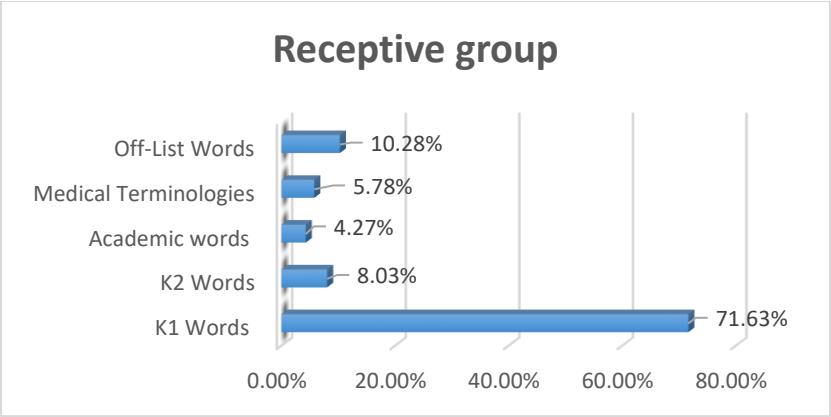

Figure 2. The percentage of the words used in the receptive group

As figure 2 depicts, the results of the receptive group are almost similar to those of the productive group, since the receptive group used more words from word list one (K1 words) compared with other word lists. However, some changes are observed in the usage of words from word list two (K2 words), academic words, medical terminologies, and off-list words.

4.2. Overall results from receptive and productive groups

According to the results, all word lists have been utilized by each group approximately at the same level. It is inferred that both receptive and productive groups were at the same vocabulary level of competence. However, findings illustrate some changes in the usages of words from word list two, academic words, medical terminologies, and off-list words. Also, according to the results, students attending the productive group possessed and used academic words and medical terminologies slightly more than the receptive group when they wrote reports. It may, therefore, be concluded that students in the productive

group added to their academic vocabularies and medical terminologies slightly more than the receptive group through the treatment.

5. Discussion and Conclusion

The analysis of the findings indicated that both receptive and productive learning of medical terminologies and vocabularies had positive effects on the medical students' reading comprehension skill at the School of Medicine. This was proved by comparing the mean scores obtained by the experimental and control groups in the post-test. Moreover, it was found that the performance of the participants in both productive and receptive groups improved in the post-tests, whereas the pre-test scores did not reveal any statistical difference between the two groups. This can be concluded as both control and experimental groups had nearly the same vocabulary knowledge at the onset of the study.

The results of the pre-test indicated that both participants of the control and experimental groups had higher scores on the post-test of general medical vocabulary, medical terminology, and reading comprehension; however, considering medical terminology knowledge, female participants outperformed male participants, a condition that changed in the post-test to the benefit of males. In addition, the ANOVA showed that there was no significant difference in control and experimental groups' total scores between different age groups.

The results of the present study are, however, in contrast to some of the previous studies. Hashemi Sharaki and Kassasian (2011) investigated the effects of receptive and productive learning tasks on vocabulary acquisition. They found that productive learning was more effective than receptive learning in both developing productive knowledge and producing larger gains in receptive knowledge. This finding also accords with Mezynskis' (1983) observations. They showed that productive tasks were possibly more effective than receptive tasks in improving comprehension. The reason for the different findings may be due to the fact that the learners were involved more with the productive task than the receptive task.

On the other hand, Rahimi Esfahani, Biria, and Haghverdi (2012), who studied the effect of incidental receptive and productive learning tasks on reading comprehension, concluded that learners in low intermediate and high intermediate groups who were taught the vocabularies productively performed significantly better than the receptive participants on the writing test. However, they also found that receptive vocabulary learning could be more useful in the comprehension of a text and productive learning was more beneficial in the improvement of participants' use of the words taught in writing,

which is partly in agreement with findings of the present study and also consistent with those reported by Falahi and Moinzadeh (2012) who found that the students in the productive group had better performance on the productive test than on the receptive post-test.

Whereas the earlier findings have showed that receptive learning is more effective to lead to receptive knowledge and productive learning might be more suitable in order to increase productive knowledge (e.g. Griffin & Harley, 1996, Stoddared, 1929), according to Webb (2005), who studied the effects of receptive and productive vocabulary learning, both tasks showed the high-efficiency in achieving receptive and productive knowledge of all aspects, which confirms the findings of the present study. Furthermore, Webb's (2005) study revealed that when the same amount of time was spent on both tasks, the receptive task was performed greater, but whenever the allocated time to tasks concerned the time required for completion, considering the fact that the productive task naturally requires more time, the productive task proved to be more effective.

In another investigation into word pairs, Webb (2009) used an innovative methodology according to which each target word was tested in ten different ways. According to the results of this study, what affected the type and amount of knowledge acquired by the participants was the direction of learning. Also, productive learning was observed to be more effective and it led to more extensive improvement in productive knowledge of meaning, syntax, and grammatical functions as well as both receptive and productive knowledge of orthography. In contrast, receptive learning resulted in better acquisition of receptive knowledge of meaning. The outcomes propose that productive learning of word pairs might be more effective when only one method is used.

Yet, in another study on word pairs, Webb (2009) inspected the impact of learning simple L2-L1 word pairs during a pre-reading and pre-writing activity. He attempted to understand whether these activities would result in better reading comprehension and writing development. The findings illustrated that the receptive group which learned L2 to L1 translation pairs comprehended 25 of 30 sentences correctly. Moreover, it was shown that learning these word pairs led to correct true/false statements for 11 out of the 15 words. The results revealed that the receptive group crucially outperformed those participants who did the translation-pair productive learning task (saw the L1 Japanese word and remembered the new L2 word). The productive group also understood 23 sentences correctly (out of 30 sentences) and could respond correctly to 9.5 (out of 15) items on the true-false test. Overall, the results of the study indicated that receptive tasks could be more impressive when the object of learning is

improving comprehension, and productive learning may be more effective in improving speaking and writing skills.

On the basis of the results of the present study, there was not any significant difference between productive and receptive learning of medical vocabularies and terminologies in reading comprehension of medical texts. Thus, this finding is in agreement with Webb's (2005) findings which showed a positive correlation between both receptive and productive tasks In other words, the findings of the present study are partly in agreement with those reported by Webb (2009) and Rahimi Esfahani et al (2012).

6. Limitations and Further Research

The present study was conducted on a small sample size of medical students and the results may not be generalized to other or larger sample sizes. On the other hand, the time spent on completing all the exercises in the two receptive and productive groups was not controlled and, in fact, the productive group spent a little more time on completing the exercises compared with the receptive group. Moreover, the participants in both groups made frequent grammatical mistakes when using target items in their writing reports. In this sense, evaluating students' productive knowledge by writing a report using the target items may not be an ideal method.

Further studies may focus on other dimensions of language learning, including grammar and pronunciation, by students of other medical areas, like nursing, because of the significance of communication with English-speaking patients attached to their field of study.

Conflict of interest

Authors declare no conflict of interests.

References

Ashrafzadeh, A., Don, Z. M., & Meshkat, M. (2015). The effect of familiarity with content knowledge on Iranian medical students' performance in reading comprehension texts: A comparative study of medical and TEFL students. *Journal of Language Teaching and Research*, *6*(3), 524-534.

Behzadi, A., & Nezhad, G. R. H. P. (2014). The effect of two task types on learning English words and idioms. *International Journal of English Language and Literature Studies*, *3*(1), 12-20.

Coxhead, A. (2000). A new academic word list. *TESOL Quarterly, 34*, 213-238.http://dx.doi.org/10.2307/3587951

Esfahani, F. R., Biria, R., & Haghverdi, H. R. (2012). Effects of incidental L2 vocabulary learning tasks on communicative knowledge of Iranian EFL learners with different proficiency levels. *World Applied Sciences Journal*, *17*(3), 400-406.

Falahi, M., & Moinzadeh, A. (2012). Effects of receptive and productive tasks on Iranian EFL students' learning of verb-noun collocations. *Journal of Language Teaching & Research*, *3*(5).

Grabe, W., & Stoller, F.L. (2001). *Teaching and researching reading*. Longman.

Griffin, G. F., & Harley, T. A. (1996). List learning of second language vocabulary. *Applied Psycholinguistics*, 17, 443-460.

Laufer, B. (1997). The lexical plight in second language reading: Words you don't know, words you think you know, and words you can't guess. In J. Coady. & T. Huckin (Eds.), *Second language vocabulary acquisition* (pp. 20-34). Cambridge University Press.

Laufer, B., Elder, C., Hill, K. and Congdon P., 2004. Size and strength: Do we need both to measure vocabulary knowledge? Language Testing, vol.21, pp. 202-226.

Laufer, B., and Goldstein Z., 2004. Testing vocabulary knowledge: Size, strength and computer adaptiveness. *Language Learning*, vol.54, no.3, pp. 399-436.

Malmström, H., Pecorari, D., & Warnby, M. (2023). Teachers' receptive and productive vocabulary sizes in English-medium instruction. *Journal of Multilingual and Multicultural Development*, 1–19. https://doi.org/10.1080/01434632.2023.2260781

Mesbah, M. (2016). Task-based language teaching and its effect on medical students' reading comprehension. *Theory and Practice in Language Studies*, *6*(2), 431.

Mezynski, K. (1983). Issues concerning the acquisition of knowledge: Effects of vocabulary training on reading comprehension. *Review of Educational Research*, 53, 253-279.

Moghadam, Z. S., Moghadam, F. S., Zarein-Dolab, S., Zarifi, V., & Roozbehi, A. (2016). The effectiveness of cooperative learning in teaching English for specific purposes to the students of nursing regarding pronunciation. *Educational Research in Medical Sciences Journal*, *5*(1), 9-15.

Mondria, J. A. & Wiersma, B. (2004). Receptive, productive, and receptive + productive L2 vocabulary learning: What difference does it make? In P. Bogaards & B. Laufer (Eds.), *Vocabulary in a second language: selection, acquisition, and testing* (pp. 79-100). John Benjamins.

Nation, I.S.P. (2001). *Learning vocabulary in another language*. Cambridge University Press.

Priebe, S. J., Keenan, M., & Miller, A. C. (2011). How prior knowledge affects word identification and comprehension, *Reading and Writing*, 7(1), 581-586. DOI: 10.1007/s11145-010-9260-0

Qian, D. (2002). Investigating the relationship between vocabulary knowledge and academic reading performance: an assessment perspective. *Language Learning*, 52, 513-36.

Rashidi, N., & Khosravi, N. (2010). Assessing the role of depth and breadth of vocabulary knowledge in reading comprehension of Iranian EFL learners. *Journal of pan-pacific association of applied linguistics*, *14*(1), 81-108.

Schmitt, N. (2004). *Vocabulary in language teaching. 4th ed*. Cambridge University Press.

Stahl, S. (2003). Vocabulary and readability: How knowing word meanings affects comprehension. *Topic in Language Disorder, 23*(3), 241-247.

Schmitt, N., 2010. *Researching vocabulary: A vocabulary research manual.* Palgrave Macmillan.

Schneider, V. I., Healy, A. F. & Bourne, L. E., Jr. (2002). "What is learned under difficult conditions is hard to forget: Contextual interference effects in foreign vocabulary acquisition, retention and transfer". *Journal of Memory and Language*, 46, 419-440.

Shahbazy, G., & Oghli, H. S. (2015). A comparative study of using receptive and productive tasks on the vocabulary development of upper-intermediate Iranian EFL learners. *Studies in English Language Teaching*, *3*(2), 153.

Shahraki, S. H., & Kassaian, Z. (2011). Effects of learner interaction, receptive and productive learning tasks on vocabulary acquisition: An Iranian case. *Procedia-Social and Behavioral Sciences*, *15*, 2165-2171.

Stoddard, G. D. (1929). An experiment in verbal learning. *Journal of Educational Psychology*, 20, 452-457.

Soleimani, H. & Mahmoudabadi, Z. (2014). The Impact of Interactive Output Tasks on Developing Vocabulary Knowledge of Iranian EFL Learners. *Iranian Journal of Applied Linguistics (IJAL)*, 17(2), 93-113.

Webb, S. (2005). Receptive and productive vocabulary learning: The effects of reading and writing on word knowledge. *Studies in Second Language Acquisition*, 27, 33-52.

Webb, S. (2009). The effects of receptive and productive learning of word pairs on vocabulary knowledge. *RELC journal*, *40*(3), 360-376.

West, M. (1953). *A general service list of English words*. Longman.

Willis, D., & Willis, J. (2007). *Doing task-based teaching*. Oxford University Press.

Younesi, H. & Tajeddin, Z. (2014). Effects of structured input and meaningful output on EFL learners' acquisition of nominal clauses. *Iranian Journal of Applied Linguistics (IJAL)*, 17(2) ,145-167.