

Effects of Spaced Versus Massed Practice on EFL learners' Vocabulary learning

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Abstract

The effectiveness of massed and spaced practice in second/foreign language learning is still an issue of debate. Moreover, few studies have probed the possible effect of spaced practice on EFL learners' vocabulary learning. The present study, therefore, aims at investigating the effectiveness of spaced practice and massed practice on vocabulary learning in authentic EFL classroom settings at tertiary level. The study also explores learners' perceptions of using the spaced practice in vocabulary learning. To do so, 66 Saudi EFL learners were selected among 86 students based on the results of Oxford Quick Placement Test. The selected participants were then non-randomly divided into two equal experimental groups; spaced group and massed group. With these aims, both groups were taught the meaning of 50 new words in a massed learning condition and in a spaced learning condition. The massed group had one intensive session on learning the target vocabulary and the spaced distribution group had three sessions at irregular time intervals. Data collection instruments were Oxford Quick Placement Test, two vocabulary tests (pre-test and post-test), and questionnaires. The obtained results revealed that there was a significant difference between the post-tests of spaced and massed groups. The findings indicated that the spaced group significantly outperformed the massed group ($p < .05$) on the post-test. The results revealed that the students perceived spaced practice to be more effective than massed practice. The results indicate that the spaced group had positive perceptions toward the use of the spaced practice in vocabulary learning. In addition to further results, implications for second language acquisition and vocabulary learning theory, and English as a foreign language pedagogy are presented.

Keywords

EFL vocabulary learning, spaced practice, massed practice, perceptions

Introduction

No one can deny the pivotal role played by vocabulary in foreign language learning. vocabulary is one of the most fundamental and significant components for foreign and second language comprehensibility. It is necessary in the sense that words are the basic building blocks of language, the unit of meaning from which larger structures such as sentences, paragraphs and whole texts are formed (Goossens et al., 2012). Vocabulary also plays a vital role in the mastery and use of language skills. It links the four skills of speaking, listening, reading and writing all together. Language skills cannot be acquired and proceed appropriately without vocabulary acquisition (Ghanbari, Esmaili and Shamsaddini, 2015). Success in communication depends on how well students acquire and retain vocabulary. As claimed by Alenezi (2016), knowing vocabulary is considered useful for language students. He stated that students with more knowledge of vocabulary are more proficient in language study than those with less knowledge. Similarly, Schuetze (2015) has argued that the acquisition of an adequate vocabulary is essential for successful second language learners because without an extensive vocabulary, they will be unable to use the structures and functions they may have learned for comprehensible communication. The same idea was adopted by Wilkins (1972) who argued that: "without grammar little can be conveyed, without vocabulary nothing can be conveyed." Therefore, learning a language depends on learning its vocabulary. In order to communicate

well in a foreign language, students should acquire an adequate number of words and should know how to use them accurately. The more vocabulary one knows or acquires, the better more sentences they could create. If people have less vocabulary, they not only cannot understand other's saying, but also cannot make sentences to transfer their messages to the other people. Thus, they will understand English expressions if they have enough vocabularies.

Mastering vocabulary is very important for the students who learn English as a foreign language. Students often recognize its importance to their language learning since they feel that it is necessary to understand and communicate with others in English. They learn them to build their knowledge of words and phrases and helping them in enhancing their English knowledge and use. Nasri and Biria (2017) argue that the acquisition of an adequate vocabulary is essential for successful second and foreign language use because, without an extensive, learners will be unable to use structures and functions.

Despite of the fundamental role played by vocabulary in the mastery of language skills, Many EFL learners consider the retention of vocabulary as one of the most difficult aspects of learning a foreign language. They see vocabulary learning as boring, as they have to memorize unfamiliar words (Stoltzfus & Sukseemuang, 2018) and are typically asked to complete lots of exercises. Learners find it hard to engage in such rote learning of vocabulary activities. They find that the remembered words fade from their mind soon and frequently. In addition to this, most of foreign language teachers have become discouraged regarding their role in enhancing education consequences due to forgetting much of the prior learned vocabulary by the learner (Carpenter, Cepeda, Rohrer, Kang, and Pashler, 2012). Thus, it is obscure for many EFL teachers and learners, whether presenting and studying material across two or more sessions that are separated in time (i.e. spaced distribution instruction) can result in better learning than spending the same amount of time in a single session with no interruption in between, that is, massed distribution instruction (Miles, 2014; Namaziandost & Nasri, 2019).

The question here is whether spacing techniques will benefit vocabulary learning in EFL classes. This research question seems very important because it does make a relevant practical contribution to the literature, instead of a more fundamental theoretical contribution. Given the vast body of literature on distributed practice effects, people may wonder why it is important to use spacing effect studies in EFL vocabulary learning in real educational settings with EFL learners. First, developing useful vocabulary is fundamental for learning an FL especially at the freshmen levels (Goossens et al., 2012). Second, teaching needs to include word review in intervals and different vocabulary learning activities (Nasri & Biria, 2017). Third, a number of studies highlighted the significant role of spacing in vocabulary learning (e.g. Kornell, 2009). Moreover, doing long-term spacing effect studies in real educational settings provides the opportunity to determine the magnitude of the spacing effect. Fourth, decades of laboratory-based psychological research demonstrated the robustness of spacing in vocabulary learning with adults (Cepeda et al., 2006). Additional studies are needed to demonstrate the robustness of spacing effect in word learning with EFL learners (Sobel, Cepeda, and Kapler, 2011).

A review of the relevant literature shows that in fact only three studies have examined the spacing effect and its impact on vocabulary learning in authentic classroom settings, namely, Sobel, Cepeda, and Kapler (2011), Goossens et al., (2012) and Schuetze (2015). It should be noted that Sobel et al. (2011) investigated the effect of spaced repetitions on L1 English vocabulary learning by young children, while only Goossens et al. (2012) and Schuetze (2015) examined the effect of spaced repetitions on L2 vocabulary learning. Sobel et al. (2011) examined the difference between spaced practice and massed practice on vocabulary retention

among fifth-grade primary school students in an Ontario middle school. The study reported that retention of spaced vocabulary was three times higher than retention of massed vocabulary. Goossens et al. (2012) examined the difference between spacing and massing vocabulary in learning sessions among third-grade L1 Dutch primary school students learning EFL. The results indicated better performance for vocabulary learned in the spaced condition. Finally, Schuetze (2015) compared the impact of two types of spacing (i.e., equal distribution and expanding distribution of spacing). In two studies, the two spacing methods were examined in learning vocabulary of German as a foreign language at university level. The results of these studies did not reveal a statistically significant difference between the two spacing methods. However, there was an increase in the retention score in the second study due to increasing the number of repetitions from three to four repetitions.

In the meantime, one of the polemical and challenging issues in teaching vocabulary to second/foreign language learners is that some researchers have interrogated the concept of spaced distribution instruction supremacy over massed distribution instruction (Nasri & Biria, 2017; Serrano & Munoz, 2007; Stoltzfus & Sukseemuang, 2018). Furthermore, although the spacing impact has been well investigated and checked for second/foreign grammar learning and language skills (Mashhadi et al., 2017; Namaziandost, Hashemifardnia, & Rahimi Esfahani, 2018), few studies have been carried out to check its feasible allotment to vocabulary learning, particularly in EFL contexts. Accordingly, Miles (2014) suggested that, at least with respects to vocabulary instruction, the issue of massed vs. spaced distribution instruction has remained unresolved and therefore further researches should investigate this issue. A quasi-experimental pre-test, post-test study was conducted on the impact of spaced distribution instruction on the development of new words versus massed distribution instruction.

Statement of the research problem

The role of vocabulary in learning a foreign language is inevitable. Vocabulary plays a prominent role in efficacious communication and has long been recognized as an essential component of mastering a foreign language (Goossens et al., 2012). Although teachers are aware of the importance of vocabulary knowledge in the mastery of language skills the mastery of language skills, some studies have shown that only a small amount of the teaching time is devoted to vocabulary learning (e.g., Kornell, 2009). Furthermore, the time spent on vocabulary learning is not always used effectively. For example, teachers may instruct their students to only memorize word definitions from dictionaries, even though this has been shown to be ineffective (Cepeda et al., 2008). In addition to this, many researchers report that students' limited vocabulary has been the main problem for students in learning English in EFL context (Alhatmi, 2012; Al Fotais, 2012; Alenezi, 2016). It was found that there is a poor and insufficient vocabulary knowledge among Saudi EFL learners. Based upon the researcher's observation, it has been noted that many Saudi EFL learners recognize vocabulary learning as one of the most common problems in EFL learning. They have unpleasant memories of learning vocabulary. For example, EFL learners face difficulties to learn and to remember new words. They feel that learning EFL vocabulary is a difficult and daunting task because of the great number of the words to be learned and the little time at their disposal. Moreover, many foreign language teachers have become discouraged regarding their role in enhancing education consequences due to forgetting much of the prior learned vocabulary by the learner (Carpenter, Cepeda, Rohrer, Kang, and Pashler, 2012). As a result, some studies have examined some of the possible reasons behind poor vocabulary knowledge among Saudi EFL learners. Different investigations revealed factors including: insufficient use of vocabulary learning strategies (Al-Shuwairekh, 2001; Alyami, 2011; Alhatmi, 2012), ineffective vocabulary instruction in the classroom (Alhaidari, 2006), poor vocabulary input in textbooks (Al Fotais, 2012; Alenezi,

2016), limited vocabulary knowledge of English language teachers, lack of vocabulary exposure outside the classroom (Alsaif, 2011) and insufficient vocabulary recycling or repetition in textbooks (Al Fotais, 2012).

Furthermore, some studies suggested a number of recommendations for tackling the issue of poor and insufficient vocabulary knowledge among Saudi EFL learners, such as training learners to be independent and autonomous (Al-Shuwairekh, 2001), training learners in effective vocabulary learning strategies (Alhatmi, 2012), encouraging learners towards extracurricular activities involving English (Alyami, 2011), increasing vocabulary input in textbooks (Alsaif, 2011; Alenezi, 2016), regular short-term testing of vocabulary knowledge (Alharthi, 2012), and systematically recycling or repeating vocabulary in textbooks (Alsaif & Milton, 2012; Al Fotais, 2012).

However, what is not completely obvious for many EFL teachers and learners is whether presenting and studying new words across two or more sessions that are separated in time (i.e. spaced distribution instruction) can result in better learning than spending the same amount of time in a single session with no interruption in between, that is, massed distribution instruction (Miles, 2014; Namaziandost and Nasri, 2019; Hosseini, Nasri, & Afghari, 2017; Nation, 2013; Segalowitz, 2010). However, the scheduling of repetitions, which might be equally important and could have an impact on long-term vocabulary retention, has been neglected in language research. Nevertheless, a great deal of psychological research into the learning of many kinds of information supports the benefit of spacing. In cognitive psychology, learners have been found to retain information better when instruction/learning sessions are repeated over a period of time with lengthy intervals between each learning session (spaced practice), as opposed to massed or concentrated presentations in a single lengthy learning session (e.g., Toppino & Bloom, 2002; Seabrook et al., 2005).

Despite the copiousness of researches on spacing effect in cognitive psychology, it has been noted that there is a paucity of research about the effectiveness of spaced practice on vocabulary learning in EFL classrooms anywhere, not only in Saudi Arabia (Al Fotais, 2019). More specifically, few spacing effect studies have been conducted in actual classrooms in Saudi Arabia. Hence, the current study has considerable interest for FL vocabulary learning/teaching researchers in general, aside from teachers and researchers in Saudi Arabia. Results from Sobel et al. (2011), Goossens et al. (2012), and Schuetze (2015) are suggestive of the value of further examination of the phenomenon of the spacing effect and the role it could play in vocabulary learning in the EFL classroom. However, the investigation of this effect is clearly in need of further attention. This deficiency of research is specifically astonishing given the calls for further researches in this field. More broadly, the effect of spacing on learning words in context is less researched and the results, so far, are inconsistent. very few studies, to the best of the researcher's knowledge, have been done on the possible application of the spacing methodology to language vocabulary in real-world classroom settings, particularly in Saudi Arabia (Al Fotais, 2019; Sobel et al., 2011; Goossens et al. 2012 and Schuetze, 2015). In an attempt to help fill this gap in the literature, this study intended to investigate the effect of massed practice and spaced practice on foreign language vocabulary learning. Besides, the present study also tried to explore Saudi EFL students' perceptions towards the use of spaced distributed methodology (instruction). Consequently, it is hoped that the current study will make a valuable contribution to the field of learning and teaching of English as a foreign language in Saudi Arabia, in particular, and to the field of foreign and second language vocabulary acquisition in general.

Questions of the study

The present study aimed to answer the following research questions:

1. what is the effect of massed practice and spaced practice on Saudi EFL students' vocabulary learning?
2. From the above main question, the following sub-questions emerged:
3. Is there any statistically significant difference between the mean scores of the students of the massed group (those who were taught the target words in an intensive 90-minute session) and the spaced group (those who study the sets of words, presented three times, once every other day) in the vocabulary pre-test?
4. Is there any statistically significant difference between the mean scores of the students of the massed group in pre and post-test?
5. Is there any statistically significant difference between the mean scores of the students of the spaced group in pre and post-test?
6. Is there any statistically significant difference between the mean scores of the students of the massed group and of the students of the spaced group in the vocabulary post-test?

Methodology

The current study aims at comparing between the effectiveness of massed practice and spaced practice on vocabulary learning in authentic EFL classroom settings at tertiary level. The present study took place in two intact classrooms of first year EFL university students. The study was designed to fit into normal classroom time over a period of 10 weeks. The study introduced the learners to fifty items through one of two types of treatment (Spaced practice and massed practice). The 50 words in the spaced condition were divided into ten sets of five words, and each set was taught per week. In the treatment phase of the study, the massed distribution group was taught the target words in an intensive 90-minute session, while the spaced distribution group was taught in three short sessions (about 90 minutes. total). The first session lasts for 30 minutes; while the second occurred two days after the initial session (lasts 30 minutes); and the third session took 30 minutes and was held two days after the second session.

The instruction lasted 10 sessions. At the end of the instruction, the post-test was given to the participants of both experimental groups to measure the effects of the treatment on the students' vocabulary learning. The instruction lasted 10 sessions. At the end of the instruction, the post-test was given to the participants of both experimental groups to measure the effects of the treatment on the students' vocabulary learning.

Participants

The sixty-six participants took part in this research were selected among 84 Saudi students between the ages of 18 and 19 years old. They were chosen based on the results of an Oxford Quick Placement Test (OQPT). The English proficiency level of the participants was intermediate. The participants were male and they were native speakers of Arabic. To conduct the study, the participants were randomly assigned to two experimental groups; spaced distribution group (n = 33) and massed distribution group (n = 33).

The participants selected for the study were Saudi EFL university students for two reasons. First, previous studies that examined the effect of spaced practice on vocabulary learning in actual classroom settings were conducted in primary and secondary school classrooms. As such, the current study hoped to shed light on this issue at university level. Second, because the researcher holds a position as an assistant professor at Qassim University in KSA, it was

feasible to get permission for the study and to teach two intact classrooms of students without interrupting their actual university study program.

Instruments

Oxford Quick Placement Test (OQPT)

The first instrument which was utilized in the present study was the OQPT. This test was used to homogenize the participants. It helped the researcher to have a greater comprehension of what level (i.e. high, intermediate, low) his participants are at. This test has 60 multiple-choice items and based on it the learners whose scores are 40 to 47 are intermediate. Based on the results of this test, 66 intermediate learners were considered as the target participants of the present study.

Vocabulary pre-test

The second instrument for collecting the sufficient data to answer the first question of the study was a researcher-made vocabulary pre-test which was designed based on the students' text book. This test consisted of 50 multiple choice items. Internal validity of the items in the test was checked by five English experts. It was piloted on a similar group from another institute. It should be mentioned that the reliability of the pre-test was calculated through KR-21 formula as it was $r = .956$.

Vocabulary post-test

The third instrument which was used in this study to determine the impacts of the treatment on the participants' vocabulary was a researcher-made vocabulary post-test. The post-test was the modified version of the pre-test; the pre-test was used both as the pre-test and post-test of the study. There was a slight difference between pre and post-tests, that is, the order of options and questions was changed to avoid the students' recalling of pre-test answers. The validity of the post-test was confirmed by those who validated the pretest; and the reliability was computed through KR-21 formula as it was $r = .899$.

Questionnaire

The fourth instrument was a questionnaire which was intended to measure participants' perceived benefits for learning with, and engagement in using, spaced practice compared with massed practice. This questionnaire was intended to be administered at the end of the study (i.e., week 10). The questionnaire consists of 15 closed-ended items with an open-ended question at the end. The closed items each took the form of a statement responded to by using a scale from one to three (1: disagree, 2: neutral, 3: agree). This format consisting of statements with Likert scale responses is widely used in attitude research (Dörnyei & Taguchi, 2009) and seemed suitable for the purposes of this study.

Data collection procedure

After making the participants homogenous, their proficiency level of English vocabulary knowledge was measured by a vocabulary pre-test. Afterwards, the students in the experimental groups received the same treatment but in different way. The new words were taught to the experimental groups through spacing instruction and massed instruction. In massed class, the words were taught during 90 minutes to the students. In fact, 90 minutes was allocated to each session. In spacing class, 90 minutes were divided into three 30 minutes and each session lasted 30 minutes.

The spacing class was held three times a week but the massed class was held once a week.

In the treatment phase of the study, the massed distribution group was taught the target words in an intensive 90-minute session, while the spaced distribution group was taught in three short sessions (about 90 minutes total). The first session lasts for 30 minutes; while the second occurred two days after the initial session (lasts 30 minutes); and the third session took 30 minutes and was held two days after the second session. The instruction lasted 16 sessions. At the end of the instruction, the post-test was given to the participants of both experimental groups to measure the effects of the treatment on the students' vocabulary learning.

Data analysis

Prior to the start of the study, the OQPT and the pre-test were administered respectively. While the OQPT was utilized in the present study to homogenize the Participants, the pretest was administered to make sure whether the two groups had any background knowledge about the target words.

In order to answer the first research question, the researcher collected the sufficient data and employed SPSS (version 25) to analyze the obtained data in the present study. Then he used the mean and standard deviation to point out the differences between the performances of the two groups during the pretest. In order to analyze the collected data of the post-test quantitatively, the independent and paired samples t-tests were run to determine the differences between the two groups.

In order to answer the second research question, the spaced group students were asked to do a questionnaire after the treatment. The researcher adopts simple percentages and frequencies technique to present the results of the questionnaire. More specifically, the results obtained from students' questionnaire were tallied, and frequencies were changed into percentages. These results were analyzed and described in terms of words and numbers.

Results

It was stated above that 66 Saudi EFL learners were drawn from a larger pool of EFL learners as a result of their scores on the placement test, and were assigned to the two groups of Spaced Instruction Group and Massed Instruction Group. To further ascertain the homogeneity of the two groups in terms of their collocation knowledge before the treatment, their pretest scores were compared via an independent-samples t test.

Pre-test Results of speaking components between the spaced group and the massed group

Table 1 presents the descriptive statistics of all the two groups on the pre-tests. Based on the below table, the mean of Spaced Group on the pre-test is 17.85 and the mean of the Massed Group on the pre-test is 16.48. As it is shown in the table, all the two groups had almost an equal performance on the pre-tests. To see whether there are statistically significant differences between these mean scores of the two groups on the pretest or not, the researcher used the t-test (see Table 1).

Based on the information presented in Table 1., there was not a statistically significant difference in the pretest for Spaced group ($M = 17.85$, $SD = 3.801$), and massed group ($M = 16.48$, $SD = 3.411$), $T\text{-test} = 1.543$ ($\text{Sig.} = .397$). This conclusion was made since the p value was larger than the significance level ($p > .05$). Hence, it could be inferred that the learners in the two groups were at the same level of pretest. The pretest showed that the students did not have any prior knowledge about 50 stimuli words.

Table 1. An Independent T-test results for the comparison of pre-test scores between Spaced group and massed group in the vocabulary test prior to experimentation

Group	N.	Mean	Std. Deviation	T	DF	Sig.
Massed	33	16.48	3.411	1.543	64	.397
Spaced	33	17.85	3.801			

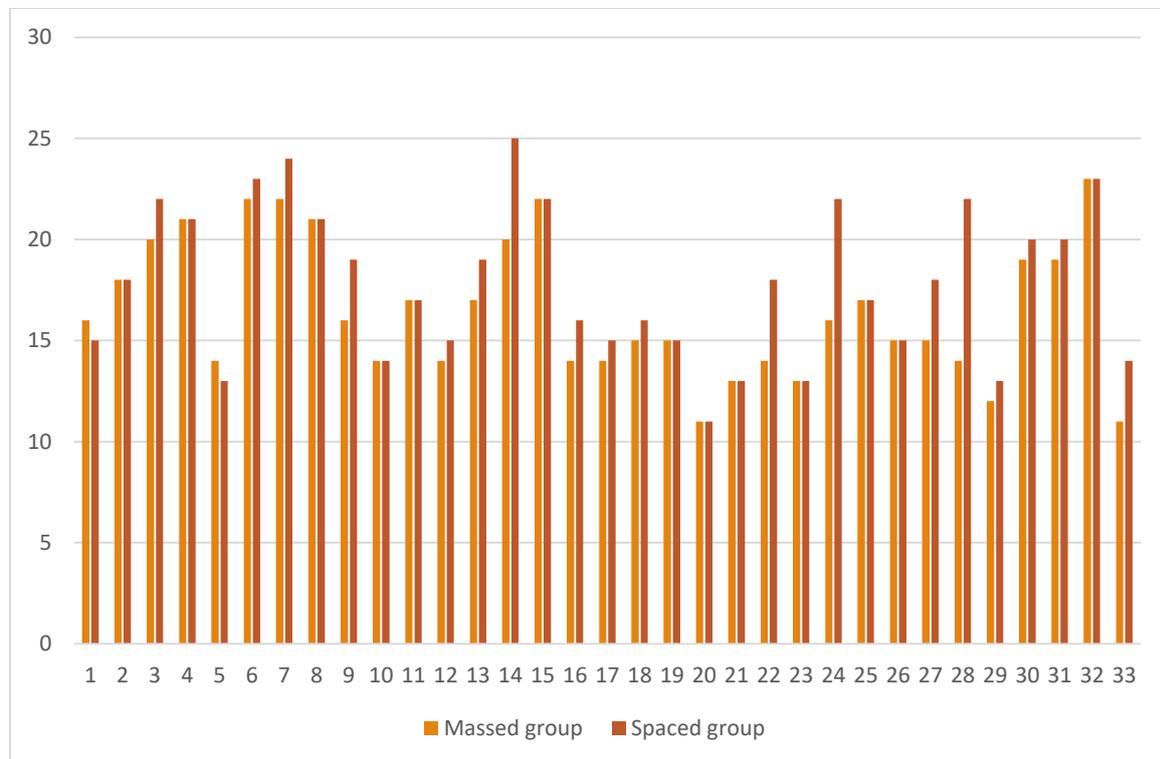


Figure 1. The pre-test scores for Massed Group and Spaced Group

It could vividly be seen in figure (1) that there is no significant difference between the spaced group and the massed group in the vocabulary pre-test. It can be seen in figure (1) that the starting point of the two groups was low average. Their performance was identified as low due to their lack of background knowledge of the target words.

Results related to comparison of the mean of the vocabulary pre-test and post-test within each group

The first research question of the study (1.b) was aimed to find out whether spacing instruction have any significant effect on Saudi EFL learners' vocabulary learning. To find an answer to this research question, the pretest and posttest scores of the learners in the Spaced Group were compared by means of a paired-samples T test.

As Table 2 shows, the spaced group learners obtained the mean scores of 17.85 on the vocabulary pretest and 30.55 on the vocabulary posttest.

In order to find out whether this difference between the pretest and posttest scores of the spaced group learners was statistically significant or not, the following t-test table had to be checked: Table 2 revealed that there was a statistically significant difference between the pretest ($M = 17.85$, $SD = 3.801$) and posttest ($M = 30.55$, $SD = 5.173$) scores of the spaced group learners

since the p value under the Sig, (2-tailed) column was smaller than the significance level (i.e. $.000 < .05$). This indicates that the treatment (using spaced instruction) was effective so far as the vocabulary knowledge of the Saudi EFL learners were concerned.

Regarding the first research question of this study (1.c), another paired samples t test was conducted. Moreover, the descriptive statistics in Table 2 show that the Massed Distribution learners got the mean score of 16.48 on the vocabulary pretest and 20.67 on the vocabulary posttest. In order to determine whether the difference between these two mean scores in each group was statistically significant or not, the researcher needed to consult the paired-samples T test table (Table 2).

Table. 2 Paired Samples t-test of the Comparison of the Mean of the vocabulary Pre-test and Post-test within each Group

Group	Pre-test Mean (SD)	Post-test Mean (SD)	df	T -Test	Sig. (2-tailed)
Massed (n=33)	16.48 (3.411)	20.67 (4.371)	32	-7.234	.000
Spaced (n=33)	17.85 (3.801)	30.55 (5.173)	32	-20.503	.000

In Table 6, the single most important piece of information is the p value under the Sig. (2-tailed) column. This p value should be compared with the pre-specified significance level (i.e., $.05$) to see if the difference between the pretest and posttest scores had been statistically significant or not. A p value less than $.05$ would indicate a significant difference between the two sets of scores, while a p value larger than $.05$ would imply a difference which did not reach statistical significance. As the p value under the Sig. (2-tailed) column in Table 2 was lesser than the significance level ($.000 > .05$), it could be construed that the difference between the vocabulary pretest ($M = 16.48$) and posttest ($M = 20.67$) of the massed group learners was of statistical significance. But it could be observed that the difference between the two means of the pre and posttests is not large. This means that the improvement in the performance of the massed group is not as high as the spaced group learners.

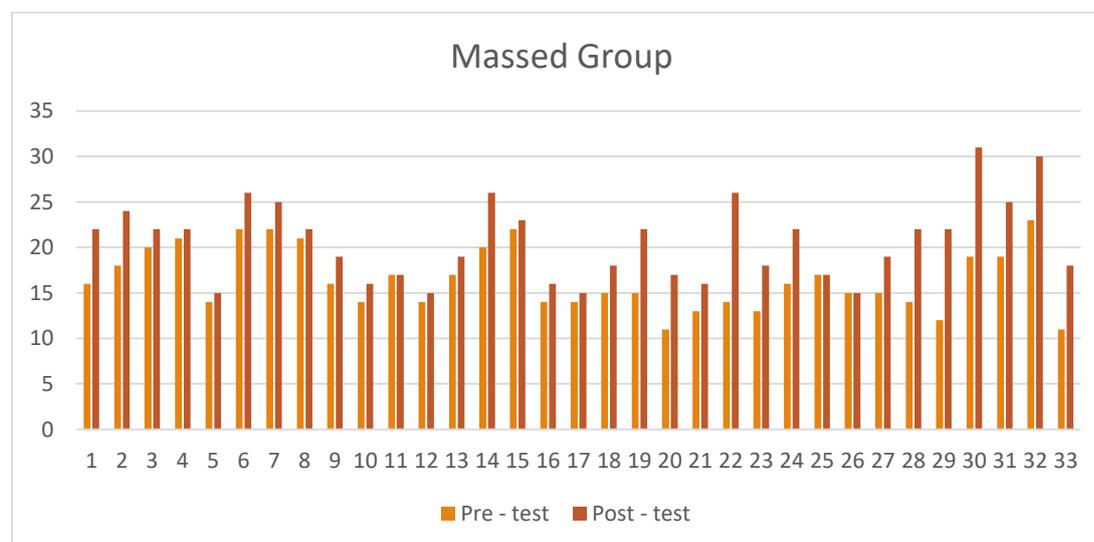


Figure 2. The scores of both pre and post-test for Massed Group

Regarding the first research question (1.C), after analyzing the data, the findings showed that the improvement in the performance of the massed group was very slight on their post-test compared to their pre-test. Their scores on the pre-test and post-test were not widely different (see figure 2).

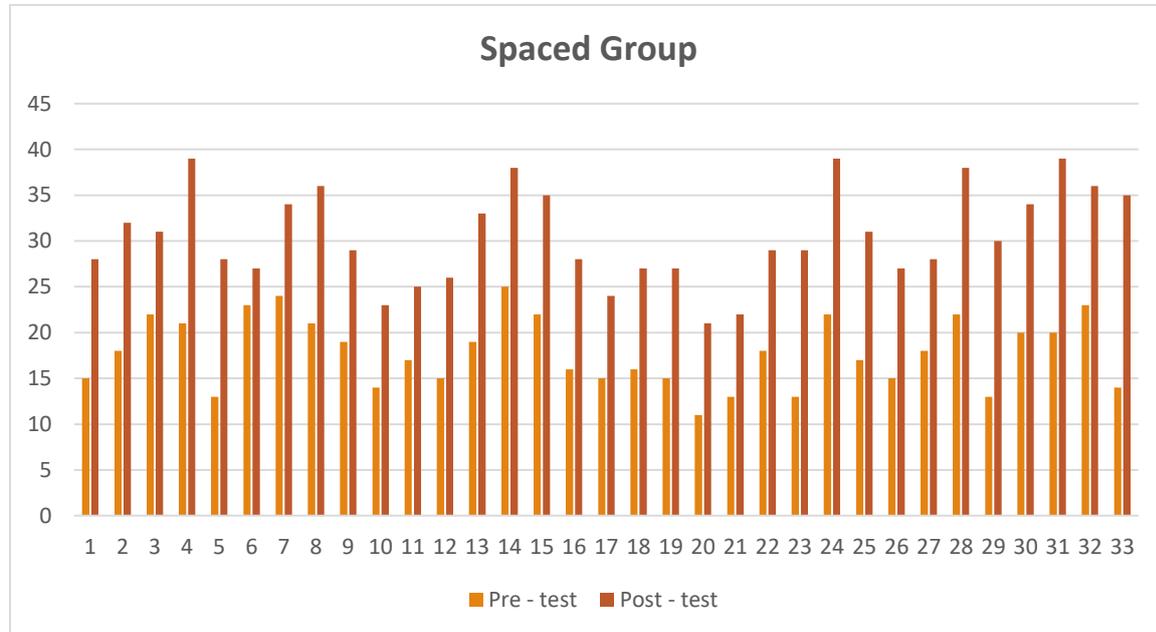


Figure 3. The scores of both pre and post-test for Spaced Group

Figure 3 indicated that the spacing group improved on their post-test compared to their pre-test. As could be seen in figure 3, the difference between the pre-test and post-test scores of the spaced group was a significant one. In the beginning, the group had a low performance qualified as inadequate, but after the group's exposure to the treatment, there was a remarkable increase in reaching a substantial mean score. Therefore, the considerable difference between the pretest and post-test may be ascribed to the spaced instruction.

Results for the comparison of post-test scores between Spaced group and massed group in the vocabulary test after Intervention

An inspection of Table 3 reveals that on the post-test given after completion of study, the group of students that had studied the words under conditions of distributed practice outperformed those students who had studied under conditions of massed practice. The results of the post-test revealed that spaced practice yielded higher scores than massed practice. Results of the post-test suggested that vocabulary learning was in fact superior in the spaced condition to the massed condition.

Table 3. An independent T-test results for the comparison of pre-test scores between spaced group and massed group in the vocabulary test after intervention

Group	N.	Mean	Std. Deviation	T	DF	Sig.
Massed	33	20.67	4.371	-8.380	64	.000
Spaced	33	30.55	5.173			

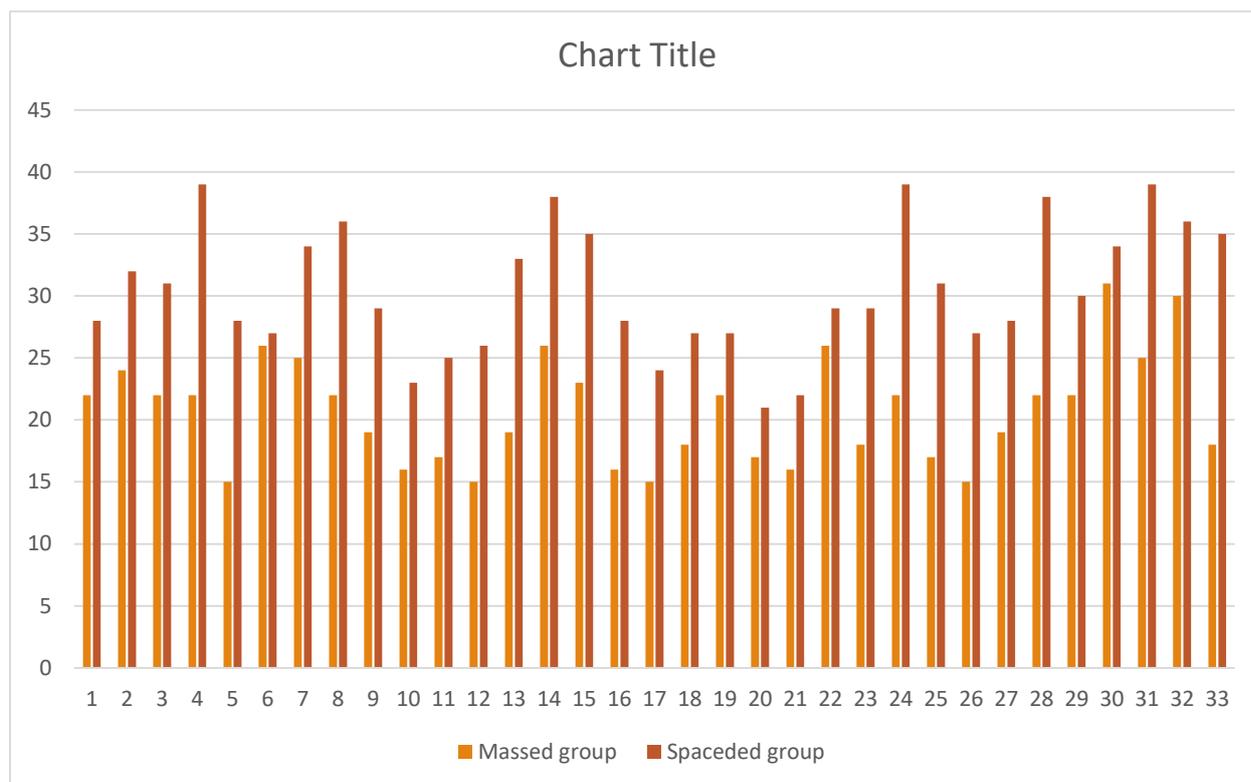


Figure 4. The post-test scores for Massed Group and Spaced Group

Figure 4 shows that the Spaced Distributed Group students considerably outperformed the Massed Distributed Group students on the vocabulary posttest, indicating that the spaced instruction had significant effects on Saudi EFL learners' vocabulary learning. This result means that the spaced instruction is effective in developing the Saudi students' EFL vocabulary learning.

Findings related to the second research question

The Questionnaire results

The data used to answer the second research question were gathered from the questionnaires which were delivered to the spaced group students by the end of the treatment. The questionnaire was used to explore student perceptions of using the spaced practice in learning vocabulary. The questionnaire consisted of fifteen items. Students were asked to rate the questions as “agree, neutral, disagree”. The results of the questionnaire were analyzed in terms of frequency and percentage to find out the students' attitudes towards the use of spaced practice in learning to vocabulary.

Item one (“Spaced repetition makes me remember words better”) showed a strong tendency of agreement. Twenty-six of the responding students (85.71%) either agreed or strongly agreed with this item. This indicates that spaced repetitions made them remember words better. Three of the respondents (8.57%) had no idea about Item one. Only one (5.71%) of the respondents disagreed with the item.

Item two (“Spaced learning lessons allow me to store more information”) gained such high agreement among the responding students. Most respondents either agreed (88.57%) with the item. However, the remaining students (11.42%) had no idea about Item two. In addition, it should be noted that the highest mean score obtained was related to Item two. About three

fourth of the respondents (74.28%) agreed with Item three (“Spaced learning lessons allow me to retain more information”).

Item four (“I can recall spaced words better on tests”) had about three fourth of children (77.14%) agreeing with this statement. Six of the participants (17.14%) had no idea about this item, and only one of the participants (5.71%) disagreed with this item. Item five (“By spaced repetitions, I can see my vocabulary improving”) had about 71.14% of the students agreeing with this statement.

Item six (“I have a better understanding when lessons are spaced out”) had 22 of the responding children (73.33%) agreeing with this statement. Seven of the responding students (23.33%) showed neither agreement nor disagreement, and only one of the participants disagreed with this item.

Concerning Item seven (“I learn quicker when lessons are spaced out”), students mostly selected agree (74.28%) while “disagree” had the lowest rate (5.72%). In addition, two of the respondents (20%) selected no idea.

The majority of responding students agreed with Item eight (“I have higher attention when topics are spaced out”), 21 of the respondents showed a complete agreement (60%). Furthermore, six of the participants (28.57%) had no idea about Item eight.

Items one to eight elicited students’ cognitive processes involved in vocabulary learning concerning spaced-retrieval methodology. In general, students had a positive attitude toward using spaced methodology. Students strongly agreed that spacing improves learning. More specifically, they believed that spacing leads to better recall than massing does. In the present study, all learning sessions were similar. The only thing that was different between learning conditions was the amount of time between the two study sessions. At the test phase, students were surprised because they could remember words of one of the lists (spaced words) vastly better than the words of the other list (massed words). This indicates that the students could clearly differentiate between the two learning schedules, and therefore were able to judge accurately the effectiveness of the two different learning approaches on the scale. The remaining items elicited children’s responses in relation to various affective states.

With regard to Item nine (“I feel more motivated when lessons are spaced out”), students mostly selected agree (71.43%). However, seven of the respondents showed a completely opposite view as they disagreed (20%). Also, three students (8.57) selected no idea. In relation to Item 10 (I get less bored when learning topics that are spaced out), less than half of the participants (45.71%) agreed with this item, 25.71% disagreed, and 33.33% had no idea. In response to Item 11 (“I’m glad because by spaced practice, I actually enjoy vocabulary learning”), more than half of the participants (51.43%) agreed, less than 25.71% had no idea, although 22.86% either disagreed or strongly disagreed. Items 10 and 11 was about the average. That is, children found the spaced-retrieval techniques used in this study neither boring nor enjoyable.

Regarding Item 12, more than two third of the respondents (71.43%) agreed with the statement, “Learning vocabulary is more fun when lessons are spaced out,” whereas only 17.14% of the respondents showed disagreement.

In response to Item 13 (“I feel pleasure from doing something over and over again”), 25 respondents agreed (71.43%) with this item, while four respondents either disagreed with the statement (11.43%), and six said they had no idea.

In relation to Item 14, less than three fourth of the respondents (68.57%) showed either agreement or strong agreement with the statement “From now on, I’d rather learn words by spaced practice”. However, the remaining respondents either disagreed or had no idea.

Finally, regarding Item 15, almost all the respondents (94.29%) agreed with the statement “Generally, I agree with spacing learning lessons”. This indicates that they generally perceived spaced learning as an effective learning methodology. In general, students’ agreement on all items of the questionnaire was above the average. This indicated that in general, students perceived spaced approach to be more effective than the massed approach.

Table 4. Results of Learner’s Perceptions of Spaced Methodology.

Items	Agree		Neutral		Disagree	
	F	%	F	%	F	%
Spaced repetition makes me to remember words better.	30	85.71	3	8.57	2	5.71
2 Spaced learning lessons allow me to store more information.	31	88.57	4	11.43	0	0
3 Spaced learning lessons allow me to retain more information.	26	74.28	5	14.27	4	11.43
4 I can recall spaced words better on tests.	27	77.14	6	17.14	2	5.72
5 By spaced repetitions, I can see my vocabulary improving.	25	71.42	6	17.14	4	11.43
6 I have a better understanding when lessons are spaced out.	25	71.43	7	20	3	8.57
7 I learn quicker when lessons are spaced out.	26	74.28	7	20	2	5.72
8 I have higher attention when topics are spaced out.	21	60	10	28.57	4	11.43
9 I feel more motivated when lessons are spaced out.	25	71.43	7	20	3	8.57
10 I get less bored when learning topics are spaced out.	16	45.71	8	22.86	9	25.71
11 I’m glad because by spaced practice, I actually enjoy vocabulary learning.	18	51.43	9	25.71	8	22.86
12 Learning vocabulary is more fun when lessons are spaced out.	25	71.43	4	11.43	6	17.14
13 I feel pleasure from doing something over and over Again.	25	71.43	6	17.14	4	11.43

14 From now on, I'd rather learn words by spaced practice.	24	68.57	7	20	4	11.43
15 Generally, I agree with spacing learning lessons.	33	94.29	2	5.71		

Discussion

This study investigated whether spaced and massed distribution instruction could enhance EFL learners' vocabulary. After collecting the needed data and analyzing them, the results indicated that the students who had learned the words by spaced practice did substantially better than the massed practice students on a post-test given by the end of the treatment. The spaced group also improved on their post-test compared to their pre-test. Their scores on the post-test were very better than their scores on the pre-test. This improvement may be due to spaced distribution instruction. Moreover, after analyzing the data, the outcomes demonstrated that the massed group did not progress on their post-test compared to their pre-test. Their scores on the pre-test and post-test were almost the same.

The responses from the questionnaire regarding students' attitudes towards utilizing the spaced practice in vocabulary learning were wholly positive and are compatible with the findings of the post-test. The spaced distributed group students felt interesting and confident in learning vocabulary. The students' responses to the questionnaire also indicated that the use of spaced distributed practice had a positive effect on their attitude towards vocabulary learning. It enhanced their self-esteem, motivation and sense of achievement and improvement. The students enjoyed spaced practice and were motivated to learn vocabulary.

The findings of the present study are in line with prior studies in cognitive psychology (Pavlik & Anderson, 2005; Seabrook, Brown, & Solity, 2005) which confirmed that spacing repetitions of whatever material is to be learned over a period of time with lengthy intervals between each repetition is better than massing repetitions in one lengthy session. Furthermore, the outcome is additionally confirming some former studies (e.g. Nakata, 2015; Namaziandost et al., 2018) indicating that the spaced distribution instruction enhanced foreign language learning and leads to better retention than massed repetition, a phenomenon commonly referred to as the spacing effect.

Spacing instruction helped Saudi EFL students to improve their vocabulary knowledge. In spacing instruction students had more time to rest, had more time to think, and had more time to study; this may lead to the students' vocabulary development. These results are congruent with several researches (e.g. Al Fotais, 2019; Lotfolahi, & Salehi, 2017; Carpenter et al., 2012), which have corroborated the supremacy of spaced instruction conditions in promoting EFL vocabulary learning. The results also agree with that reached by Cepeda et al., (2008) who affirm that spacing effect benefits in vocabulary learning are ubiquitous and well documented in an adult population. Moreover, the findings of the current study support the results reached by Miles (2014), Pavlik, Bird (2010), Anderson (2005) and Rohrer and Pashler (2007) who indicated that the spaced group outperformed the massed group on the vocabulary post-test. They also indicated that spaced practice produced better long-term retention than massed practice.

The findings imply that spacing instruction enhanced Saudi EFL learners' collocation learning. The findings are in line with previous studies in cognitive psychology (Seabrook et al., 2005) which confirmed the effect of spaced distribution instruction in different domains of learning.

Moreover, the results are also compatible with some previous studies (Nakata and Elgort, 2020; Namaziandost, et al., 2020; Namaziandost et al., 2018; Namaziandost et al., 2019; Lotfolahi, A.R., & Salehi, 2017, Swehla et al., 2016) showing that the spaced distribution instruction improved foreign language learning. Studying information across two or more sessions that are separated (i.e., spaced apart or distributed) in time often produces better learning than spending the same amount of time studying the material in a single session.

The present study supported and extended the findings of Delaney, Verkoeijen and Spirgel (2010) and Kornell (2009) who found that spaced practice led to higher vocabulary retention over a period of five weeks than massed practice. It should be noted however that, in their studies, the participants were primary school students who were native speakers of the language of the words being learned (respectively English and Dutch), while in the present study the participants were EFL university students. Therefore, the results in the present study have remarkably demonstrated that spaced practice could be effective in learning vocabulary at extremes of the educational continuum.

Based on the encoding variability theory, the more spaced two items are, the more likely it is that they will be encoded differently in the participant's mind (Mirshekaran, Namaziandost, & Nazari, 2018). This variability in memory representation, which is facilitated by the various contexts in which spaced items emerge, provides more retrieval clues (Mashhadi et al., 2017). As a result, remembering is favored in spaced practice. Moreover, based on deficient processing theory, in spaced sequences, the first presentation is not easily accessible at the time of the second presentation, and full processing of the second presentation is thus essential (Namaziandost et al., 2019). Consequently, this processing, in turn, simplifies learning and retention. To put it in a nutshell, it is assumed that when participants are presented to two items concomitantly or within a short period of time, they do not dedicate as much consideration to these items as when they are exposed with adequate spacing.

In short, the results of the present study revealed that instruction about spacing contributes to better learning than instruction about massing. The findings displayed that spacing practice learners performed better on post-test vocabulary testing. To sum up, our findings extend earlier studies by Sobel et al. (2011) and Goossens et al. (2012) that show the beneficial effects of spacing in vocabulary learning, and it puts an end to the belief that students benefit from cramming more than spacing.

Educational implications

The findings of this study revealed the effects of spaced practice on improving EFL vocabulary learning. Some implications of this study can be of valuable help to students, instructors, and curriculum developers in different ways. Students can space their self-study sessions out in time to enhance the amount of their learning. It could be a good idea for instructors to schedule classroom learning activities according to a spaced schedule to increase students' performance at the tests. Also, it will help syllabus designers and curriculum developers through which they will be able to plan the course books to facilitate foreign vocabulary learning. That is, because spacing has an enhancing impact on students' long-term memory (Cepeda et al., 2008), syllabus designers and curriculum developers will have the opportunity to decide when in a course and where in a book a word needs to be repeated.

Conclusion

The current study aims at investigating the effect of spaced practice versus massed practice on learning vocabulary among Saudi EFL learners at Qassim university. It has, however, much

broader interest and importance since, to my knowledge, the current study is the first to examine the effect of massing and spacing on EFL vocabulary learning in authentic classroom settings at university level in general, not only at a Saudi university. In addition, this study examines the learners' perceptions toward the use of spaced practice in EFL vocabulary learning. With these aims, both groups were taught the meaning of 50 new words in a massed learning condition and in a spaced learning condition. In the massed learning condition, each target word was practiced three times in one classroom session. In the spaced learning condition, each target word was practiced once in each of three classroom sessions. The same vocabulary tests were administered immediately after the intervention. Questionnaires were additionally distributed to the spaced group to gather self-reported individual data.

After collecting the needed data, they were analyzed through independent and paired samples t-tests. The post-test results showed the spaced distribution group outperformed the massed distribution group on the vocabulary test. The results also indicated that the spacing group improved on their post-test compared to their pre-test. Their scores on the post-test surpassed their scores on the pre-test. This improvement may be the results of spacing instruction. Moreover, the questionnaire findings indicate that a high percentage of the spaced participants have positive perception toward the use of the spacing practice in vocabulary learning.

The findings of this study are compatible with the results reached by Nakata & Suzuki (2018). Goossens et al., (2012), Sobel et al. (2011) and Toppino and Bloom's (2002) who conclude that learning vocabulary with spaced repetition leads to better retention than massed repetition, a phenomenon commonly referred to as the spacing effect.

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