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Research Paper

## Impact of Spaced Instruction versus Massed Instruction on Iranian EFL Learners' Reading Comprehension, and Vocabulary Gain

Zeinab Rezaei Gashti<sup>1</sup>, Ali Asghar Yousefi Azarfam<sup>2\*</sup>, Fatemeh Mirzapour<sup>3</sup>

<sup>1</sup>Ph.D. candidate, Department of English, Sarab Branch, Islamic Azad University, Sarab, Iran

<sup>2\*</sup>Department of English, Sofiyan Branch, Islamic Azad University, Sofiyan, Iran

<sup>3</sup>English Language Department, Sofiyan Branch, Islamic Azad University, Sofiyan, Iran

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### Abstract

This investigation aimed to examine the impact of spaced and massed education on the reading comprehension and vocabulary gain of Iranian EFL students. The researcher selected 150 Iranian participants out of 300 based on their enactment in the Oxford Quick Placement Test (OQPT). The selected medium participants were unsystematically assigned into two empirical groupings (spacing and massed) and one control group. The participants' reading comprehension and vocabulary knowledge in English were estimated using a pre-test. Three groups were provided with instruction on reading skills by English texts and new words from American English File 3. The massed group received a 90-minute session for each text, whereas the spaced group received three 30-minute sessions; the first session lasted 30 minutes, followed by two more sessions, each lasting 30 minutes, scheduled two days apart. Behind the teaching, a reading and vocabulary post-test were distributed to the three classes. The results of data analysis utilizing independent samples t-tests and one-way ANOVA showed a considerable distinction between the post-tests of the spaced and massed groups compared to the control group. The findings demonstrate that the spaced grouping, which followed the specific recommended steps in their community, outperformed the massed and control groups ( $p < .05$ ). This has consequential implications for English instructors, learners, and curriculum developers.

**Keywords:** Massed instruction; Spaced instruction; EFL reading Comprehension; Vocabulary Gain

تأثیر آموزش فاصله دار در مقابل آموزش انبوه بر درک مطلب و افزایش واژگان زبان آموزان ایرانی زبان انگلیسی  
این تحقیق با هدف بررسی تأثیر آموزش فاصله دار و انبوه بر درک مطلب و افزایش واژگان دانشجویان ایرانی زبان انگلیسی انجام شد. محقق ۱۵۰ شرکت‌کننده ایرانی را از بین ۳۰۰ شرکت‌کننده بر اساس عملکرد آنها در آزمون تعیین محل سریع اکسفورد (OQPT) انتخاب کرد. شرکت‌کنندگان محیط منتخب به صورت غیر سیستماتیک در دو گروه تجربی (فاصله و انبوه) و یک گروه کنترل قرار گرفتند. درک مطلب و دانش واژگان شرکت‌کنندگان در زبان انگلیسی با استفاده از یک پیش‌آزمون برآورد شد. به سه گروه آموزش مهارت‌های خواندن توسط متون انگلیسی و کلمات جدید از پرونده انگلیسی آمریکایی ۳ داده شد. جلسه اول ۳۰ دقیقه به طول انجامید و پس از آن دو جلسه دیگر، هر جلسه ۳۰ دقیقه، به فاصله دو روز برنامه ریزی شده بود. پس از تدریس، پس از آزمون ریدینگ و واژگان بین سه کلاس توزیع شد. نتایج تجزیه و تحلیل داده‌ها با استفاده از آزمون‌های t نمونه‌های مستقل و آنالیز واریانس یک‌طرفه، تمایز قابل‌توجهی را بین پس‌آزمون‌های گروه‌های فاصله‌دار و توده‌ای نسبت به گروه کنترل نشان داد. یافته‌ها نشان می‌دهند که گروه‌بندی فاصله‌دار، که از مراحل توصیه‌شده خاص در جامعه خود پیروی می‌کرد، از گروه‌های توده‌ای و کنترل بهتر عمل کرد ( $p < .05$ ). این پیامدهای مهمی برای مدرسان انگلیسی، زبان آموزان و توسعه دهندگان برنامه درسی دارد.  
کلیدواژه‌ها: آموزش دسته جمعی آموزش فاصله دار؛ درک مطلب EFL؛ افزایش واژگان

### Introduction

The concept of the spaced effect, initially introduced by Ebbinghaus (1913), suggests that learning and retaining information is more effective when revised incrementally rather than in

one continuous study session. This effect has been observed in various learning domains, such as the recall of mathematical knowledge (Rohrer & Taylor, 2006), the accession of L1 words in youths (Childers & Tomasello, 2002; Namaziandost et al., 2018), and the remembrance of intricate physical components and visual images (Toppino, 1991). Additionally, word-processing outcomes have been found to enhance learning (Rogers, 2017; Seabrook et al., 2005). Lotfolahi and Salehi (2017) further demonstrated that the impact of spacing is associated with distributing study sessions over time rather than clustering them together.

As documented in the literature, the reasonable learning method is the one that promotes the transfer of knowledge through long memory. Lotfolahi and Salehi (2017); Baddy (1997); and (Day & Park, 2005) examined whether teachers can use spaced mode for EFL language training as part of natural learning and found it quite reasonable. The study also highlighted the importance of incorporating spaced repetition into language learning curriculums to enhance long-term retention and application of knowledge. Additionally, it emphasized the need for educators to integrate natural learning methods into their teaching practices to optimize language acquisition and fluency. The benefits of utilizing the spaced effect in the development of complex mathematical skills were confirmed by the research conducted by Rohrer and Taylor (2006). Additionally, Moulton et al. (2006) discovered that teaching a specific surgical technique using spaced intervals produced more favorable outcomes compared to teaching through a single concentrated exercise session, as evidenced by a postponed post-test conducted one month later. Similarly, Shebilske et al. (1999) observed that students achieved more satisfactory results in learning a complex computer simulation training task when practice sessions were distributed in spaced intermissions instead of concentrated in a session. These findings illustrate that the spacing effect goes further in the simple memorization of truths and assists in acquiring additional intricate learning tasks involving a diversity of skills.

Undoubtedly, English reading is a strongly applicable skill, particularly in alien language contexts, where access to foreign speech is primarily through written materials. English reading serves as the most leisurely and productive means of obtaining knowledge. It allows readers to expand their understanding, broaden their perspectives, and facilitate learning and comprehension of the world about them (Penjak & Karninè, 2017). It is a fundamental learning objective that holds immense importance for individuals of all ages. As stated by Okuniewski (2014), developing proficient reading skills opens doors to a multitude of possibilities and perspectives, enabling individuals to explore new realms, acquire new knowledge, stay updated with information and technology, appreciate literature, and efficiently carry out daily tasks - all of which are essential aspects of modern life.

English is considered a prominent foreign language, taught extensively in numerous countries. The importance of vocabulary cannot be denied in any language, as it carries deep meaning and significance. The mastery of English, or any other language, starts with the acquisition and usage of common words, a process that begins even in our mother tongue (Gashti, 2021). Gashti (2021), Cameron (2001), and Lewis (1993) assert that individuals learn vocabulary before they start communicating. In the natural progression of listening, speaking, reading, and writing a first or second speech, a person needs to possess the vocabulary to express or comprehend ideas. Similarly, in the process of retaining English as an unfamiliar language, students have a larger set of vocabulary to acquire. It is evident that vocabulary, along with grammar and phonetics, recreates a vital function in mastering a foreign language. Proficiency in vocabulary is often seen as an essential mechanism for dual language learners, as restricted proficiency in this area hinders effective communication. Schmitt (2000) underlines the significance of vocabulary acquisition and stresses that it is crucial for both communication and the accession of a second language.



Nation (2001) characterized the connection between word consciousness and language utilization as interdependent: Understanding word empowers the usage of language, and conversely, language usage brings about an improvement in the perception of vocabulary. Inadequate vocabulary knowledge leads learners to quickly realize their limited comprehension abilities. Scholars like Laufer and Nation (1999), Maximo (2000), Read (2000), GU (2003), Nation (2001), and various others acknowledged the essence of acquiring wording to proficiently employ a second language, accentuating its fundamental significance. A vital part in the formation of sweeping oral and composed texts, so the results of the preceding study showed that spaced education leads to a more decent education than massed education, so sufficiently completed that through frequent contact with specific materials of various subjects, practical remembrance of vocabulary items and better reading comprehension can be achieved the outcomes suggested that the spaced group achieved superior results in the evaluation following reading comprehension due to the explicit guidance they were provided with (Lotfolahi & Salehi, 2017). Hintzman (1974) demonstrated that interval instruction maintained reliable performance compared to centralized instruction in vocabulary memorization. So, the spaced impact directs to the benefit of retaining data replicated in a disseminated mode compared to notification recounted in a massed mode. Significantly, the spaced plan included more vocabulary items than the massed plan. Thus, it is clear that regular exposure to specific materials on various topics is sufficient for effectively improving vocabulary retention and reading comprehension. More importantly, spaced training increases the plausibility of the callback function and the learning process in any memory test (Melton, 1970).

Hence, the foremost intent of this analysis is to employ two different approaches to investigate how the study explores how the distribution of instructions, whether spaced or massed, affects the reading comprehension and vocabulary improvement of EFL trainees in Iran. The prominent approach employed for this research is a quantitative study, which will involve gathering and analyzing data. Foreign language learners, including Iranian students, often struggle with limited vocabulary, which affects their communication efficiency. This is due to ineffective vocabulary teaching strategies employed by language teachers. Traditional approaches to teaching English have not been reformed, leading to poor performance among learners. The materials used in English language classes may not be sufficient for efficient learning. Additionally, many learners have the misconception that reading comprehension requires translating and understanding every word in the textbook, rather than grasping the main ideas. It is important to raise awareness about reading and understanding English texts among these learners. The investigation strived to analyze the consequence of spaced and massed instruction on reading comprehension and vocabulary acquisition of Iranian EFL students.

Year (2009) delved into the potential impact of the distance effect on L2 grammar acquisition, focusing on Korean high school students divided into three groups. The study employed varying spacing patterns for transitive and spatial verbal constructions, highlighting the influence of temporal intervals on learning. In a similar vein, Lotfolahi and Salehi (2017) innovatively explored spacing schedules in young EFL learners, contrasting massed and spaced conditions for English–Farsi word pairs. Spaced practice, incorporating tests with corrective feedback, demonstrated exceptional long-term retention that resembled massed practice. The current study, inspired by previous research (Mashhadi & Farvardin, 2017; Miles, 2014), the primary objective of this examination is to address the current openings in publications by scrutinizing the influence of spaced and massed instruction on reading comprehension and vocabulary development within the specific context of English as a Foreign Language (EFL) in Iran. Conducting the breakdown seeks to donate to the prevalent comprehension of successful language instruction strategies, which has been significantly lacking in previous studies.

This study is significant because it can inform educators and curriculum developers about effective teaching and learning methods. The results can guide educators in tailoring their teaching approaches to the unique cultural and linguistic context. The study also addresses multiple aspects of learning, such as reading comprehension, and vocabulary gain, providing a comprehensive understanding of the impact of different instructional methods. Given the implications uncovered by this study, it is strongly recommended that educators avoid relying exclusively on a single instructional approach. Rather, they should integrate both spaced and massed instruction techniques within their classrooms. The findings of this meticulous investigation can greatly benefit educators, researchers, and curriculum developers, as they strive to enhance the teaching of English grammar through the skillful combination of spaced pedagogy and massed instruction methods.

### **This deconstruction attempts to respond to the ensuing research inquiries:**

**Q1.** Does spaced and massed instruction have any significant effect on Iranian intermediate EFL learners' reading comprehension?

**Q2.** Does spaced and massed instruction have any significant effect on Iranian intermediate EFL learners' vocabulary knowledge?

**Q3.** Is there any significant difference between Iranian intermediate EFL learners' reading comprehension, and vocabulary knowledge through teaching spaced and massed instructions?

## **Methodology**

### **Participants**

In this study, 300 Iranian EFL trainees carried the Oxford Quick Placement Test (OQPT). 150 intermediate level learners were picked as the instance participants who were assigned aimlessly to either the spaced instruction or the massed instruction groups. The investigation was executed in two English Language Institutes in Gilan Province. The parties' ages ranged from 16 to 21. The same teacher taught all groups to control the teacher's effect.

### **Instruments**

The study used the Oxford Quick Placement Test (OQPT) as an initial agent to select similar subjects. Students scoring between 30 and 47 out of 60 on the OQPT were classified as intermediate and included in the study. The researcher also created a reading comprehension pretest for the study by collecting data from institutions that used the American English File 3, Second Edition textbooks. The pretest was developed by experienced researchers and consisted of 40 queries involving multiple-choice, true-false, and fill-in-the-blank. Experts evaluated the pretest for clarity, simplicity, and representativeness. It was also tested on a similar group to ensure effectiveness. The pretest had a reliability index of 0.85, computed using the Cronbach Alpha formula.

A vocabulary pre-test was also utilized as a further tool for data collection. The test was created to establish the students' text and consisted of 40 multiple-choice objects. It was validated by the panel of researchers including university professors with above 15 years of teaching experience, and allowed teachers to assess various learning goals effectively. The objective nature of the test reduced rating bias. Students could quickly respond to multiple items, providing comprehensive coverage. It was also piloted on 50 intermediate students from another institute to ensure its feasibility. The final instrument was a post-test to evaluate reading comprehension and vocabulary gain based on the initial assessment. It is important to note that slight adjustments were made to the post-tests compared to the pre-tests, involving rearranging options and

questions to prevent students from recalling their initial responses. As a crucial step, both the post-tests and pre-tests underwent thorough reliability and validity assessments.

### **Procedure**

In the study's initial phase, participants underwent a pre-test assessing comprehension and vocabulary. Experimental groups received spaced and massed instructional treatments, while the control group had traditional instruction involving techniques such as reading aloud. After reading, all groups guessed the meanings of bold vocabulary words. Massed instruction sessions were 90 minutes daily, while spaced instruction had three 30-minute sessions, totaling approximately 90 minutes. The researcher, a Ph.D. candidate with 15+ years of English teaching experience, employed reading strategies for pre-reading, while-reading, and post-reading in both experimental groups. The study aimed to compare mass and spaced instruction effects on learning new words, revealing spaced instruction's superiority in retaining vocabulary.

For pre-reading, engaging activities included discussions, brainstorming, and picture presentations, fostering collaboration and prediction of reading topics. Reading strategies encompassed identifying topic sentences, skimming for specific information, and scanning for gist information and the main idea. Post-reading activities involved learner interest areas, discussions, asking the thin type of questions that could be answered directly from the passage, and thick questions that required deeper analysis and prior knowledge, character analysis, encouraging critical analysis, and a comprehensive understanding of the text. To understand unfamiliar vocabulary, learners used bilingual dictionaries, leveraging their knowledge of both languages. The 20-session instruction included OQPT and pre-tests in the first two sessions, focusing on teaching passages and words in the subsequent 16 sessions, and concluding with post-tests in the nineteenth and twentieth sessions.

### **Design of the Study**

This study utilized a quasi-research setup and similar experimental designs but without random appointment of participants to groups. It aimed to investigate cause-and-effect relationships between variables when randomization was not possible. The study examined the effects of an intervention in a real-world setting but had less control over confounding variables compared to a valid experimental design. Quantitative data were collected by utilizing pre and post-tests in the analysis, which contained two experimental classes and a control group. The independent variables were spaced and massed instructions, while the dependent variables were reading comprehension and vocabulary learning.

### **Data Analysis**

The data acquired during the deconstruction were evaluated utilizing the SPSS Software, specifically version 25. The analysis included several steps. First, the data was scanned for standard diffusion operating the Kolmogorov-Smirnov (K-S) test. Then, both descriptive and statistical inference were used. Descriptive statistics were used to analyze the data from the reading comprehension and vocabulary pre-tests, providing the mean scores and standard deviations. Inferential statistics, specifically a one-way ANOVA, were employed to investigate the data in the post-test and check for any differences between the evaluation focused on the Iranian intermediate EFL learners' proficiency in reading comprehension and their command of vocabulary taught through spaced and massed instructions. The one-way ANOVA was chosen because the data had three levels: a categorical independent variable and a quantitative dependent variable.

## **Results**

To evaluate the accuracy and effectiveness of reading comprehension and vocabulary tests, the researcher administered these tests to groups of 50 similar students before and after reading. To ensure that the target participants were matched to their textbook, age, gender, and English proficiency, students from other institutions were also tested. The trustworthiness of the pre and post-reading comprehension examinations was evaluated using the Cronbach alpha formula and equipped with a reliability index of 0.85 for the pre-test and 0.87 for the post-test. To ensure content validity, a group of English teachers was enlisted to review the reading comprehension tests and suggest improvements to enhance clarity, simplicity, and accuracy. Correspondingly, the dependability and validity of the pre and post-vocabulary assessments were evaluated. A group of English teaching experts scrutinized the internal validity of the questions, and the reliability of the tests was determined utilizing the KR-21 procedure, yielding a reliability index of 0.83 for the pre-test and 0.84 for the post-test. All participants across the three groups, consisting of two experimental groups (spaced and massed) and a control group, completed an initial assessment of reading comprehension and vocabulary knowledge. To ensure the consistency of the results, the first Kolmogorov-Smirnov (K-S) test was utilized to confirm the normal distribution of the data, and subsequently, the mean differences between the spaced, massed, and control groups for each dependent variable were examined in the pre-tests of the two spaced and massed groups. Upon analyzing the data, it was observed that the p-values for the pre-test scores in reading comprehension and vocabulary tests ( $p > .05$ ) exceeded the significance level of .05, thus validating the assumption of normality. The initial research inquiry examined whether there lived a noteworthy impact of spaced and massed instruction on the reading comprehension abilities of Iranian intermediate EFL learners. As previously mentioned, the average scores of the two groups were recorded as the pre-test scores. A presentation of descriptive data regarding the pre-test scores for participants in the control group and the spaced and massed groupings is illustrated in Table 1.

**Table 1**

*Descriptive Statistics of the pre-test for control, spaced, and massed groups*

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Reading Comprehension PRE	Spaced	50	25.72	2.733	.387
	Control	50	25.00	2.711	.383
Reading Comprehension	Massed	50	25.26	2.820	.399
	Control	50	25.00	2.711	.383

Based on the data presented in Table 1, it can be observed that the control group had an average score of 25.72, accompanied by a standard deviation of 2.733. In contrast, the spaced group had an average score of 25.00; the data has a standard deviation of 2.711. Looking at the mean scores and standard deviations, it can be noted that the control and massed groups displayed mean scores of  $25.00 \pm 2.711$  and  $25.26 \pm 2.820$ , respectively.

**Table 2**

*Results of the pre-test of the control group, spaced group, and massed group*

		Levene's Test for Equality of Variances		t-test for Equality of Means				95% Confidence Interval of the Difference		
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Reading Comprehension PRE Spaced Group	Equal variances assumed	.091	.763	1.323	98	.189	.720	.544	-.360	1.800
	Equal variances not assumed			1.323	97.993	.189	.720	.544	-.360	1.800
Reading Comprehension PRE Massed Group	Equal variances assumed	.183	.670	.470	98	.639	.260	.553	-.838	1.358
	Equal variances not assumed			.470	97.847	.639	.260	.553	-.838	1.358

As illustrated in Table 2, the mean scores of the control group and the spaced group do not show any significant difference ( $t=1.323, p=.189 > .05$ ). In a similar vein, it can be seen that the average scores received from the control group and the massed group do not exhibit any noteworthy disparity ( $t=0.470, p=0.639 > .05$ ), thereby indicating a likeness among the three groups.

**Table 3***Descriptive Statistics of the post-test for control, spaced, and massed groups*

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Reading Comprehension POST	Spaced	50	33.44	2.837	.401
	Control	50	28.60	2.763	.391
Reading Comprehension POST	Massed	50	30.18	2.974	.421
	Control	50	28.60	2.763	.391

The findings presented in Table 3 indicate that the average score of the spaced group ( $M=33.44, SD=2.837$ ) surpasses that of the control group ( $M=28.60, SD=2.763$ ). Nevertheless, it is imperative to confirm the data's normal distribution before conducting the independent samples t-test. Moreover, Table 3 exposes that the average score of the massed group ( $M=30.18, SD=2.974$ ) exceeds that of the control group ( $M=28.60, SD=2.763$ ).

**Table 4**

*Results of the post-test of the control group and spaced group*

## Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Reading Comprehension POST Spaced Group	Equal variances assumed	.021	.885	8.643	98	.000	4.840	.560	3.729	5.951
	Equal variances not assumed			.8.643	97.932	.000	4.840	.560	3.729	5.951
Reading Comprehension POST Massed Group	Equal variances assumed	.140	.709	2.752	98	.007	1.580	.574	.441	2.719
	Equal variances not assumed			2.752	97.473	.007	1.580	.574	.441	2.719

The findings of the post-test analysis on both the control and spaced groups are presented in Table 4. The data in Table 4 reveals a noteworthy difference in the average scores ( $t=8.643$ ,  $p=.000<.05$ ) between the spaced group and the control group. Furthermore, Table 4 highlights a significant discrepancy in the average scores ( $t=2.752$ ,  $p=.007<.05$ ) between the massed group and the control group. As a result, the null hypothesis was disproven, providing support for the alternative hypothesis that confirms the positive influence of both spaced and massed instructions on the reading comprehension of Iranian intermediate EFL learners.

The second research question examined the significant impact of spaced and massed instruction on reading comprehension and vocabulary gain of Iranian intermediate EFL students. To provide descriptive analysis, we calculated the average and dispersion of the participants in the control, spaced, and massed groups. The specific results can be observed in Table 5.

**Table 5***Descriptive Statistics of the pre-test for control, spaced, and massed groups*

Groups		N	Mean	Std. Deviation	Std. Error Mean
Vocabulary PRE	Spaced	50	25.68	3.389	.479
	Control	50	25.22	3.328	.471



	Groups	N	Mean	Std. Deviation	Std. Error Mean
Vocabulary	Spaced	50	25.68	3.389	.479
Vocabulary PRE	Massed	50	25.38	3.301	.467
	Control	50	25.22	3.328	.471

Table 5 displays the average scores and variations in the control and spaced groups, with the respective values of (M=25.22, SD=3.328) and (M=25.68, SD=3.389). The mean scores and standard deviations of the control and massed groups are also presented in Table 5, showing values of (M=25.22, SD=3.328) and (M=25.38, SD=3.301) respectively. Table 22 highlights the findings obtained from this analysis.

**Table 6**

*Results of the pre-test of the control group, spaced, and massed groups*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Vocabulary PRE Spaced Group	Equal variances assumed	.004	.949	.685	98	.495	.460	.672	-.873	1.793
	Equal variances not assumed			.685	97.967	.495	.460	.672	-.873	1.793
Vocabulary PRE Massed group	Equal variances assumed	.003	.960	.241	98	.810	.160	.663	-1.155	1.475
	Equal variances not assumed			.241	97.993	.810	.160	.663	-1.155	1.475

Table 6 demonstrates that the average discrepancy in scores between the control and spaced groups lacks significance ( $t=.685$ ,  $p=.495 > .05$ ) as the p-value is surpassed. Table 6 discloses that the distinction between the average scores indicates that there is no noteworthy difference ( $t=.241$ ,  $p=.810 > .05$ ) between the control and massed groups, as the value surpasses. Hence, the Levene's test affirms the similarity among the three categories. After the introduction of the intervention, the researcher employed SPSS software to analyze and compare the average values of the two sets of data during the post-test phase. Table 7 exhibits the outcome of these descriptive statistical measures for the mean values of the two groups.

**Table 7***Descriptive Statistics of the post-test for control, spaced, and massed groups*

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Vocabulary POST	Spaced	50	33.22	3.547	.502
	Control	50	28.66	3.198	.452
Vocabulary POST	Massd	50	30.12	3.420	.484
	Control	50	28.66	3.198	.452

The results presented in Table 7 reveal that the spaced group has a higher average score ( $M=33.22$ ,  $SD=3.547$ ) compared to the control group ( $M=28.66$ ,  $SD=3.198$ ). To conduct the independent samples t-test, it is necessary to ensure that the data follow a normal distribution, which is confirmed in SPSS. The post-test results for both the control and spaced groups can be seen in Table 7. These findings indicate that the mean score of the massed group ( $M=30.12$ ,  $SD=3.420$ ) surpasses that of the control group ( $M=28.66$ ,  $SD=3.198$ ). Table 7 visually presents these results. To achieve this goal, the researcher confidently employed an independent samples t-test. Table 8 displays the outcomes obtained from this t-test.

**Table 8***Results of the post-test of the control group, spaced group, and massed group*

		Levene's Test for Equality of Variances		t-test for Equality of Means				95% Confidence Interval of the Difference		
		F	Sig.	T	Df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Vocabulary POST Spaced group	Equal variances assumed	.714	.400	6.751	98	.000	4.560	.675	3.220	5.900
	Equal variances not assumed			6.751	96.967	.000	4.560	.675	3.219	5.901
Vocabulary POST Massed group	Equal variances assumed	.311	.579	2.205	98	.030	1.460	.662	.146	2.774
	Equal variances not assumed			2.205	97.561	.030	1.460	.662	.146	2.774

According to Table 8, the research discovered a notable variation ( $t=6.751$ ,  $p=.000<.05$ ) in average scores between the spaced and control groups. Participants' descriptive statistics, such as mean and standard deviation, were computed, unveiling noteworthy outcomes for both the control and spaced groups ( $t=2.205$ ,  $p=.030<.05$ ). These results confirm the notion that spaced, concentra

ted assistance has a beneficial impact on the comprehension of Iranian intermediate English as a Foreign Language learners while dismissing the null hypothesis.

**The results discovered during the investigation presented in the third stage of this research**

The third research investigation sought to explore whether there was a significant distinction in the ranks of reading comprehension and vocabulary proficiency among Iranian intermediate EFL learners who received spaced or massed instruction. Before conducting a one-way ANOVA, it is crucial to confirm that three essential assumptions have been fulfilled: the presence of a normal distribution, equal variances, and independence. Initially, the normality of the reading comprehension and vocabulary knowledge distributions was examined. Subsequently, Levene's Test was employed to evaluate the equality of variance between the variables, and the findings are shown in Table 9.

**Table 9**

*Results of the equality of variances*

		Levene's Test for Equality of Variances	
		F	Sig.
Reading Comprehension POST	Equal variances assumed	.053	.818
	Equal variances not assumed		
Vocabulary POST	Equal variances assumed	.084	.772
	Equal variances not assumed		

The p-value, being lower than the significance values of the two variables, suggests that the homogeneity of variance assumption is fulfilled. Moreover, the validation of the third assumption of independence assures that the data collected from various groups comprise distinct individuals. The measure of data was conducted using one-way ANOVAs, and the results can be observed in Table 11. To observe the descriptive statistics of the dependent variables in the spaced and massed groups, refer to Table 10.

**Table 10**

*Descriptive Statistics of the spaced group and massed group for the reading comprehension, and vocabulary knowledge*

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Reading Comprehension POST	Spaced	50	33.44	2.837	.401	32.63	34.25	28	40
	Massed	50	30.18	2.974	.421	29.33	31.03	24	37
	Total	100	31.81	3.323	.332	31.15	32.47	24	40
Vocabulary POST	Spaced	50	33.22	3.547	.502	32.21	34.23	27	40
	Massed	50	30.12	3.420	.484	29.15	31.09	24	37
	Total	100	31.67	3.801	.380	30.92	32.42	24	40

**Table 11**

*Results of the spaced group and massed group for the reading comprehension, and vocabulary knowledge*

		Sum of Squares	Df	Mean Square	F	Sig.
Reading Comprehension POST	Between Groups	265.690	1	265.690	31.458	.000
	Within Groups	827.700	98	8.446		
	Total	1093.390	99			
Vocabulary POST	Between Groups	240.250	1	240.250	19.788	.000
	Within Groups	1189.860	98	12.141		
	Total	1430.110	99			

The study steered a comparison of spaced and massed teaching techniques on reading comprehension and vocabulary gain. The results presented substantial disparities between the two groups, with the spaced teaching method producing significantly higher scores ( $F=31.458$ ,  $p=.000$  for reading comprehension and  $F=19.788$ ,  $p=.000$  for vocabulary knowledge). These findings assert the importance of urgently addressing these discrepancies to ensure equal opportunities for all individuals. Thus, it is theorized that there is a negligible disparity between the two teaching approaches that were confidently rejected.

### Discussion

This study investigated the impact of spaced and massed teaching on the reading comprehension and vocabulary acquisition of Iranian EFL trainees. Three research questions were posed to address this topic. Mean differences between the spaced, massed, and control groups were calculated using independent samples T-tests. No significant variations were found among the groups before instruction. The study aspired to compare the effects of spaced and massed instruction with the control group. One-way ANOVA was performed on the post-test results to investigate variations among Iranian intermediate EFL learners in reading comprehension and vocabulary knowledge spans. Statistical tests were used to determine if spaced or massed instruction had an impact on learners' scores compared to the control group. The results, presented in the tables, show that the spaced instruction group performed better than the massed and control group in reading comprehension and vocabulary knowledge. Therefore, the initial hypothesis that there would be no significant difference through spaced instruction was rejected.

The data-gathering process for research questions Q1 and Q2 included using an independent-sample t-test to examine the post-test data. This helped to present the impact of the treatment on students' reading comprehension and vocabulary knowledge. The results clearly show that students who received spaced instruction performed better than those in the control group who did not receive any specific treatment. These results highlight the positive impact of spaced instruction on the targeted learning outcomes, reinforcing the benefits of distributing learning sessions over time compared to uninterrupted or massed education. They align with previous research emphasizing the advantages of spacing out learning sessions to enhance retention and overall learning outcomes.

The third research inquiry aimed to determine if there were significant variances in reading comprehension and vocabulary proficiency among Iranian intermediate female students of English as a Foreign Language (EFL) who were made visible to spaced and massed instruction. To answer this question, we compared the two teaching methods to assess their effectiveness in

improving these typical learning functions. We conducted a confirmatory analysis and employed a one-way ANOVA. The mean statistical description for the two groups is displayed in Table 10., while Table 11. showcases the results for the spaced and massed instructional groups regarding the three dependent variables.

Table 10. shows average scores for reading comprehension and vocabulary knowledge of spaced instruction vs. massed instruction. Results suggest significant differences among the two groups ( $p < 0.05$ ). Consequently, the third nonbinding hypothesis of the study, which posited no significant differences among Iranian EFL learners in reading comprehension and vocabulary learning with spaced and massed instruction, was defective. The outcomes of this study emphasize the significance of spaced instruction for intermediate female EFL learners in Iran, and it observed that spaced teaching was more persuasive than Massed instruction in achieving better outcomes like improved reading and concept comprehension and enhanced vocabulary learning.

So, spaced instruction supports deep understanding by allowing learners repeated exposure to the material over time. This allows for the outcome of information, the recognition of patterns, and the consequence of connections between ideas and concepts. The spatial approach encourages learners to engage in active processing of the text, thereby promoting advanced cognitive abilities composed of examination, assessment, and combination that enable a more profound comprehension of the content, structure, and underlying themes of the text. Spaced instruction facilitates long-term retention of vocabulary by utilizing repeated exposures to words over spaced intervals. This approach allows learners to solidify their understanding and memory of new words, leading to more durable knowledge retention.

Spaced instruction promotes the contextual understanding and application of vocabulary in different settings. Learners are exposed to words in various contexts, enabling them to grasp subtle nuances, usage patterns, and the capability to apply vocabulary effectively. While mass classes can provide short-term benefits in time-limited situations, for example, in last-minute test preparation or immediate recall needs, promoting reading comprehension is more effectively achieved through spaced instruction. at a later date. Long-term, sustainable motivation and effectiveness. Vocabulary acquisition. By sequencing learning sessions and incorporating repetition and repetition, students are more likely to understand complex concepts, maintain motivation, and expand their vocabulary.

The studies conducted in experimental psychology provide valuable insights into effective learning strategies. They contribute to our understanding of the benefits of spaced education in maximizing long-term memory retention and highlight the importance of incorporating interval-based learning approaches in various educational settings. Miles (2014) confirmed the findings of this study, supporting the notion that Spaced learning has been proven to have greater efficiency compared to mass learning. The results indicate that the participants who received spaced instruction outperformed those who received massed instruction when it reached the length of reading comprehension in the follow-up assessment. The results signify that the spaced instruction class surpassed the massed instruction class in the duration of reading comprehension during the post-test. Based on these findings, students receive distributed instructions at regular intervals. This approach enhances the chances of retaining the acquired knowledge until they have the opportunity to reinforce it. Several methods can be employed to enhance learning. These include inserting random prompts, providing explicit instructions, or incorporating specific activities for tasks such as speaking, reading, or writing.

The conclusions drawn from this research align with previous research conducted by Carpenter et al. (2012), supporting the concept presented in the coding variability strategy. This strategy proposes that when two items are concurrently distinct, Anderson and Bower (1972) propose that encoding these ideas within the participant's mind could be dissimilar. The concept

of diversity in how memories are stored is further emphasized when individual components are introduced in different environments. These diverse contexts offer additional cues that assist in retrieval. Therefore, the instruction of spaced distribution often leads to more effective recall. Carpenter et al. (2012); and Greene (1989) highlighted the importance of variability in the in-memory representation, emphasizing its impact on memory performance. The idea that spaced distribution instruction enhances recall is in line with the principles of coding variability theory. By incorporating spaced intervals and exposing learners to different contexts during the learning process, memory retrieval is strengthened, resulting in improved overall recall. The upshots of the attending deconstruction were likewise found to be in alignment with the earlier investigation instructed by Mashhadi et al. (2017), indicating that spaced instruction has a profitable impact on long-term vocabulary learning in EFL learners. These results suggest that items separated by a wider time gap are more likely to be encoded and interpreted differently in a learner's memory. This enables our theoretical hypothesis. The distinction in the depiction of memory is facilitated through the diverse circumstances in which spaced elements are introduced, thereby furnishing learners with a more accessible framework. This disparity in the varied environments in which spaced items are encountered makes it easier to remember and retain information, thus providing a more accessible framework for learners. In contrast, this is not observed in the case of mass distribution. Hence, it can be argued that teaching in a distributed manner actively enhances the learning process.

In conclusion, there is mounting evidence suggesting that the concept of practical intervals has implications for courses focused on natural language. The research conducted revealed that when a specific schedule with a limited number of teaching hours per week is implemented, dividing this allocated time across several days is vital for enhancing short- and long-term memory retention in reading tasks that cater to various cognitive abilities. As the promising results of the final evaluation emerge, both course coordinators and ambitious students must recognize the need for a comprehensive weekly schedule that includes multiple days. Regular training sessions, even if they are of shorter duration, have demonstrated greater efficacy compared to attempting to fit all the hours into a single day. The spacing effect pertains to the notion of distributing study sessions across a period instead of consolidating them. This tactic aids in the process of encoding information into long-term memory. Through our investigation, we endeavor to investigate the potential application of spacing techniques to augment English as a Foreign Language (EFL) reading comprehension and vocabulary acquisition within an authentic learning environment. The results suggest that spacing techniques can be efficiently employed in EFL classrooms.

In the realm of language learning within academia, particularly when it comes to understanding written text, there are numerous advantages to implementing a delayed learning approach. By incorporating spaced-out training sessions, students can feel more confident in their capability to learn what they read. The findings of this research demonstrate that individuals learning English should actively employ spatial training to monitor their progress and enhance their learning journey. The attainment of a broad vocabulary is an essential and significant skill needed to learn and master a foreign language. It acts as the bedrock for the growth and improvement of other language abilities, such as reading, listening, speaking, writing, spelling, and pronunciation. Consequently, as educators acknowledge the importance of vocabulary acquisition, they consistently strive to identify the most effective approaches for successful instruction.

In this research, the utilization of mass instruction, whereby individuals engage in continuous task practice without interruption, and spaced instruction, which entails providing individuals with rest breaks during practice sessions, were employed to assess their impact on vocabulary recovery and retention. After applying the treatment sessions, it was established that the group

exposed to spaced instruction demonstrated superior performance in the post-test evaluations compared to the group subjected to mass distributions. Acquiring vocabulary is an essential skill in the innovation of teaching and learning a foreign language, as it serves as the foundation for the evolution of other skills such as reading, listening, speaking, writing, spelling, and pronunciation. Therefore, educators are constantly present, monitoring the most efficient methods enabling the pedagogy of vocabulary through virtual means. In the breakdown, the effects of mass instruction, which involves continuous practice without breaks, and spaced instruction, which includes rest breaks during practice sessions, were examined in representations of vocabulary recovery and retention. The results of the treatment sessions revealed that the group receiving spaced instructions outperformed the group with mass distributions in the post-tests.

The discoveries of this breakdown hold momentous implications for those in education, curriculum designers, and developers involved in English language instruction, particularly in the context of distance and mass learning. The findings stress the importance of sustainable practices in educational programs, with a focus on evidence-based reading activities. Recommendations for curriculum enhancement include the careful selection and implementation of appropriate instructional strategies to achieve high levels of reading proficiency.

Firstly, the study advocates for the use of instructional strategies aligned with evidence-based reading activities, emphasizing their careful selection and implementation for optimal learning outcomes. The integration of sustainable practices is deemed essential for the success of language programs. Secondly, the implementation of spaced instruction, especially in the realm of vocabulary learning within foreign language education, is highlighted as advantageous. The study suggests that utilizing distance learning enables students to enhance vocabulary acquisition with increased confidence. Additionally, the conscious use of time-shifted classes is recommended for monitoring performance and sustaining learning. Lastly, the study underscores the need for immediate efforts to establish and evaluate the sustainability of language programs, emphasizing ongoing assessments and evaluations to ensure effectiveness and longevity. The iterative process of making necessary adjustments and improvements is deemed crucial for program success.

The attending analysis emphasizes the vital function of sustainability in English language instruction. Concentrating on refining established programs, incorporating suitable instructional strategies, and continually evaluating program sustainability are proposed as ways to enhance student performance and ensure long-term success in reading proficiency. The study suggests several avenues for future research, including exploring the effects of massed and spaced instructions across different language proficiency levels. It recommends investigating potential variations and cultural influences by conducting similar studies in diverse geographic areas. Future research is encouraged to replicate the analysis by extending the study duration and conducting multiple posttests. This will allow for a more comprehensive understanding of the word-learning processes and the precise impacts of spacing, particularly among young learners. Future research is encouraged to replicate the analysis with extended periods and multiple post-tests, providing deeper insights into word-learning processes and the specific effects of spacing, especially on young learners. Addressing the study's limitations, future research should aim for a more representative sample by including male students. Extending the treatment duration is also proposed for a comprehensive assessment of instructional methods. Additionally, the study's focus on Iranian EFL students suggests the need for similar investigations in other EFL and ESL settings to broaden the scope of findings.

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### Biodata

**Zeinab Rezaei Gashti** is a Ph.D. student of TEFL at Sarab University, Sarab, Iran. She has been teaching English for several years at language schools and a University. She has passed many TTC classes and she has published 5 ISI and Scopus international articles in foreign international journals. Her main areas of interest include methods and techniques of language teaching and English learning strategies.

Email: [zeynabrezaeigashti@gmail.com](mailto:zeynabrezaeigashti@gmail.com)

**Ali Asghar Yousefi Azarfam**, as a PhD holder in TESL, has been the assistant professor and faculty member of Islamic Azad University for almost 17 years while teaching in different EFL disciplines. He has also taught many courses at postgraduate levels in Iran and Malaysia. His national and international conference presentations and journal publications have been in his main areas of interest such as CALT, language skill development, and practical teaching.

Email: [ali.youssefi8@gmail.com](mailto:ali.youssefi8@gmail.com)

**Fatemeh Mirzapour** is an assistant professor of English Language and Literature at Sofiyan Branch, Islamic Azad University. She holds a Ph.D. in English Teaching. Her main interests are, primarily, language teaching, psycholinguistics, and discourse analysis.

Email: [fatemehmirzapour54@gmail.com](mailto:fatemehmirzapour54@gmail.com)



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