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Єлизавета КРЮКОВА¹, Наталія ЯМШИНСЬКА², Неоніла КУЦЕНОК³, Інна МЕЛЕШКО⁴

Національний технічний університет України

«Київський політехнічний інститут імені Ігоря Сікорського, Україна

¹ <https://orcid.org/0000-0002-7408-9584>

lizacru@ukr.net

² <https://orcid.org/0000-0002-0518-3657>

nyamshinskaya@ukr.net

³ <https://orcid.org/0000-0001-7111-0088>

engnila@ukr.net

⁴ <https://orcid.org/0000-0002-7414-7828>

inameleshko@ukr.net

МЕТОД ІНТЕРВАЛЬНОГО ПОВТОРЕННЯ ДЛЯ ПІДВИЩЕННЯ РІВНЯ ВОЛОДІННЯ СТУДЕНТАМИ АНГЛІЙСЬКОЮ МОВОЮ

Анотація. У процесі вивчення іноземної мови метод інтервального повторення набув важливого значення. Це, безсумнівно, ефективна навчальна техніка, яка може суттєво покращити засвоєння студентами словникового запасу та граматичних структур мови, що вивчається. Інтервальне повторення сприяє поліпшенню запам'ятовування навчального матеріалу, активізуючи процес навчання через регулярне повторення та використання наочних засобів. Автори статті провели дослідження ефективності використання інтервального повторення як методу покращення оволодіння англійською мовою. У дослідженні взяли участь студенти Національного технічного університету України "Київський політехнічний інститут імені Ігоря Сікорського". До експерименту було залучено 76 студентів, яких розділили на дві групи: експериментальну та контрольну. Експериментальна група використовувала інтервальне повторення для вивчення словникового запасу та граматики, тоді як контрольна група продовжувала навчання за традиційною програмою без використання даного методу. Для оцінки впливу інтервального повторення обидві групи пройшли однакове тестування до та після експерименту. Попереднє тестування було проведено з метою встановлення рівня володіння словниковим запасом та граматикою кожного студента, що дозволило безпосередньо порівняти прогрес, досягнутий під час дослідження. Підсумкове тестування, яке було проведено наприкінці експерименту, мало на меті оцінити ефективність методу інтервального повторення, вимірюючи покращення мовленнєвих навичок. Дані були зібрані за допомогою онлайн-опитувань та анкетування з використанням шкали Лікерта. Результати показали, що більшість студентів експериментальної групи, які систематично використовували інтервальне повторення, продемонстрували значне покращення мовленнєвих навичок, що підтверджується вищими балами підсумкового тесту. Контрольна група, навпаки, показала менш виразний прогрес, що підкреслює додаткову цінність інтервального повторення у процесі вивчення мови. Отримані результати доводять універсальність та ефективність інтервального повторення, особливо коли цей метод інтегрується у навчальну практику. Він показав свою дієвість не тільки для запам'ятовування, але й для покращення використання мовленнєвих навичок на практиці, що сприяє більш впевненому спілкуванню іноземною мовою. Крім того, студенти з експериментальної групи зазначили позитивний вплив на їхню мотивацію та вміння керувати часом, що додатково підтверджує потенціал інтервального повторення як потужного інструменту при вивченні іноземної мови.

Ключові слова: інтервальне повторення; збереження пам'яті; засвоєння мови; когнітивна психологія; результати вивчення мови.

Yelyzaveta KRYUKOVA¹, Natalia YAMSHYNSKA², Neonila KUTSENOK³, Inna MELESHKO⁴

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine

¹ <https://orcid.org/0000-0002-7408-9584>

lizacru@ukr.net

² <https://orcid.org/0000-0002-0518-3657>

nyamshinskaya@ukr.net

³ <https://orcid.org/0000-0001-7111-0088>

engnila@ukr.net

⁴ <https://orcid.org/0000-0002-7414-7828>

inameleshko@ukr.net

ENHANCING ELS STUDENTS' LANGUAGE PROFICIENCY THROUGH SPACED REPETITION

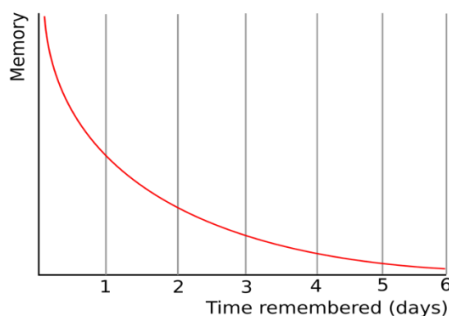
Abstract. In language learning, the method of spaced repetition has gained significant importance. It is undoubtedly a learning technique that can greatly enhance students' vocabulary and grammar acquisition. Spaced repetition allows to improve students' long-term retention of the language content they study enhancing language learning through active engagement, repetition, and visual aids. The effectiveness of spaced repetition as a method of improving English language acquisition was investigated by the authors of the paper. The participants of the research were students at the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute." The

experiment involved 76 students, who were divided into two groups: an experimental group and a control group. The experimental group applied spaced repetition to their vocabulary and grammar learning, while the control group continued their studies according to the traditional syllabus without the use of spaced repetition. To assess the impact of spaced repetition, both groups took the same test before and after the experiment. The pre-test served to establish a baseline measurement of each student's vocabulary and grammar proficiency, allowing for a direct comparison of progress made during the study. The post-test, conducted at the end of the experiment, aimed to evaluate the effectiveness of the spaced repetition method by measuring any improvements in language skills. Data was collected through a combination of online surveys and a Likert scale questionnaire. The results demonstrated that the majority of students in the experimental group, who consistently used spaced repetition, reported significant improvements in their language skills, as evidenced by higher scores on the post-experiment test. In contrast, the control group showed less pronounced progress, highlighting the added value of spaced repetition in language learning. The findings underline the versatility and effectiveness of spaced repetition, especially when integrated into the daily learning process. This method not only proved its effectiveness for memorization but also enhanced the practical application of language skills, leading to more confident and accurate communication in English. Additionally, students in the experimental group reported positive impacts on their motivation and time management, further supporting the potential of spaced repetition as a powerful tool for language education across various linguistic fields.

Keywords: spaced repetition; memory retention language acquisition; cognitive psychology; language learning outcomes.

Introduction. In the field of understanding how the human brain reacts to specific learning processes, neuroscientists support the impact of having multiple learning sessions with the retention of knowledge. Spaced learning is a product made out of human's lack of capacity to retain information and attempts to reduce the forgetting rate.

The spaced repetition method for learning builds on the psychological concept known as the spacing effect. German psychologist Hermann Ebbinghaus [4] first proposed this idea in the late 1800s and early 1900s. Through his research on how quickly individuals memorize information, Ebbinghaus observed that memory retention declines over time, but not at a consistent rate. He discovered that we tend to forget new information more rapidly immediately after learning it, with the rate of forgetting slowing down as time passes. Ebbinghaus visualized this phenomenon using graphs, which he referred to as the learning curve, the forgetting curve, or the spacing effect [4]. These concepts form the foundation of spaced repetition as a learning strategy.



Adopted from: https://en.wikipedia.org/wiki/Forgetting_curve

A lot of research is devoted to studying how the human brain responds to learning processes, highlighting the importance of multiple learning sessions for better knowledge retention. The concept of "spaced learning" is central to this discussion due to its significant implications for both memory and educational practices. In simple words it involves reviewing material repeatedly at ever-increasing intervals in order to make sure that crucial lessons stick in the mind. Spaced repetition is a learning technique rooted in cognitive psychology, gaining significant attention as an effective strategy for enhancing memory retention and language acquisition.

Spaced learning is defined by Ebbinghaus as a technique which requires a sufficient number of repetitions, memorization of gained knowledge [4].

Spaced learning, a technique designed to counteract the brain's natural tendency to forget information, is examined in this study. The paper seeks to understand their effects on memory retention by comparing spaced learning with massed learning.

This method is based on the principle that information is more effectively encoded into long-term memory when it is reviewed at gradually increasing intervals. The growing complexity of global communication and the increasing demand for multilingual proficiency have driven educators and researchers to explore innovative approaches to language instruction. Among these, spaced repetition stands out due to its ability to address one of the most persistent challenges in language learning: the retention and recall of new information over time. By strategically spacing out review sessions, learners can overcome the forgetting curve, a phenomenon where newly acquired knowledge is rapidly lost if not reinforced.

In this paper the authors have explored the effectiveness of this method across various linguistic domains, including vocabulary acquisition and grammar mastery. This research has not only demonstrated the benefits of spaced repetition, but also highlighted its versatility and adaptability to different learning needs and environments.

According to the findings of the research, authors gained valuable insights into how spaced repetition can be optimised and applied to improve language learning outcomes.

Analysis of previous studies and publications. Conventional science curricula tend to emphasize educational practices that lead to high scores on immediate exams, though these practices may not reliably indicate students' long-term academic success. Similarly, in language learning, traditional methods often prioritize short-term memorization and grammar drills aimed at passing tests, rather than fostering deep, long-lasting linguistic proficiency.

However, in this paper we aim to show the evidence of spacing effect in language education and probes into its theoretical mechanisms. In brief, as part of our investigation, we intend to address how spacing works by repeatedly presenting the learning material across various temporal intervals.

In reviewing the existing literature on the impact of spaced learning on language acquisition, several key themes emerge.

This effect is rooted in cognitive psychology, where the distribution of learning sessions over time is believed to enhance memory consolidation processes.

In a meta-analysis, Cepeda et al. [1] found that when the total study time remained the same, recall efficiency was greater with spaced learning using expanding intervals between study sessions compared to both fixed intervals and massed learning.

Distributed practice in verbal recall tasks: a review and quantitative synthesis.

The researchers of this phenomenon argued that the spacing effect occurs under a wide variety of conditions.

Greene [6] claimed that "memory for repeated items on a list improves as a function of the spacing between repetitions". His study found that spacing effects in free recall are not dependent on learning intentions. When retrieval cues are given, spacing effects are attributed to a rehearsal strategy that reduces rehearsal frequency for massed items. Without such cues, spacing effects are driven by a different process involving the retrieval of repeated items during study.

Other researchers such as Estes [5], Hintzman [7], Naqib et al. [11] suggested that the spacing effect may involve different mechanisms depending on the duration of the spacing interval.

Son [13] suggested that metacognitive control might affect this spacing effect, as forcing participants to use spaced intervals instead of their preferred massed restudy led to a diminished spacing effect. However, further experiments revealed that issues with item selection, rather than metacognitive control, likely explained the reduced spacing effect. When these item-selection issues were addressed, the spacing effect remained strong and consistent, regardless of whether participants' preferences were followed.

Existing research has consistently shown that the spacing effect plays a significant role in the long-term retention of language skills. Studies have explored how this effect can be harnessed to improve vocabulary acquisition, grammar comprehension, and overall linguistic proficiency.

Lafleur [8] addressed the application of spaced repetition in vocabulary acquisition, specifically through the "indirect spaced repetition concept." Lafleur critiqued traditional approaches that relied heavily on repetitive drills, proposed instead that vocabulary learning could be more effective when spaced repetition is integrated into contextually meaningful tasks. This method encourages learners to engage with language in authentic contexts, enhancing retention and reducing the monotony often associated with rote learning. However, while this approach increases engagement, it may require more sophisticated instructional design, which could be challenging for educators to implement consistently.

Cole [2] explored the use of spaced repetition software for vocabulary acquisition, with a focus on assessing its effectiveness. In his research Cole highlighted the significant benefits of using digital tools like Anki and Quizlet in ESL classrooms, which allow for personalized and adaptive learning experiences and help ESL students practice and memorize vocabulary and verb forms etc. These tools can track learner's progress, adjusting the frequency of repetition based on individual needs, which greatly enhances vocabulary retention. However, Cole also noted potential drawbacks, such as the risk of students becoming overly reliant on these tools, potentially neglecting other important language skills like grammar and conversational practice [2].

The study of Cozzens and Bartolotti [3] was also focused on the promotion of spaced repetition flashcard apps with language classes, and they compared their effectiveness in vocabulary and grammar learning. Their research indicated that while these apps are particularly effective for vocabulary acquisition, their application in grammar learning can be more complex. The structured nature of flashcards is well-suited to discrete vocabulary items but may not fully capture the nuances of grammatical structures. Additionally, the authors pointed out the main obstacles to adopting SRS (spaced repetition study) which are from conventional classroom habits and structures. They concluded that the success of these tools is contingent upon their integration into a broader curriculum, requiring active involvement from educators to ensure balanced language development.

Losey-León and Balderas [10] focused on spaced repetition within the context of grammar mastery, particularly in a virtual learning environment tailored for Maritime English. Their adaptive testing system,

which adjusts the repetition schedule based on real-time learner performance, is shown to be effective in helping students master complex grammatical structures. This approach offers a highly individualized learning experience, which can significantly improve grammar retention and application. However, the implementation of such system is resource-intensive and requires significant technological infrastructure, which may limit its accessibility in more traditional or less technologically advanced educational settings.

Pokrywka et al. [12] and Lo [9] extended the discussion to listening and speaking skills, with a particular focus on how spaced repetition could be applied beyond vocabulary and grammar, explored the use of Long Short-Term Memory (LSTM) networks to optimize spaced repetition schedules for listening and speaking practice. Their research suggests that AI-driven models can predict optimal review intervals, significantly enhancing the effectiveness of spaced repetition for these skills. However, the complexity of these models and the need for advanced technological resources may pose challenges for widespread adoption.

Lo [9] on the other hand, examined the effectiveness of spaced repetition compared to immediate repetition in enhancing listening and speaking skills through dual-subtitled videos. Lo's findings indicated that spaced repetition is particularly effective when combined with multimedia content, offering substantial improvements in both comprehension and oral fluency [9]. This study underscores the potential of spaced repetition to support more dynamic and interactive forms of language learning, though it also highlights the need for high-quality multimedia resources, which may not always be readily available.

A large body of research reviewed offers distinct advantages of spaced learning study, such as increased engagement and personalized learning experiences, but also presents certain challenges, including resource requirements and the potential for skill neglect if not properly integrated into a comprehensive language learning strategy.

The purpose of the study. This paper aims to investigate the possible effects of the incorporation of spaced repetition method in ESL classes on language acquisition. To attain this aim, the following tasks are to be pursued:

- 1) to establish the students' views on implementing spaced repetition method with the help of surveys;
- 2) to demonstrate the effectiveness of presenting learning material across various temporal intervals on the development of vocabulary, grammar, and its impact on long-term understanding and reflective skill development;
- 3) to determine the impact that the strategy of spaced repetition has on the motivation, attention, and the ability of students to inspect their learning progress during language acquisition.

Research Methods. The experiment designed to prove or disprove the effectiveness was conducted among 76 first-year students studying engineering at the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute".

Before the experiment the participants took a survey aimed to determine their awareness of the interval repetition method. This survey included questions on their prior experience with various study techniques and their familiarity with spaced repetition as a learning tool. The data collected from the survey provided a baseline understanding of the participants' knowledge, which was essential for analysing the impact of the method. Additionally, the survey helped identify any pre-existing biases or misconceptions about the effectiveness of interval repetition. This initial assessment was crucial for tailoring the subsequent phases of the experiment.

After that, the students were divided into two groups: the first group continued language acquisition using traditional methods, while the spaced learning approach was implemented with the second group (experimental group) during their language lessons.

An entry test was conducted at the beginning of the experiment to determine the language proficiency level of participants in both groups. A final test was administered after the study period to assess the vocabulary and grammar proficiency of all participants. The results from these assessments were then compared to evaluate the effectiveness of the two methods.

At the end of the study, a Likert scale questionnaire was administered to assess the satisfaction of the participants of the second group with the use of interval repetition in the foreign language learning process.

A Likert scale for 6 survey prompts with its varied set of responses was used to find out responders' attitudes, indicate the level of the agreement and satisfaction. The survey was conducted with the help of Google Forms service. The respondents were asked to indicate their level of agreement with various statements, ranging from 'Strongly agree' to 'Strongly disagree,' and their satisfaction from 'Very satisfied' to 'Very dissatisfied.' To display the distribution of responses on the Likert scale, we used a bar chart and calculated the median (Mdn) and interquartile range (IQR) to measure central tendency.

Summary of the main research material. Based on the first survey conducted among the participants of the experiment a comprehensive analysis of their awareness and understanding of the spaced repetition method for learning English vocabulary and grammar reveals several key insights.

A significant majority of students (67%) reported being aware of the spaced repetition method prior to the survey, while the remaining 33% had no prior knowledge of it. A smaller percentage (13%) first encountered the method through direct instruction from teachers.

When asked to assess their familiarity with the concept, the students' responses varied. A notable portion (33%) described themselves as somewhat familiar with spaced repetition, while 27% were only slightly familiar. Interestingly, 20% of students reported a high level of familiarity, describing themselves as either very familiar or extremely familiar with the method, whereas 13% had no familiarity at all. This distribution suggests that while awareness is relatively widespread, a deeper understanding of the method is less common.

In terms of understanding how spaced repetition is applied to English learning, 40% of students indicated that they understood the method somewhat, with another 27% stating that they understood it very well. Only 7% felt they had complete understanding, while 20% acknowledged only a little understanding, and 7% admitted to not understanding it at all. This indicates a potential area for further education, as a substantial number of students might not fully grasp the application of the method despite being aware of it.

The survey results reveal that while awareness of the spaced repetition method is relatively high, there is a varying degree of understanding and usage among students.

Before starting the experiment, a baseline knowledge assessment was conducted to evaluate the students' current vocabulary and grammar proficiency in English as a second language. An entry test or pre-test was provided to establish a reference point for measuring future progress.

In the pre-test, only 45% of the students in the experimental group could correctly recall vocabulary words. However, after consistent use of spaced repetition, 78% of the students correctly identified and used these words in the post-test, indicating a marked improvement in their vocabulary retention.

The pre-test revealed that 40% of the students in the experimental group struggled with the correct usage of complex grammatical structures. In contrast, 72% of the students demonstrated accurate usage of these structures in the post-test, showcasing the effectiveness of spaced repetition in reinforcing grammar rules.

To implement the spaced repetition method within the experimental group, students were introduced to a range of interactive tools, including Anki, Quizlet, Memrise, and Duolingo, designed to enhance vocabulary and grammar retention through systematic review at optimal intervals. The ESL teachers played a pivotal role in ensuring the effectiveness of these tools by closely monitoring student engagement, providing ongoing support, and encouraging consistent use.

Teachers implemented various strategies to maintain student motivation and commitment to the spaced repetition process. They organized regular motivational sessions where students could discuss challenges and share their progress. These sessions served as a platform to boost morale and reinforce the importance of regular practice. Additionally, teachers sent reminders to keep students on track, ensuring that they adhered to the spaced repetition schedules.

Moreover, teachers assessed and addressed psychological barriers that could potentially hinder the effectiveness of the method. For instance, they offered personalized feedback to alleviate any anxiety or frustration students might experience due to the repetitive nature of the method. By fostering a supportive environment, the educators helped students overcome obstacles and remain focused on their learning goals.

These efforts ensured that the spaced repetition tools were not only used consistently but also effectively, leading to improved outcomes in the experimental group compared to the control group, which followed the traditional syllabus. This structured approach, combining technological tools with personalized support, proved instrumental in enhancing the students' language learning experience.

After the 10-week period of using spaced repetition tools in the experimental group, while the first group continued with traditional methods, a post-test was conducted with students from both groups, and its results were compared with those of the pre-test. The purpose of the post-test was to assess the effectiveness of the spaced repetition technique in enhancing the students' mastery of vocabulary and grammar. The results demonstrated a significant improvement in the experimental group compared to the control group, which continued to follow traditional learning.

Overall, the post-test results clearly illustrated that the students who engaged in spaced repetition outperformed those in the control group across all assessed areas. The experimental group exhibited stronger vocabulary retention, better grammatical accuracy, and proving the efficacy of spaced repetition in language learning.

To summarize the results of the experiment a Likert scale survey was conducted to gauge the students' satisfaction with spaced repetition as a study method. The survey focused on several key areas, including the perceived effectiveness of the method, ease of use, impact on motivation and engagement, time management, and overall satisfaction.

1) A significant portion of students (65%) reported that they found the spaced repetition method to be effective for learning new vocabulary, rating its value as "High" (Mdn=2, IQR =1,25) (See Table 1).

Table 1.

Students' perception of spaced learning							
Survey prompts	Very high	High	Moderate	Low	Very low	Mdn	IQR
How do you evaluate the effectiveness of spaced repetition learning?	25	40	20	10	5	2	1,25
How do you evaluate the improvement in your ability to retain and recall vocabulary through consistent use of the spaced repetition method?	27	28	25	13	7	2	2
	Strongly agree	Agree	Undecided	Disagree	Strongly disagree	Mdn	IQR
How strongly do you agree or disagree with the following statement: <i>"The tools and platforms applied with the method of spaced repetition are easy to use and integrate into your daily study routines"</i> ?	29	41	20	8	2	2	2
How strongly do you agree or disagree with the following statement <i>"The spaced repetition method helped me stay motivated to study regularly"</i> ?	30	44	14	8	4	2	2
How strongly do you agree or disagree with the following statement <i>"The spaced repetition method helped me manage my study time more effectively"</i> ?	21	39	19	12	9	2	1
	Very satisfied	Satisfied	Neither	Dissatisfied	Very dissatisfied	Mdn	IQR
How do you rate your overall satisfaction with the spaced repetition method?	30	38	17	10	5	2	2

Thus, they perceived a marked improvement in their ability to retain and recall vocabulary through consistent use of the method. These findings resonate with the research conducted by Lafleur [8], who emphasized that spaced repetition is particularly effective in vocabulary acquisition when integrated into meaningful, context-based tasks.

2) Similarly, a substantial number of students felt that their understanding of English grammar had also improved due to the use of spaced repetition tools. 55% of the participants rated the effectiveness of this approach as "Very high" or "High". According to grammar learning, the study aligns with findings from Cozzens and Bartolotti [3] and Losey-León and Balderas [10], who found that while spaced repetition is effective for vocabulary, its application to grammar requires more sophisticated instructional design.

However, a minority of respondents (20%) indicated low to very low values of the effectiveness of this method, expressing dissatisfaction with its impact on their learning, particularly in areas like grammar retention. This suggests that the method did not fully meet their expectations or address their specific learning needs (Figure 1).

3) The usability of spaced repetition tools received generally positive feedback. The calculation of the median (Mdn =2) and the Interquartile range (IQR=2) showed that most respondents (41%) agreed that the tools were easy to use and integrate into their daily study routines (See table 1). This high level of user-friendliness likely contributed to the sustained engagement observed throughout the study period. Nevertheless, a small percentage (10%) found the tools challenging to use, which highlights the importance of ensuring that such tools are accessible to all students, regardless of their technological proficiency (Figure 2).

4) The results of the study showed that most students agreed with Prompt 4 about the motivation (Mdn=2, IQR =2) (See table 1). 44% of students claimed that spaced repetition method helped them stay motivated to study regularly. The method's structured approach, which emphasizes regular review and gradual mastery of material, appears to have kept students engaged and committed to their learning goals. However, 14% of students remained neutral, and 12% disagreed with this statement, suggesting that while the method was effective for many, it may not resonate equally with all learners.

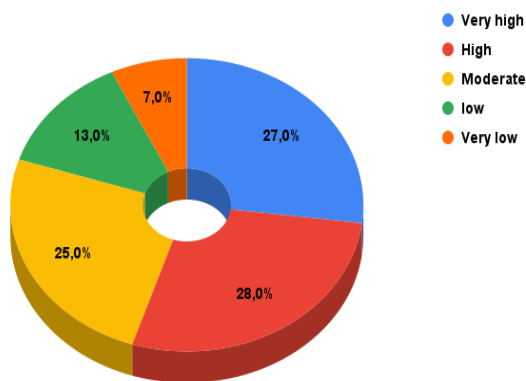


Fig. 1. Effectiveness of Spaced Repetition for Grammar Learning. The spaced repetition method improved my understanding of English grammar

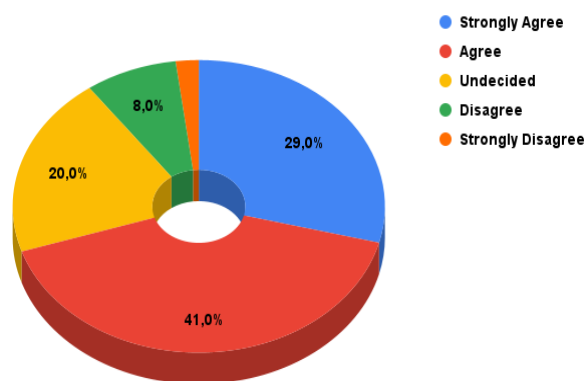


Fig. 2. Usability of Spaced Repetition Tools. The spaced repetition tools were easy to use and integrate into my daily study routine

5) The survey also explored the impact of spaced repetition on students' time management. A majority of students (60%) (Mdn=2, IQR =1) (See table 1) felt that the method helped them manage their study time more effectively, with 29% strongly affirming and 31% affirming that the method positively impacted their overall learning efficiency.

The spaced repetition framework, which encourages short, focused study sessions, likely made it easier for students to balance their language learning with other academic responsibilities. Despite this, 19% of respondents were neutral, and 11% disagreed, indicating that time management remains a challenge for some, even with the structured approach provided by spaced repetition.

6) When considering their overall experience, the results of the study showed that 68% of students, combining those who were highly satisfied and satisfied, expressed satisfaction with the spaced repetition method, indicating that they would likely continue using it in the future. A similar percentage stated that they would recommend the method to other students. However, 15% of students expressed dissatisfaction, highlighting that while the method is generally effective and well-received, it may not be the best fit for everyone (Figure 3).

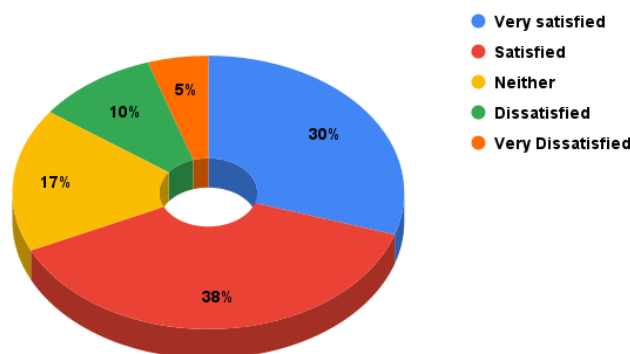


Fig. 3. Responders' overall satisfaction with the spaced repetition method

The survey revealed that 47% of students had used spaced repetition tools such as Anki, Quizlet, Memrise, or Duolingo in their studies for after classes activities. Among these, Anki was the most commonly used tool (20%), followed by Quizlet (13%). However, the majority (53%) had not used any such tools.

When examining how frequently students used spaced repetition tools, the data showed a wide range of habits. Over half of the students (53%) never incorporated these tools into their study routines, while 13% used them rarely. Around 20% used the tools occasionally, and a smaller segment (14%) used them frequently or always. This suggests that while the tools are available and known to many, they are not yet fully integrated into the regular study habits of a significant portion of the student body.

The data suggest that similar to the findings of Lafleur [8], Cole [2], Cozzens, Bartolotti [3], and Losey-León [10], spaced repetition is a powerful tool for language learning when properly implemented, though it may require additional support and instructional strategies to fully leverage its benefits.

This experiment highlights the effectiveness of spaced repetition in enhancing long-term retention of vocabulary and grammar, making it a powerful tool for language learning. The data strongly suggest that integrating spaced repetition into regular study routines can lead to more substantial knowledge retention compared to traditional study methods.

These findings indicated that while a substantial number of students had recognized the benefits of spaced repetition tools, there remained a significant gap in their widespread adoption and consistent use. This suggested a need for further integration of these tools into regular study routines and potentially more comprehensive training on their effective use. The varied results in retention improvements also underscored the importance of personalized approaches to language learning, as the effectiveness of these tools could differ based on individual learning styles and preferences.

Conclusion and prospects for further research. The findings of research provide robust evidence supporting the efficacy of spaced repetition as a powerful tool in various domains of English language learning.

In the realm of vocabulary acquisition, students demonstrated a high frequency of spaced repetition usage, which correlated with marked improvements in vocabulary retention and overall satisfaction with the learning process. The utilisation of tools like Anki and Quizlet was instrumental in this success, underscoring the importance of integrating technology into language learning routines.

Similarly, in the study of grammar, spaced repetition proved to be a critical method for mastering complex grammatical structures. The significant improvements reported in both written and oral grammar application highlight the method's effectiveness beyond mere memorization, fostering deeper understanding and confident usage of grammatical rules.

Overall, these studies collectively highlight the versatility and effectiveness of spaced repetition across different linguistic domains. The consistent positive outcomes across vocabulary and grammar suggest that spaced repetition should be considered a cornerstone of language learning strategies. The high levels of satisfaction and the tangible improvements reported by students further reinforce the importance of this method in achieving language proficiency and fluency in both general and specialised contexts.

The results of the Likert scale survey provide valuable insights into the students' experiences with the spaced repetition method. Overall, the method was well-received, particularly in terms of its effectiveness for vocabulary retention, ease of use, and its positive impact on motivation and time management. However, the mixed responses from a minority of students suggest that while spaced repetition is a powerful tool for many, there is room for improvement, particularly in making the method more adaptable to different learning styles and needs. These findings underscore the importance of offering a variety of study strategies to accommodate the diverse preferences and challenges of learners in any educational setting.

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