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Effectiveness of Spaced Repetition Techniques for Vocabulary Acquisition for English Language Learners in Maritime Industry

H. M. C. P. Jayawardena

University of Kelaniya, Sri Lanka

Email address of the corresponding author - hmjayawardena@gmail.com

Abstract

This study investigates the effectiveness of spaced repetition (SR) techniques for vocabulary acquisition and retention in adult English as a Second language (ESL) learners within the maritime industry. Twenty students conveniently sampled from a maritime English course participated. The research employed a mixed method approach with pre-test, post-test, and delayed post-test designs to assess vocabulary knowledge in both an Anki spaced repetition group and a rote memorization group. The classroom environment was observed to be friendly, supportive, and facilitated learning in the students' first language. This likely contributed to a positive learning experience for both groups. Pre-test results confirmed the students in both groups were beginners (A1 level) in maritime English. Post-test results revealed that the rote memorization group achieved high scores in recalling exact definitions, demonstrating effectiveness for immediate recall. However, the Anki group displayed a deeper understanding of vocabulary concepts beyond simply memorizing definitions. A one-month delayed post-test highlighted the significant advantage of SR for long-term retention. The Anki group performed exceptionally well, while the rote memorization group struggled with vocabulary activities. This suggests that spaced practice facilitated the transition of learned vocabulary from short-term to long-term memory. These findings support the potential benefits of SR (Anki[1]) for fostering deeper vocabulary understanding and long-term retention compared to rote memorization techniques in adult ELLs learning maritime English. While the small sample size and convenient sampling method limit generalizability, this research provides valuable insights for future studies exploring SR effectiveness across various learning contexts and proficiency levels in the maritime industry.

Keywords: English as a Second Language Learners; Maritime English; Spaced Repetition (SR); Vocabulary Acquisition

Introduction

Spaced repetition (SR) is a powerful learning technique that has been extensively studied in cognitive psychology. It involves reviewing information at progressively increasing intervals, based on retrieval difficulty. This method aligns with the principles of memory consolidation, enhancing the transition of newly learned material from short-term to long-term memory (McDaniel & Bjork, 2017). Research has consistently demonstrated the effectiveness of SR in various learning contexts, including language acquisition (Fitzpatrick et al., 2018; Loaiza & Fernandes, 2014). For adult English language learners (ELLs) navigating specialized fields like the maritime industry, acquiring new vocabulary

[1] *Anki is a free and open-source flashcard program. It uses techniques from cognitive science such as active recall testing and spaced repetition to aid the user in memorization.*

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can be challenging. SR offers a promising approach to address this issue by optimizing vocabulary retention and reducing the need for rote memorization (Bahrick, 1994; Cepeda et al., 2006).

Research Problem

While traditional methods like flashcards and rote memorization can play a role in vocabulary acquisition, they often lack the spaced review element crucial for long-term retention. This can lead to cramming behavior and rapid forgetting of newly learned vocabulary. Furthermore, traditional methods may not provide sufficient opportunities for active recall, a key factor in strengthening memory.

Spaced repetition, with its emphasis on spaced reviews and active recall, offers a potential solution to these limitations. However, the effectiveness of SR in the specific context of adult ELLs, particularly compared to traditional methods, remains an underexplored area. This research aims to address this gap by investigating the impact of SR on vocabulary acquisition and retention in ELLs in the maritime industry.

Research Questions

1. Does the use of spaced repetition techniques lead to greater vocabulary acquisition and retention compared to traditional methods (e.g., flashcards, rote memorization) among adult English language learners?

2. How do the long-term retention rates of vocabulary acquired through spaced repetition compared to those acquired through traditional methods among adult ELLs?

Literature Review

Vocabulary acquisition is a critical aspect of successful English language learning (ELL) (Nation, 2006). However, retaining new vocabulary can be challenging for ELLs, often requiring effective strategies to overcome memory limitations. Spaced repetition (SR) emerges as a promising technique to address these challenges. This review examines the existing research on the effectiveness of SR for vocabulary acquisition in ELLs.

Theoretical Framework

SR builds on the concept of spaced learning, where information is reviewed at progressively increasing intervals based on retrieval difficulty (Cepeda et al., 2006). This aligns with memory consolidation principles, promoting the transfer of vocabulary from short-term to long-term memory (McDaniel & Bjork, 2017). Core principles of SR involve initial exposure, followed by spaced reviews with increasing intervals and active recall techniques (Bahrick, 1994).

Effectiveness of SR for Vocabulary Acquisition

Several studies support the effectiveness of SR for vocabulary learning. Using flashcards with spaced repetition schedules, Leitner (1974) demonstrated improved vocabulary recall compared to traditional flashcards for German high school students. More recent studies by Fitzpatrick et al. (2018) and Loaiza and Fernandes (2014) utilizing digital spaced repetition apps found significant improvements in vocabulary acquisition and retention among adult language learners.

SR in the Context of ELLs

While research supports the general benefits of SR for vocabulary learning, studies specifically examining its effectiveness with ELLs are limited. Some studies show promise. For instance, McDonough et al. (2013) found that SR combined with imagery techniques improved vocabulary acquisition in adolescent ELLs. However, further research is needed to explore the impact of SR on adult ELLs compared to traditional methods and across different proficiency levels.

Individual Differences and SR

The effectiveness of SR might be influenced by individual learner characteristics. Wichtendahl et al. (2018) suggests learning styles may play a role, with visual learners potentially benefiting more from SR

techniques incorporating imagery. Motivation might also be a factor, as shown by McDaniel and Buchanan (2004) who found that learners with higher intrinsic motivation displayed better vocabulary retention using SR. Further research is needed to understand how these factors interact with SR for ELLs.

The existing research suggests that SR has the potential to be an effective tool for vocabulary acquisition in language learning. While studies demonstrate its general effectiveness, more research is required to explore its impact specifically on adult ELLs compared to traditional methods and considering individual learner characteristics.

Methodology

This research employed a mixed method approach with elements of pre-test, post-test, and delayed post-test designs (Creswell & Clark, 2018). The target population consisted of 20 students conveniently sampled from two batches enrolled in the deck rating course[2] at SMTI Maritime Academy, Dehiwala. Data collection spanned eight months and involved a combination of methods. Classroom observations via checklist (Fitzpatrick et al., 2018) provided context for understanding the participants' learning environment and interaction with vocabulary. Pre-tests, post-tests, and a delayed post-test assessed the students' vocabulary knowledge before, immediately after, and three months following the intervention, respectively. The use of multiple time points allowed for the assessment of vocabulary knowledge over time, providing evidence of long-term retention (Bahrick, 1994). This design is consistent with previous studies investigating the effects of SR on vocabulary learning (Cepeda et al., 2006). These tests were qualitative in nature and may have involved tasks like sentence completion, definitions, or picture identification to gauge vocabulary understanding ensured that the assessment was aligned with the specific demands of the maritime industry (Loaiza & Fernandes, 2014). In order to assess the students, descriptive statistics were considered while the comparisons were done through graphs and charts. This approach allowed for easy interpretation and identification of trends (McDaniel & Buchanan, 2004). Additionally, the research compared test results across time points to evaluate the effectiveness of the intervention of Anki flash card software against rote memorization on long-term vocabulary retention.

Data Findings and Analysis

The findings of this study align with existing literature on the effectiveness of spaced repetition (SR) for vocabulary learning (Cepeda et al., 2006; Fitzpatrick et al., 2018). While rote memorization can be effective for short-term recall (McDaniel & Buchanan, 2004), SR promotes a deeper understanding and long-term retention (McDaniel & Bjork, 2017). The rote memorization group demonstrated high immediate recall, aligning with previous studies that have shown the effectiveness of rote memorization for short-term retention (Bahrick, 1994). However, the limitations of rote memorization for long-term retention are well-documented (Cepeda et al., 2006). It was evident through the results that 14 students scored less marks for the delayed post test even though it was the third time they were answering the same paper.

The SR group (who employed Anki software) exhibited superior long-term retention, consistent with research demonstrating the efficacy of SR for promoting the transition of information from short-term to long-term memory (McDaniel & Bjork, 2017). The conclusion was drawn with the capability of 18 students to score higher than at the delayed post-test rather than at the immediate post-test. This finding is further supported by studies highlighting the benefits of SR for vocabulary learning in various contexts (Loaiza & Fernandes, 2014; Fitzpatrick et al., 2018).

[2] *Deck rating course refers to the non-officer level roles within mercantile ships. The students undergo systematic trainings regarding the relevant departments via 6 sets of 20 days residential courses that they have to complete in order to complete the deck rating certificate and obtain the seaman's identification record book. The demographic factors included males from 18 – 25 years with Sinhala as their first language.*

The positive classroom environment likely played a supportive role in the learning outcomes for both groups. A supportive environment can enhance motivation, reduce anxiety, and facilitate learning (Fitzpatrick et al., 2018). However, the study's findings suggest that the effectiveness of SR was more pronounced than rote memorization, even in a supportive classroom environment. The results of this study have important implications for maritime English instruction. The use of SR techniques, such as Anki, can be a valuable tool for enhancing vocabulary acquisition and retention. Instructors can incorporate SR into their teaching practices to help students develop a deeper understanding of maritime vocabulary and improve their long-term recall.

Limitations

Due to the limitations of this study, the generalizability of the findings must be approached cautiously. The relatively small sample size of 20 students may not accurately represent the entire deck rating student population at SMTI, Additionally, the use of convenient sampling, where readily available participants were selected, could introduce bias into the results. Furthermore, the qualitative nature of the data, relying on observations and test performance manually assessed rather than statistical software analysis, necessitates careful interpretation to avoid overgeneralizations. Despite these limitations, this study provides valuable insights into the potential benefits of spaced repetition for vocabulary acquisition in maritime English learners.

Conclusion

This study investigated the effectiveness of spaced repetition (SR) techniques, specifically using Anki flashcards, compared to traditional rote memorization for vocabulary acquisition and retention in adult English language learners (ELLs) within the context of a maritime English course. The findings support the potential benefits of SR for fostering long-term vocabulary knowledge in ELLs. While both groups demonstrated improvement after the intervention period, the delayed post-test revealed a clear advantage for the Anki group. Their spaced practice facilitated the transition of vocabulary from short-term to long-term memory, leading to superior retention compared to the rote memorization group. This highlights the limitations of rote memorization for long-term learning and underscores the effectiveness of SR in promoting deeper understanding and application of vocabulary beyond just recalling definitions. The positive and supportive classroom environment likely contributed to the overall learning experience for both groups. However, the delayed post-test served as a crucial measure of long-term retention, highlighting the effectiveness of SR in this regard. By building upon these findings and exploring these future research directions, educators can equip adult ELLs with powerful tools like spaced repetition to improve their vocabulary acquisition and communication skills in their target language.

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