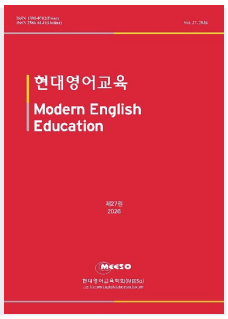
Modern English Education, Vol. 27, (2026) pp. 111-122
doi: https://doi.org/10.18095/meeso.2026.27.1.111



Modern English Education

ISSN: 1598-0782 / e-ISSN: 2586-6141
http://journal.meeso.or.kr

The Spacing Effect on Incidental Vocabulary Learning through Social Media

Sayidmurod Saydakhmat ugli Abdurahmonov (Kyungpook National University)
Donghyun Kim (Kyungpook National University)

Received: 21 January 2026
Revised: 10 February 2026
Accepted: 27 February 2026

Abdurahmonov, Sayidmurod Saydakhmat ugli & Kim, Donghyun. (2026). The spacing effect on incidental vocabulary learning through social media. *Modern English Education*, *27*, 111-122.

Keywords
Vocabulary acquisition, incidental vocabulary learning, social media, spaced exposure, concentrated exposure, second language acquisition
어휘습득, 우연적 어휘학습, 소셜미디어, 분산노출, 집중노출, 제2언어습득

Sayidmurod Saydakhmat ugli Abdurahmonov (First author)
PhD Student
Department of English Language and Literature
Kyungpook National University
Email: saidmurodorient@gmail.com

Donghyun Kim
(Corresponding author)
Assistant Professor
Department of English Language and Literature
Kyungpook National University
Email: donghyun@knu.ac.kr

*This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2023S1A5A8078806).

Abstract

As social media increasingly shapes daily communication, it is important to explore its potential for language learning. This paper investigates whether the spacing effect observed in incidental vocabulary learning research applies to second language exposure on social media. It specifically examines the differences between spaced and concentrated exposure while keeping the total number of encounters the same. Twenty intermediate-level Uzbek learners of English were divided into two groups: one group received four concentrated exposures to Instagram video content within a single week, while the other group experienced the same four exposures spaced over two weeks. Participants were not instructed to memorize vocabulary, and their learning was assessed through meaning recognition and recall tests conducted before, immediately after, and two weeks following the exposure. The results indicated that the spaced group significantly outperformed the concentrated group in meaning recognition at both the immediate and delayed posttests, and also demonstrated slight advantages in meaning recall. These findings suggest that spacing enhances incidental vocabulary acquisition, even in informal digital settings. This study extends previous research on the spacing effect to real-world social media contexts and provides valuable insights into incorporating naturalistic exposure into language learning strategies.

INTRODUCTION

Today's digital age offers a vast amount of exposure to new information for individuals outside of our traditional educational settings, particularly via social media. Platforms like Instagram, Facebook, X (formerly Twitter), and TikTok have become major tools for gaining unintentional knowledge among viewers. According to Godwin-Jones (2018) and Manca (2020), social media affords flexible access to information and learning opportunities beyond traditional constraints of time and place. The rapid development of social media has changed the way we learn with technology, creating opportunities for informal and continuous exposure to knowledge. Therefore, these platforms have come to be seen as important sites for incidental learning. Incidental learning refers to the acquisition of knowledge with no intention of learning. This mechanism plays an important role in how language learners acquire vocabulary from informal input. According to Hulstijn (2003), incidental learning is the unintentional or unplanned acquisition of knowledge, typically occurring when individuals are engaged in tasks not primarily aimed at learning. Schmitt (2010) stated that incidental learning is a byproduct of meaningful activities like watching, reading, or interacting with media, highlighting the importance of context and engagement in the learning process. Through these everyday interactions, learners can gradually accumulate vocabulary and other language skills without formal instruction.

In digital learning, the spacing effect can be a crucial phenomenon for learners: information presented at spaced intervals tends to be remembered better than information presented in a short, concentrated burst. Previous work has observed that learning can be more effective when study sessions are spaced out over time, rather than concentrated into a single session (Cepeda et al., 2006; Young, 1985). Repeated exposure to information across intervals enhances long-term retention by encouraging deeper cognitive processing and memory consolidation (Kang, 2016). This principle is particularly relevant for digital environments where users encounter content intermittently over time, providing natural opportunities for spaced learning even in informal contexts.

Until now, spacing effects have been well documented in research (Bahrick & Hall, 2005; Cepeda et al., 2006; Dunlosky et al., 2013; Pashler et al., 2007). However, most of these studies are based on laboratory or controlled classroom settings, and most experimental tasks involved deliberate memorization or intentional learning (Cepeda et al., 2006; Pavlik Jr & Anderson, 2005). Other studies have largely focused on reading-based or audiovisual input in a traditional learning environment (Peters et al., 2016; Webb, 2007). While incidental learning through digital exposure is recognized, the interaction between spaced exposure and incidental learning via authentic social media content remains underexplored. This study seeks to fill that gap by investigating whether spaced exposure to language content on Instagram leads to better incidental vocabulary acquisition compared to concentrated exposure. For this study, learning tasks were designed based on Instagram posts, providing authentic, engaging content that reflects how users typically encounter language online. By exploring the intersection of spacing effects and incidental learning in a social media context, this study seeks to offer insights into the potential of digital platforms as tools for informal language acquisition.

LITERATURE REVIEW

The Spacing Effect on Vocabulary Learning

The concept of the spacing effect was first introduced in 1885 when Hermann Ebbinghaus published the results of his groundbreaking experimental work on memory. He concluded that "with any considerable number of repetitions, a suitable distribution of them over a space of time is decidedly more advantageous than the massing of them at a single time" (Ebbinghaus, 1885, p. 89). Since then, the spacing effect has been widely investigated by psychologists, cognitive scientists, and linguists due to its potential to significantly enhance learning outcomes when compared to concentrated learning conditions. For example, Vlach et al. (2008) studied the effect of spacing on children's memory and category induction. Their results showed that presenting instances from two categories in a spaced sequence led to greater learning than presenting them in a concentrated sequence. Similarly, Yeung et al. (2020) examined the application of spaced learning in resuscitation training. Although the overall certainty of evidence was low, their findings suggested that spaced instruction improved skill performance both at the end of the course and at a one-year follow-up, compared to traditional concentrated learning formats.

In the field of language learning, many relevant studies have emerged over the past two decades. Cepeda et al. (2006) conducted a meta-analysis of 254 studies on the spacing effect in verbal learning, concluding that spaced practice consistently outperformed concentrated practice across various age groups and types of learning material. Nakata and Elgort

(2021) further refined this line of research by distinguishing between different types of lexical knowledge. Their study demonstrated that spacing facilitated the acquisition of explicit vocabulary knowledge, such as form–meaning mapping measured through recall and recognition tests, but did not yield advantages for tacit knowledge, as measured through semantic priming. This distinction is theoretically important, as it suggests that spacing effects may operate differently depending on the nature of the knowledge being assessed. Accordingly, claims about the benefits of spacing should be interpreted in relation to the specific type of lexical knowledge targeted. Komiya and Takeuchi (2016) conducted an experiment with Japanese learners of English as a Foreign Language (EFL) to compare the effects of spaced and concentrated vocabulary exposure using identical learning materials (flashcards). The results demonstrated that spaced learning led to significantly better performance on both immediate and delayed vocabulary tests. These findings provide strong empirical support for the effectiveness of spaced learning in contemporary EFL contexts. Another study by Pavlik Jr and Anderson (2005) compared different spacing conditions in adult learners studying Japanese vocabulary. They tested optimized spaced practice, fixed interval spacing, and concentrated repetition, finding that spaced learning consistently produced better long-term retention. Their work also introduced a computational model to predict the optimal spacing intervals for vocabulary retention, highlighting that not only is spacing superior to massing, but the timing of repetitions is also critical. More recent second language acquisition (SLA) research has provided a clearer and more comprehensive picture of the spacing effect in L2 vocabulary learning. Kim and Webb (2022) conducted a large-scale meta-analysis of thirty-seven L2 vocabulary studies and reported medium-to-large overall effects of spaced practice on vocabulary learning ($g = 0.58$ for immediate posttests and $g = 0.80$ for delayed posttests). Their findings establish a strong empirical benchmark for spacing effects in L2 contexts and demonstrate that distributed exposure robustly benefits vocabulary retention across learning conditions and test formats. Importantly, this body of work situates spacing as a reliable principle in L2 learning rather than a phenomenon limited to general memory research.

Despite strong evidence supporting the effectiveness of spaced learning for vocabulary acquisition, most existing studies have been conducted in controlled laboratories or classroom settings and have relied primarily on intentional learning tasks. As a result, it remains unclear whether the benefits of spaced exposure extend to incidental learning contexts, particularly those involving authentic and informal digital input.

Incidental Vocabulary Learning

As outlined above, this study integrates both spaced repetition and incidental learning, aiming to explore their combined effects on vocabulary acquisition. Over the past two decades, a few researchers have examined the mechanisms of incidental learning. Findings suggest that both first language (L1) learners (Jenkins et al., 1984; Nagy et al., 1987; Nagy et al., 1985; Shu et al., 1995) and second language (L2) learners (Day et al., 1991; Dupuy & Krashen, 1993; Hulstijn, 1992; Pitts et al., 1989; Waring & Takaki, 2003) can incidentally acquire word meanings through reading. Webb (2008) investigated the role of context quality in incidental vocabulary learning by having 50 Japanese university students read 30 sentences containing 10 unfamiliar pseudowords, each repeated three times. One group encountered the target words in rich, informative contexts, while the other saw them in less informative contexts. An unexpected vocabulary test followed, measuring both word form and meaning. Results showed that meaning recognition improved significantly with rich context, but there was no notable difference in meaning recall between the two groups. The study concluded that repeated exposure alone is insufficient—contextual richness plays a key role in effective incidental vocabulary acquisition. Another important factor in this type of learning is the number of encounters with target vocabulary. However, there is no consensus on how many exposures are necessary for incidental acquisition. For example, Hulstijn et al. (1996) found little difference between encountering a word once or three times. In contrast, Waring and Takaki (2003) reported that more than 20 exposures may be needed to incidentally learn the meaning of a new word. Considering this, the current study included multiple exposures (more than 4–5 times) to each target word throughout the learning sessions.

Research on incidental vocabulary acquisition through audiovisual media has yielded mixed results, highlighting the complexity of this learning process. For example, Bisson et al. (2014) conducted an eye-tracking study to explore how subtitles influence incidental vocabulary learning while watching video content. Although participants consistently read subtitles, no measurable vocabulary gain was detected, indicating the need for more sensitive testing methods. By contrast, Montero Perez et al. (2018) found that captioned videos significantly improved form recall, meaning recall, and spelling in a study involving 133 Flemish undergraduates learning French. Similarly, other research has shown that watching subtitled films and television shows can lead to vocabulary gains among L2 learners (Bird & Williams, 2002; Webb & Rodgers, 2009a; Webb & Rodgers, 2009b). These findings collectively suggest that while the impact of subtitled content can vary, it holds significant potential for language acquisition. The current study builds on this line of research by incorporating both

subtitled video content and spacing effects, examining how they jointly impact incidental vocabulary learning.

Although previous research has demonstrated that vocabulary can be acquired incidentally through reading and audiovisual input, relatively little attention has been paid to how the temporal distribution of exposure influences incidental learning outcomes. No studies have examined whether the spacing effect operates in incidental learning conditions within authentic social media environments such as Instagram.

The Present Study

While the present study adopts an incidental learning condition in which participants are not instructed to memorize vocabulary, the outcome measures target explicit lexical knowledge, namely meaning recognition and meaning recall. Accordingly, the study examines whether spaced exposure facilitates the consolidation of incidentally encountered vocabulary into explicit, declarative memory, rather than implicit acquisition.

Based on the literature reviewed, spaced learning has consistently been shown to outperform concentrated learning in explicit vocabulary acquisition. However, most of these studies have focused on intentional learning contexts, where participants are made fully aware of what they are expected to learn prior to the exposure and are explicitly instructed to memorize the material for later testing. In contrast, the present study focuses on incidental learning, a process in which participants are not informed that they are expected to memorize vocabulary but instead encounter target words naturally through social media content. Previous research (Hunt & Beglar, 2005; Nation & Nation, 2001) emphasized the importance of promoting incidental vocabulary learning as a complementary approach to intentional instruction. Despite the increasing role of digital platforms in L2 exposure, very few studies have examined the impact of spacing in incidental learning contexts, and even fewer have explored this effect within authentic social media environments. To address this gap, the current study investigated whether spaced repetition enhances explicit vocabulary knowledge following incidental exposure more effectively than concentrated exposure when delivered through Instagram, one of the world's most widely used platforms, with over 2 billion active users globally. Specifically, this research asked:

- RQ1. In an incidental learning context using Instagram videos, does spaced exposure lead to greater immediate gains in vocabulary meaning recognition than concentrated exposure?
- RQ2. In the same context, does spaced exposure lead to greater immediate gains in vocabulary meaning recall than concentrated exposure?
- RQ3. Are any spacing-related advantages in vocabulary meaning recognition and meaning recall maintained over time?

METHOD

Participants

The study included 20 intermediate-level English learners (10 in the spaced group and 10 in the concentrated group), who were randomly assigned to the twice-a-week (spaced) and four-times-a-week (concentrated) exposure groups. The participants were recruited from a language school in the Tashkent area in Uzbekistan. To ensure the groups were balanced on their English proficiency, they had been assessed using a standardized test (MOCK IELTS) before the study began. Their scores fell within the B1–B2 range of the CEFR, confirming they were intermediate learners of English. The participants ranged in age from 20 to 24 years and were enrolled in various undergraduate majors, including business, engineering, and social sciences. The group was composed of 14 women and 6 men and none of the participants had any prior overseas experience in an English-speaking country.

Stimuli

For the study, twenty low-frequency and upper-intermediate to advanced-level English vocabulary words (see Appendix) were chosen from two popular, authentic Instagram videos. The videos were specifically selected because they had high viewer engagement (the two videos combined were viewed nearly 5 million times), clear narration from a speaker, and synchronized subtitles. To ensure the words were appropriate for the study, their status was verified using Oxford Learner's Dictionary, which reports CEFR-aligned frequency and level information. This process focused on selecting words that were

naturally used in spoken English and simultaneously shown with on-screen subtitles, a common feature of this type of media that helps facilitate incidental learning.

The first video, "Antarctica," focused on geography, history, and environmental conditions, while the second video, "The Smallest Country in the World," introduced cultural, political, and social facts. Target vocabulary items were selected based on the following criteria: (a) low frequency in general English use, (b) relevance to the video context, and (c) clear alignment between spoken narration and subtitles. Word difficulty was determined using established dictionary frequency information and CEFR-based reference materials. Each target word appeared between 4 and 6 times across the four sessions.

Design

The study followed a 2 × 3 mixed factorial design. Exposure spacing (spaced exposure vs. massed exposure, hereafter referred to as concentrated exposure) served as the between-subjects factor, with participants randomly assigned to one of the two groups. The test time (pretest, posttest, delayed posttest) was the within-subjects factor, as all participants completed assessments at three different time points. Participants completed four sessions in total. The spaced group engaged with Instagram content over two weeks, with sessions on Mondays and Thursdays. In contrast, the concentrated group completed the same content within one week, from Monday to Thursday. After each session, participants in both groups answered ten comprehension questions per video, one for each vocabulary item featured in that video. Vocabulary knowledge was first assessed using a pretest, which included two task types: meaning recognition (multiple-choice) and meaning recall (fill-in-the-blank). A posttest was administered immediately after the final session to both groups, and a delayed posttest was conducted two weeks later to measure retention.

Although the present study uses the terms "concentrated" and "spaced" for ease of reference, it should be noted that the so-called concentrated condition does not involve zero-interval repetition within a single session. Rather, the design contrasts a concentrated exposure schedule (four sessions across four consecutive days; inter-session interval ≈ 24 hours) with a spaced exposure schedule (four sessions over two weeks; inter-session interval ≈ 3–4 days). Following Nakata (2015), this distinction is better understood in terms of differences in absolute and relative spacing rather than a strict massed–spaced dichotomy.

Procedure

The study was conducted over four learning sessions with 20 intermediate-level English learners who were randomly assigned to two groups: a spaced exposure group ($n = 10$) and a concentrated exposure group ($n = 10$). The entire experiment, including all tests and learning sessions, was delivered through Google Forms. To establish a baseline, all participants first completed a pretest consisting of 40 items: 20 multiple-choice questions for meaning recognition and 20 fill-in-the-blank questions for meaning recall, all assessing their prior knowledge of 20 target English vocabulary words. Following the pretest, the learning phase began with participants watching two Instagram-style video posts in each of the four sessions. The first video, an approximately 10-minute post by Nas Daily titled "Antarctica," was delivered via voice-over narration with subtitles and contained the target vocabulary embedded in its authentic captions and audio. Immediately after, they watched a second video titled "The Smallest Country in the World," which was approximately 7 minutes and featured clear narration and subtitles. Following each video, participants completed a comprehension test to ensure their engagement and attentiveness. This sequence of two videos and subsequent comprehension checks constituted one complete learning session. Participants were instructed to watch each video only once per session and were not permitted to pause, rewind, or re-watch the videos. They were also instructed not to engage in any additional vocabulary learning activities related to the videos during the study period.

The key difference between the groups was the schedule of these four learning sessions. The concentrated group received all four sessions over four consecutive days (Monday through Thursday of one week), while the spaced group received the same materials spread out over two weeks, with sessions delivered on Monday and Thursday each week. Both groups completed different comprehension questions after each video to prevent memorization. At the conclusion of the final learning session, all participants took an immediate posttest with the same 40 items as the pretest, but in a randomized order. To measure long-term retention, a delayed posttest was administered two weeks later, using the same format and without any additional exposure to the target words. All test responses were collected and stored using Google Forms. Each correct answer was awarded one point, for a maximum possible score of 40 per test. The scores from the pretest, immediate posttest, and delayed posttest were then compared to evaluate the impact of spaced versus concentrated exposure on incidental vocabulary learning and long-term retention.

RESULTS

Because the primary aim of the study was to compare group differences at each testing point, we conducted independent-samples *t*-tests to examine differences between the spaced and concentrated groups on recognition and recall scores at the posttest and delayed posttest. Prior to these analyses, pretest scores were compared to confirm group equivalence. We assessed normality and homogeneity of variance, and these diagnostics indicated no substantial violations, so parametric *t*-tests were retained despite the small group sizes. The results indicated no significant differences between the spaced exposure group and the concentrated exposure group for either meaning recognition, $t(11.71) = 1.77$, $p = .10$, or meaning recall, $t(10.52) = -0.62$, $p = .55$, indicating that the two groups were comparable prior to the treatment.

The descriptive results (means and standard deviations) for recognition (See Table 1) and recall (See Table 2) accuracy scores are shown across three tests. To assess the spacing effect on incidental learning outcomes, we conducted independent samples *t*-tests to compare the mean scores between the spaced and concentrated groups at both the immediate and delayed posttests. All descriptive and inferential statistics were recalculated using the raw data to ensure consistency between the reported means, standard deviations, *t*-values, *p*-values, and effect sizes. We also calculated Cohen's *d* to measure the effect size, which indicates the magnitude of the difference between the groups, providing a more complete picture of the findings beyond statistical significance.

TABLE 1

The Mean Accuracy Scores and Standard Deviations (SD) for Vocabulary Recognition by Group and Test Time

Group	Pretest	Posttest	Delayed Posttest
Concentrated	0.46 (0.50)	0.36 (0.48)	0.49 (0.50)
Spaced	0.36 (0.48)	0.50 (0.50)	0.62 (0.49)

TABLE 2

The Mean Accuracy Scores and Standard Deviations (SD) for Vocabulary Recall by Group and Test Time

Group	Pretest	Posttest	Delayed Posttest
Concentrated	0.09 (0.28)	0.14 (0.27)	0.15 (0.35)
Spaced	0.11 (0.31)	0.16 (0.37)	0.29 (0.45)

The spaced group showed significantly higher scores than the concentrated group on the posttest for meaning recognition ($M = 0.50$ vs. $M = 0.36$, $t(18) = 2.95$, $p = .003$, $d = 0.30$). The difference at the delayed posttest also remained significant ($t(18) = -2.74$, $p = .006$, $d = 0.27$), with the spaced group maintaining an advantage ($M = 0.62$ vs. $M = 0.49$). Figure 1 shows that participants in the spaced group steadily improved and retained vocabulary better over time; however, the concentrated group's gains declined slightly after the initial learning.

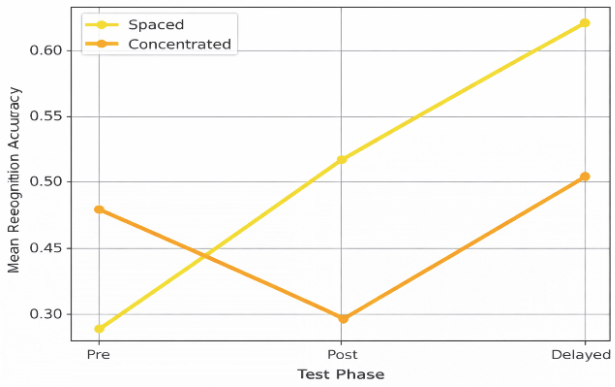


FIGURE 1

Meaning Recognition Accuracy for Both Groups across Test Phases

For the recall measure, the spaced group again demonstrated higher performance across both testing phases. However, these differences did not reach statistical significance. At the posttest, the spaced group showed slightly higher mean scores than the concentrated group ($M = 0.16$ vs. $M = 0.14$). A similar pattern was observed at the delayed posttest, and the spaced group obtained higher mean recall scores over the concentrated group ($M = 0.29$ vs. $M = 0.15$), as seen in Figure 2. Overall, these results indicated trends favoring spaced exposure, but they did not provide statistical evidence for a clear spacing effect in vocabulary recall.

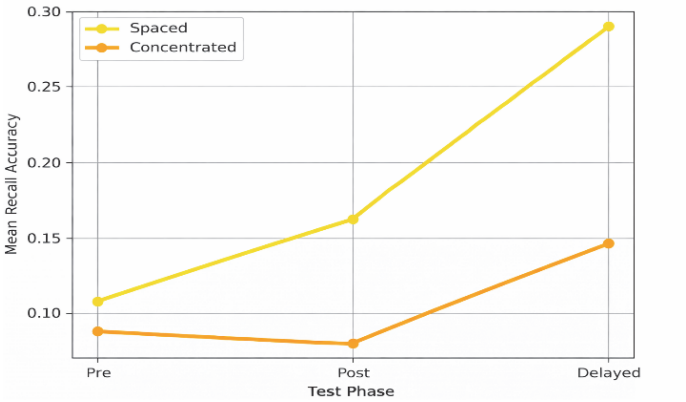


FIGURE 2
Meaning Recall Accuracy for Both Groups across Test Phases

Figure 3 illustrates the individual performance trajectories for the meaning recognition task. Although the overall trend shows the spaced group's average scores climbing more steadily than the concentrated group's, the individual lines demonstrate that learning was not uniform. Some participants in both groups showed strong gains, while others showed little change, highlighting the diverse responses to the learning conditions.

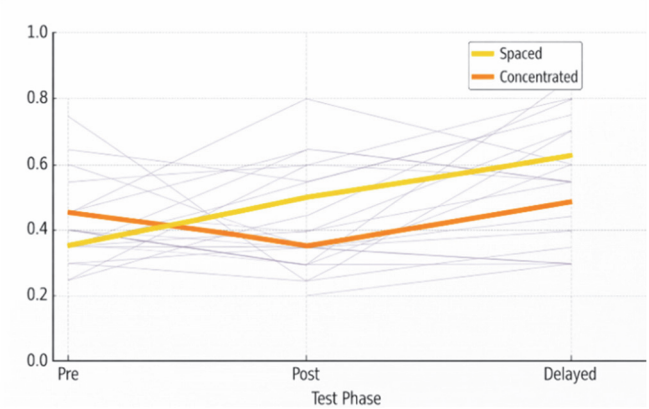


FIGURE 3
Group and Individual Trends for Meaning Recognition

This variability was even more pronounced in the meaning recall data, as shown in Figure 4. For this more challenging task, many participants in both groups demonstrated minimal to no gains, with their accuracy scores remaining near zero across all three tests. The modest increase seen in the spaced group's average (see Figure 2) appears to be driven by a subset of learners who achieved substantial gains by the delayed posttest, pulling the group average up. This indicates that while the spacing effect was potent for some individuals in acquiring recall knowledge, many did not reach the threshold for incidental learning on this measure within the study's timeframe.

To monitor participant engagement during the learning phase, comprehension tests were administered after each video exposure. Figure 5 shows that performance was lowest in the initial session (approximately 30% accuracy), rose to around

55% in the third session, and then decreased slightly in the final session. These scores indicate moderate comprehension overall, with some variability between the two videos, but—most importantly for the present study—a similar pattern for the concentrated and spaced groups. Since both groups demonstrated comparable levels of comprehension, we interpret the comprehension task primarily as evidence that participants in both conditions attended to the input. It is therefore unlikely that systematic differences in attention, rather than the spacing of exposure, can account for the observed group differences in vocabulary learning and retention.

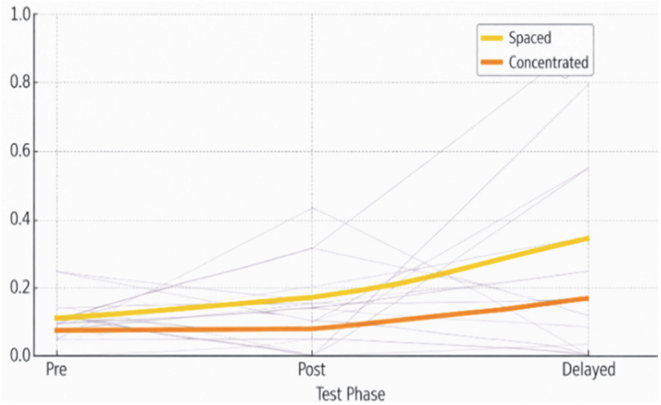


FIGURE 4
Group and Individual Trends for Meaning Recall

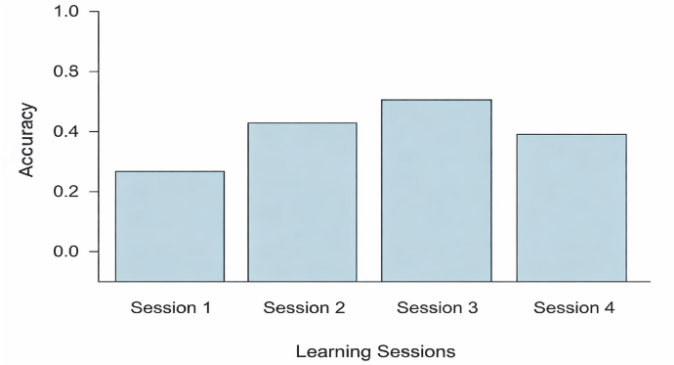


FIGURE 5
Overall Comprehension Accuracy by Learning Sessions

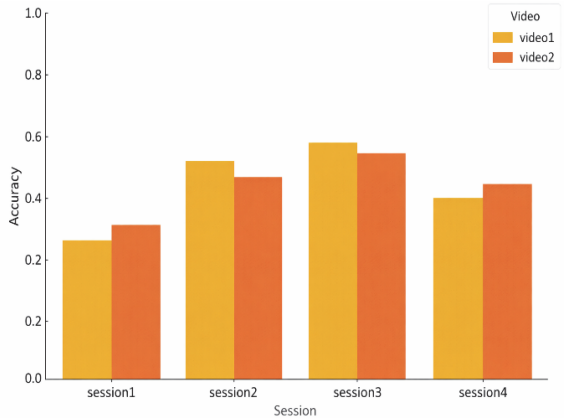


FIGURE 6
Overall Comprehension Accuracy by Learning Sessions and Video 1 and Video 2

DISCUSSION

The present study found that participants in the spaced learning group demonstrated significantly greater gains in meaning recognition and slightly higher scores in meaning recall compared to those in the concentrated learning group, particularly at the posttest stage. Although the group differences in recall did not reach statistical significance at either testing phase, small effect sizes consistently favored spaced exposure. Recall is generally considered a more demanding task than recognition, as it requires deeper retrieval processes and stronger lexical representations (Nation, 2013; Webb, 2008). The fact that even a small number of spaced exposures in authentic videos led to numerically higher recall scores suggests that with a somewhat larger sample, more exposures, or easier target words, reliable recall differences might emerge. This interpretation aligns with previous work by Komiya and Takeuchi (2016), who found that recall benefits from spacing typically require more exposures than recognition benefits. Overall, these findings indicate that spacing offers at least a modest advantage for vocabulary acquisition under incidental learning conditions—where learners are not explicitly instructed to memorize—and that distributing exposure across time can support more robust vocabulary gains in informal, real-world settings such as social media.

One contribution of this study is that it shows how principles of second language acquisition, such as the spacing effect, can be successfully applied to authentic digital learning contexts. As mentioned earlier, most previous spacing research has been conducted in highly controlled environments using flashcards, word lists and tasks with instructions (Cepeda et al., 2006; Pavlik Jr & Anderson, 2005). In comparison, this study demonstrates that spacing also benefits learners when exposure is embedded in naturalistic materials that are not explicitly designed for vocabulary learning. This finding is particularly relevant in the current era, where learners increasingly rely on informal digital resources, such as YouTube, TikTok, and Instagram, to encounter foreign languages. It suggests that teachers and curriculum designers can leverage the same cognitive principles outside the classroom by encouraging learners to schedule and revisit authentic online input in a spaced manner.

The study extends previous work by integrating spaced repetition and incidental learning within a digital environment. Examining these mechanisms in an authentic social media context helps clarify how spacing influences vocabulary acquisition in real-world exposure settings. Furthermore, by using authentic Instagram video content rather than scripted or classroom-based materials, the study enhances ecological validity. This design more accurately reflects how learners are exposed to language outside of formal settings, making the findings highly relevant for contemporary digital language learning. The results of this study are consistent with previous findings on the benefits of spaced learning (Cepeda et al., 2006; Komiya & Takeuchi, 2016; Pavlik Jr & Anderson, 2005). These earlier studies, however, largely focused on intentional learning in controlled environments. In contrast, the current research extends the applicability of the spacing effect to incidental learning contexts involving authentic media input. This alignment reinforces the theoretical claim that repeated and distributed exposure, regardless of learner intent, enhances memory consolidation and long-term retention (Kang, 2016; Webb, 2008).

From a pedagogical standpoint, the findings also point to practical recommendations. Teachers can encourage learners to structure their informal digital exposure in a spaced manner, for instance by revisiting short videos across several days rather than watching them repeatedly in a single session. Language learning applications might integrate this principle by sending reminders to re-watch specific media clips at optimal intervals, as suggested in mobile-assisted and technology-mediated learning research (Godwin-Jones, 2018; Kang, 2016). Importantly, this approach aligns with learner autonomy and contemporary digital practices, as students increasingly consume online content outside of formal instruction (Manca, 2020; Peters & Webb, 2018). The study thus suggests a pathway for blending everyday digital engagement with research-based principles of vocabulary learning. The findings of this study open several avenues for future exploration. Researchers might examine whether the spacing effect holds across different types of media (short-form videos, live content) and various social media platforms. Replicating the study with participants of varying linguistic backgrounds and proficiency levels would also help enhance its generalizability. Although deliberate memorization was not required, incidental access to word meaning likely occurred through contextual inference during media exposure. The target words appeared in rich audiovisual contexts, where visual cues and surrounding discourse may have supported approximate meaning construction without conscious lookup. In this study, the comprehension task was included to ensure participants' engagement with the content rather than to directly assess their knowledge of the target words' meanings. Importantly, future research should place greater emphasis on learners' attentional engagement during exposure. Given the role attention plays in incidental learning (Hulstijn, 2003; Laufer & Hulstijn, 2001), incorporating measures such as real-time tracking, comprehension gating, or participant feedback could offer deeper insight into the cognitive mechanisms underlying vocabulary acquisition in digital spaces.

A few limitations should be acknowledged as well. First, although participants were categorized as intermediate English

learners based on a placement test, their overall proficiency may not have been sufficient to fully understand the comprehension and vocabulary test items, which were administered entirely in English. This could have influenced their performance and introduced variability into the results. Second, the use of identical test items across the pretest, posttest, and delayed posttest may have introduced testing effects, potentially contributing to vocabulary gains independently of video exposure. Third, individual differences such as learners' interest in vocabulary learning, familiarity with Instagram content, and preferences for video-based input were not controlled for and may have influenced vocabulary outcomes. The relatively brief exposure duration may also limit the extent to which vocabulary gains can be attributed to robust incidental learning from contextual input alone. Compared to previous studies employing longer or more intensive exposure, the present design relied on short video-based input with limited opportunities for deep processing. Consequently, the observed gains should be interpreted cautiously, as repeated testing may have contributed to learners' performance alongside exposure effects. Lastly, the relatively small sample size (n = 20; 10 per group) limits statistical power and reduces the generalizability and robustness of the t-test results. Future studies with larger samples could employ non-parametric analyses or mixed-effects modeling to corroborate and extend the present findings.

CONCLUSION

This study compared concentrated and spaced exposure to new vocabulary, and the results showed that the latter condition was more effective for incidental learning. The spaced group achieved significantly better gains in meaning recognition and showed a consistent, although not statistically significant, advantage in meaning recall. These findings extend the well-established benefits of the spacing effect from controlled, intentional learning settings to authentic, informal digital contexts. The results also suggest that core principles of second language acquisition remain highly relevant to contemporary technology-mediated learning. With this in mind, educators and app developers can design more effective experiences for incidental learning environments. Finally, the study highlights the potential of social media (e.g., Instagram) for vocabulary acquisition and offers practical guidance for learners seeking to optimize informal digital engagement for better long-term retention.

References

Bahrick, H. P., & Hall, L. K. (2005). The importance of retrieval failures to long-term retention: A metacognitive explanation of the spacing effect. *Journal of Memory and Language, 52*(4), 566–577. https://doi.org/10.1016/j.jml.2005.01.012

Bird, S. A., & Williams, J. N. (2002). The effect of bimodal input on implicit and explicit memory: An investigation into the benefits of within-language subtitling. *Applied Psycholinguistics, 23*(4), 509–533. https://doi.org/10.1017/s0142716402004022

Bisson, M.-J., Van Heuven, W. J., Conklin, K., & Tunney, R. J. (2014). Processing of native and foreign language subtitles in films: An eye tracking study. *Applied Psycholinguistics, 35*(2), 399–418. https://doi.org/10.1017/s0142716412000434

Cepeda, N. J., Pashler, H., Vul, E., Wixted, J. T., & Rohrer, D. (2006). Distributed practice in verbal recall tasks: A review and quantitative synthesis. *Psychological Bulletin, 132*(3), 354–380. https://doi.org/10.1037/0033-2909.132.3.354

Day, R. R., Omura, C., & Hiramatsu, M. (1991). Incidental EFL vocabulary learning and reading. *Reading in a Foreign Language, 7*(2), 541–551. https://doi.org/10.64152/10125/67035

Dupuy, B., & Krashen, S. D. (1993). Incidental vocabulary acquisition in French as a foreign language. *Applied Language Learning, 4*(1-2), 55–63. https://eric.ed.gov/?id=EJ477798

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest, 14*(1), 4–58. https://doi.org/10.1177/1529100612453266

Ebbinghaus, H. (1885). Über das Gedächtnis. *Üntersuchungen zur experimentellen Psychologie*. Duncker & Humblot.

Godwin-Jones, R. (2018). Using mobile technology to develop language skills and cultural understanding. *Language Learning & Technology, 22*(3), 3–17. https://doi.org/10.125/44607

Hulstijn, J. H. (1992). Retention of inferred and given word meanings: Experiments in incidental vocabulary learning. In P. J. L. Arnaud & H. Béjoint (Eds.), *Vocabulary and applied linguistics* (pp. 113–125). Macmillan. https://doi.org/10.1007/978-1-349-12396-4_11

Hulstijn, J. H. (2003). Incidental and intentional learning. In C. J. Doughty & M. H. Long (Eds.), *The handbook of second language acquisition* (pp. 349–381). Blackwell Publishing. https://doi.org/10.1002/9780470756492.ch12

Hulstijn, J. H., Hollander, M., & Greidanus, T. (1996). Incidental vocabulary learning by advanced foreign language students: The influence of marginal glosses, dictionary use, and reoccurrence of unknown words. *The Modern Language Journal, 80*(3), 327–339. https://doi.org/10.1111/j.1540-4781.1996.tb01614.x

Hunt, A., & Beglar, D. (2005). A framework for developing EFL reading vocabulary. *Reading in a Foreign Language, 17*(1), 23–59. https://doi.org/10.64152/10125/66601

Jenkins, J. R., Stein, M. L., & Wysocki, K. (1984). Learning vocabulary through reading. *American Educational Research Journal, 21*(4), 767–787. https://doi.org/10.3102/00028312021004767

Kang, Sean. H. K. (2016). Spaced repetition promotes efficient and effective learning: Policy implications for instruction. *Policy Insights from the Behavioral and Brain Sciences, 3*(1), 12–19. https://doi.org/10.1177/2372732215624708

Kim, Su Kyung, & Webb, S. (2022). The effects of spaced practice on second language learning: A meta-analysis. *Language Learning, 72*(1), 269–319. https://doi.org/10.1111/lang.12479

Komiya, Y., & Takeuchi, O. (2016). Comparing the effects of spaced and concentrated vocabulary learning in a classroom setting. *JACET Journal, 60*, 1–17.

Laufer, B., & Hulstijn, J. (2001). Incidental vocabulary acquisition in a second language: The construct of task-induced involvement. *Applied Linguistics, 22*(1), 1–26. https://doi.org/10.1093/applin/22.1.1

Manca, S. (2020). Snapping, pinning, liking or texting: Investigating social media in higher education beyond Facebook. *The Internet and Higher Education, 44*, 100707. https://doi.org/10.1016/j.iheduc.2019.100707

Montero Perez, M., Peters, E., & Desmet, P. (2018). Vocabulary learning through viewing video: The effect of two enhancement techniques. *Computer Assisted Language Learning, 31*(1-2), 1–26. https://doi.org/10.1080/09588221.2017.1375960

Nagy, W. E., Herman, P. A., & Anderson, R. C. (1985). Learning word meanings from context: How broadly generalizable? (Technical Report No. 392). Center for the Study of Reading, University of Illinois at Urbana-Champaign. https://doi.org/10.2307/747758

Nagy, W. E., Anderson, R. C., & Herman, P. A. (1987). Learning word meanings from context during normal reading. *American Educational Research Journal, 24*(2), 237–270. https://doi.org/10.3102/00028312024002237

Nakata, T. (2015). Are learners aware of effective ways to learn second language vocabulary from retrieval? Perceived effects of relative spacing, absolute spacing, and feedback timing on vocabulary learning. *Vocabulary Learning and Instruction*, *4*(1), 66–73. https://doi.org/10.7820/vli.v04.1.nakata

Nakata, T., & Elgort, I. (2021). Effects of spacing on contextual vocabulary learning: Spacing facilitates the acquisition of explicit, but not tacit, vocabulary knowledge. *Second Language Research, 37*(2), 233–260. https://doi.org/10.1177/0267658320927764

Nation, I. S. P. (2013). *Learning vocabulary in another language* (2nd ed.). Cambridge University Press. https://doi.org/10.1017/cbo9781139858656

Nation, I. S., & Nation, I. (2001). *Learning vocabulary in another language* (Vol. 10). Cambridge University Press. https://doi.org/10.1017/s0008413100018260

Pashler, H., Bain, P. M., Bottge, B. A., Graesser, A., Koedinger, K., McDaniel, M., & Metcalfe, J. (2007). Organizing instruction and study to improve student learning (NCER 2007-2004). National Center for Education Research, Institute of Education Sciences, U.S. Department of Education. https://doi.org/10.1037/e607972011-001

Pavlik Jr, P. I., & Anderson, J. R. (2005). Practice and forgetting effects on vocabulary memory: An activation-based model of the spacing effect. *Cognitive Science, 29*(4), 559–586. https://doi.org/10.1207/s15516709cog0000_14

Peters, E., Heynen, E., & Puimège, E. (2016). Learning vocabulary through audiovisual input: The differential effect of L1 subtitles and captions. *System, 63*, 134–148. https://doi.org/10.1016/j.system.2016.10.002

Peters, E., & Webb, S. (2018). Incidental vocabulary acquisition through viewing L2 television and factors that affect learning. *Studies in Second Language Acquisition, 40*(3), 551–577. https://doi.org/10.1017/s0272263117000407

Pitts, M., White, H., & Krashen, S. (1989). Acquiring second language vocabulary through reading: A replication of the Clockwork Orange study. *Reading in a Foreign Language, 5*(2), 271–275. https://doi.org/10.64152/10125/67017

Schmitt, N. (2010). *Researching vocabulary: A vocabulary research manual*. Springer. https://doi.org/10.1057/9780230293977_7

Shu, H., Anderson, R. C., & Zhang, H. (1995). Incidental learning of word meanings while reading: A Chinese and American cross-cultural study. *Reading Research Quarterly, 30*(1), 76–95. https://doi.org/10.2307/747745

Vlach, H. A., Sandhofer, C. M., & Kornell, N. (2008). The spacing effect in children's memory and category induction. *Cognition, 109*(1), 163–167. https://doi.org/10.1016/j.cognition.2008.07.013

Waring, R., & Takaki, M. (2003). At what rate do learners learn and retain new vocabulary from reading a graded reader? *Reading in a Foreign Language, 15*(2), 130–163. https://doi.org/10.64152/10125/66776

Webb, S. (2007). The effects of repetition on vocabulary knowledge. *Applied Linguistics, 28*(1), 46–65. https://doi.org/10.1093/applin/aml048

Webb, S. (2008). The effects of context on incidental vocabulary learning. *Reading in a Foreign Language, 20*(2), 232–245.

Webb, S., & Rodgers, M. P. H. (2009a). The lexical coverage of television programs. *Applied Linguistics, 30*(3), 407–427. https://doi.org/10.1093/applin/amp010

Webb, S., & Rodgers, M. P. H. (2009b). The vocabulary demands of television programs. *Language Learning, 59*(2), 335–366.

Yeung, J., Djarv, T., Hsieh, M., Sawyer, T., Lockey, A., Finn, J., Greif, R., Lightfoot, D., Singletary, E., & Morley, P. (2020). Spaced learning versus concentrated learning in resuscitation—a systematic review. *Resuscitation, 156*, 61–71. https://doi.org/10.1016/j.resuscitation.2020.08.132

Young, R. K. (1985). Ebbinghaus: Some consequences. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 11*(3), 491–495. https://doi.org/10.1037//0278-7393.11.3.491

Appendix

Instagram posts

1. https://www.instagram.com/reel/C_-rLsSSB9R/?igsh=ZTFtYmxjbzR1NHNl

2. https://www.instagram.com/reel/C9AWRVyOCtO/?igsh=MW8yYXY1azhkOXhyMQ==

Target vocabulary

	Video 1	Video 2
1	southernmost	chapel
2	civilization	invasion
3	expedition	recognition
4	infamous	diplomat
5	converge	permit
6	fluctuate	pursue
7	seasick	currency
8	desolate	abandon
9	reflecting	treason
10	preservation	jurisdiction

Pre, post and delayed posttests:
https://forms.gle/LQCoNELjL1tfEdZW9

Comprehension questions:
https://forms.gle/zb5MxzdHjsdoux5L7