People's Democratic Republic of Algeria

Ministry of Higher Education and Scientific Research

University of Mohamed Sadik BenYahia, Jijel

Faculty of Letters and Languages

Department of English

Incidental L2 Vocabulary Learning from Listening-while-Reading: The Effect of Spacing Repeated Occurrences

Dissertation submitted in partial fulfilment of the requirements for the degree of Master in

Didactics of Foreign Languages

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June 2023

Declaration

We, Latifa GRIMES and Nousseiba LAOUET, hereby declare that this dissertation entitled "*Incidental L2 Vocabulary Learning from Listening-while-Reading: The Effect of Spacing Repeated Occurrences*" is our original work and has not been submitted in whole or in part for any other degree or qualification. Any sources of information used in this study have been appropriately acknowledged and referenced. We also certify that we have not copied or plagiarized the work of other students or researchers partially of fully. In case any material is not documented, I shall be responsible for the consequences.

Dedication

I shall dedicate this tears-soaked manuscript to the one who was always there to wipe them

My Mother

I shall attribute this humble work to the one who enthusiastically

supported it, without having to understand it.

My Mother

To her, who brought me to this life,

and kept bringing life to everything in my life

My Mother

To him who soothed me and assisted my path by his masculine unique way of love

My Father

Latifa

I dedicate this work to my beloved family, my parents, the retired teacher K. Akila, the primary education inspector Yahia LAOUET, who have been both my source of inspiration, guide, and gave me all the support. When I thought of giving up, they were always by my side.

To my beloved brothers, Sohaib and Houdeifa “Dodo”, to my big sister Oumeima “Mima”.
I want to thank them for being in my life.
Last but not least, I want to thank me for believing in me. I want to thank me for being patient during my last five years at this university.
Lastly, to all my lovely friends who made life easier when we were together and shared our thoughts and summaries, especially during the exams. I appreciate the good times and conversations when we had fun. I will always cherish our memories together and truly appreciate their friendship.

Above all, to my Allah, who always give me strength and patience in everything I do.

Nousseiba

Acknowledgements

Above all, we thank Allah whose infinite mercy and divine wisdom helped us figure out what worked best in the conduct of this study. Alhamdulillah!

"He who doesn't thank people doesn't thank Allah"

We are deeply indebted to our mentor, Dr. Souheyla GHEBGHOUB, for her high-quality feedback, organised supervision, and punctuality. We highly appreciate the fact that she assisted this study until the very last minute especially in the deadline's eve. We proudly declare that this piece of research would not have been done without her extraordinary mentorship.

Thanks also go to Dr. Mohammed BOUKEZZOULA and Dr. Sara MEZERREG for the thought-provoking questions and valuable insights as part of the board of examiners.

I would also like to extend gratitude to the head of the private institution "Global School-Jijel" Mr Bilal MECHAKEF. The generous man who widely opened the doors of his school to be a venue for our experiment and granted us permission to use the school's equipment. Thank you so much, Sir Bilal. We shall take time to appreciate the unparalleled support we got from Miss Ines GRINE and her valuable advice. She was more than a teacher and such a good friend who was always there to assist in the process of data collection.

Last but not least, we gratefully acknowledge the help of the wonderful participants who took part in the research, and especially to those who appeared in all the experimental sessions.

Abstract

This study aimed to investigate the effect of distributing word occurrences over multiple listening-while-reading sessions (spaced practice) on incidental L2 vocabulary learning. To this end, a between-participants experimental design was set up, with forty-one Algerian intermediate EFL learners randomly assigned to either a spaced practice group or a control (massed) group. Participants in the spaced practice read and listened to two short stories containing nine pseudowords over three sessions of one-day intervals, while the control group read and listened to the same input in one session. Vocabulary knowledge was assessed using two unannounced immediate posttests: written form recognition and meaning recognition. It was predicted that there would be a significant difference between the spaced and control groups in pseudoword gains for both form and meaning. The findings of a logistic regression analysis showed a positive effect of spaced repeated encounters for written form recognition ($p < .001$) but not for meaning recognition ($p = .78$). Specifically, distributed practice participants were four times more likely to accurately recognise written forms than massed group participants.

Keywords: distributed practice, spacing, vocabulary, reading-while-listening, pseudowords.

List of Abbreviations

AI: Artificial Intelligence

CEFR: Common European Framework of Reference

DP: Distributed practice

EFL: English as a Foreign Language

L1: First Language

L2: Second Language

MP: Massed practice

P1: Presentation 1

RO: Reading-only

RWL: Reading-while-listening

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General Introduction

Learning a second language (L2) imposes huge lexical demands on its learners since vocabulary has crucial importance in attaining a good command of the language in question. Empirical reports suggest that fair foreign language spoken and written text comprehension is granted, provided that the learner is in possession of a vocabulary size of around 6,000 to 7,000 words and a vocabulary breadth of around 8,000-to-9,000-word families (Nation, 2006). Hence, the prerogative of expanding learners' vocabulary occupied researchers' foci.

An interesting interdisciplinary alley between cognitive psychology and second language research acknowledged the efficacy of the spacing exposures to the target pieces of vocabulary on memory and retention. Insights from these empirical reports deem the distribution of practice over multiple study schedules superior to massing them in a single or consecutive study session.

1. Background of the Study

Distributing study episodes over an estimated time interval, what is known as spacing, is a robust phenomenon in experimental psychology. The term was first coined in the seminal work of Ebbinghaus (1885), where he highlighted the importance of a suitable number of distributions along with a time interval between the distributions. The years that preceded this can actually be called "the spacing effect" era in research. Thousands of studies were later conducted in this trajectory to put the magnitude of the spacing effect to the test under various circumstances and in different contexts. The overwhelming majority of these studies were on the consensus that spacing hugely influences memory and retention. L2 vocabulary research

was no exception; the phenomenon was examined to explore the extent to which it can impact lexical uptake.

Unlike intentional learning, the magnitude of the spacing effect on incidental vocabulary learning seems to be 'premature' (Nakata & Elgort, 2020 p. 3) due to the fact that results are inconsistent. In the reading and listening literature, significant differences were at times documented and at others not. Nakata & Elgort (2020)'s study is among the few ones that sought to compare learning gains from spacing versus massing word encounters in a reading task. They instructed their participants (N = 66) to read various sentences including 48 unknown words, guess the meaning and provide either English or Japanese equivalents. Subjects were tested on meaning recall and meaning-form matching. Test scores revealed that the spaced group outperformed the massed group.

Listening studies only examined repeated exposures vs. non-listening at all; superiority was documented for the spaced exposures. For example, in an experiment conducted by Kim (2022), the researchers randomly assigned 300 participants into a control group or into one of the three experimental groups in order to examine the effects of repeated song listening, one, three, or five times and the relationship between frequency of occurrence and incidental vocabulary acquisition. Participants in the experimental groups listened to two songs once (E1), three times (E3), and five times (E3), then took an immediate post-test and a delayed post-test after five weeks, while the control groups only took the post-tests. Aspects of vocabulary tested were spoken-form recognition, form-meaning connection, and collocation recognition through a multiple-choice vocabulary test. The experiment revealed that the frequency of occurrence had an effect on vocabulary gains. Similarly, a longitudinal incidental listening study reported

that students who received treatment not only did they overscore the control group on the end-of-treatment test but also on the end-of-university tests (Gavrylenko, Vasylieva, Zhyvotovska and Zubenko, 2022).

While evidence from various designs confirms the impact of spacing on contextual word learning (Pavia, Webb, & Faez, 2019; Van Zeeland & Schmitt, 2013), other studies had reported little to no-significant difference between groups. For instance, although Webb and Chang (2014) obtained high vocabulary gains from a reading-while-listening study (44,6 %), the distribution of exposure frequency was found to have no impact on the incidental uptake of the items. Another study (Elgort and Warren, 2014) utilized a four-chapters book to implement the target words and made the participants encounter them multiple times over a 10-day interval. The authors reported an advantage of the massed schedule over the spaced one. Similarly, Webb and Chang (2015) failed to establish a correlation between distributed presentations of items and lexical uptake in a reading-while-listening study. In short, the results of the effect of spacing in incidental vocabulary learning remain inconclusive.

Varying time intervals between items' presentations revealed inconsistent results as well. Serrano & Huang (2018) sought to compare intensive and spaced presentations of the target vocabulary in a text. Participants (N= 71) either read the divided text once every 5 consecutive days (intensive) or once per week within a 5-week-interval (distributed). Both groups were able to incidentally acquire vocabulary from the assisted reading. In another study (Elgort, Brysbaert, Stevens, & Van Assche, 2018), a shorter time interval was implemented and eventually accounted for a significant difference. Authors manipulated the presentation schedules in a way that their subjects would read the target words massed in the same day or

spaced over two days. The two-days-interval was found to be more effective than the within the same day one. All in all, the spacing effect was well documented in intentional vocabulary learning literature, claiming for the existence of a distributed practice primacy, nonetheless, incidental learning context has been understudied and results are remains inconclusive.

2. Statement of the Problem

Students with insufficient vocabulary size would experience various communication breakdowns due to their inability to comprehend the other party's message or to convey their own message. Given the cruciality of a solid vocabulary knowledge for both comprehension and communication, L2 teachers work hard to teach and assess vocabulary. In the context of teaching English for communicative purposes, instructors often feel overwhelmed by the task of providing enough knowledge and practice of vocabulary needed for communication. For example, as an instructor of English language at a private school (Researcher 1), me and my colleagues often face the problem that the learners would fail to recall an L2 word that was appropriately taught in a previous session. It is also noteworthy that many students find intentional vocabulary learning from explicit instruction a conundrum and a tedious task.

One remedy for the above learning difficulty is the spacing of repetitions of words in incidental learning contexts over multiple sessions of reading and listening.

A review of the literature identified a gap in knowledge on the potential effect of distributing word encounters over sessions in incidental learning contexts on acquiring these words. To the best of our knowledge, only a few studies have manipulated learning conditions to compare the effect of the spacing on unintentional vocabulary learning. Inconsistency of the results is another reason why more studies should be conducted in this area and identify a clear-cut effect

of either of the schedules. In an attempt to fill that gap, the main concern of this piece of research is to compare the effectiveness of distributed exposures to the target items massed in a single study session (traditional practice) versus encounters spaced over three sessions.

3. Research Questions and Hypotheses

The present empirical investigation aims to answer the following research questions:

1. Are repeated word occurrences spaced over multiple reading-while-listening sessions more conducive to incidental acquisition of *word form* than occurrences massed in a single session?

2. Are repeated word occurrences spaced over multiple reading-while-listening sessions more conducive to incidental acquisition of *word meaning* than occurrences massed in a single session?

The study puts forward the following hypothesis:

- Participants who read and listened to the target pseudowords in the distributed practice group would overscore the massed practice group on both meaning and form recognition tests .

4. Research Methodology

To explore the effectiveness of "the spacing effect" on incidental word learning , this empirical study adopted a between-groups experimental design. The study will compare the differences in learning gains obtained from two different groups: The control group (1) will read and listen to the target pseudowords massed during a one session, while the experimental group (2) will be exposed to multiple occurrences of the same words spaced over three sessions within

a 24-hour interval. Subjects are to sit for a form and meaning recognition test immediately after the end of the treatment under both conditions.

5. Significance of the Study

The findings of the present study hold significant implications for second language acquisition (SLA) and cognitive psychology research. The study addresses a critical gap in our understanding of the spacing phenomenon in two new contexts: (1) the context of incidental L2 vocabulary learning and (2) the context of listening-while-reading. Additionally, the study contributes to the existing literature by examining the spacing effect in a novel context which is Algerian schools.

This research provides L2 teaching practitioners with insights about a robust phenomenon that is known to positively affect retention. As far as the pedagogical implications are concerned, this piece of research highlights the significance of incidental L2 vocabulary learning and provides valuable insights about spaced practice that can inform practitioners and materials developers.

6. Organization of the Dissertation

The manuscript at hand encompasses two chapters: a theoretical and a practical one. The reader of this dissertation would first be provided with a theoretical foundation chapter. In that chapter, an overview of the relevant operationalization of terms and comprehensive explanations of the theories are detailed. The fieldwork provides a detailed framework of the methodology adopted to obtain the results. Towards the end of this paper, results are discussed,

visualized, and interpreted. To conclude, a general conclusion is mentioned in this dissertation to conclude, acknowledge the limitations and discuss pedagogical implications.

Section One: Incidental Learning of L2 Vocabulary

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The main theme addressed in the initial section of this chapter is the incidental learning of second language (L2) vocabulary. The section encompasses a thorough description of the nature of the incidental mode of learning in L2 and how it differs from the intentional one. It also casts the net to aspects of vocabulary and the means by which its knowledge manifests. It further explores their incidental acquisition by referring to some studies using different types of input: reading and reading-while-listening. Lastly, it represents an overview of the various means by which vocabulary knowledge can be assessed.

1.1 Incidental vs. Intentional Second Language Learning

Among the most debated topics in L2 learning is the issue of whether a second language should be *learnt* or *acquired*. One view claims that an L2 learner is supposed to consciously study the grammar and vocabulary of the language, while the other rests upon the assumption that an L2 learner can *acquire* or *pick them up* unconsciously. The latter is called “incidental learning” and the former is called “intentional learning".

On the one hand, intentional learning, according to Bereiter and Scardamalia (1989, p. 363), "refers to cognitive processes that have learning as a goal rather than an incidental outcome”. Seel (2012) explained that intentional learning involves the use of learning and metacognitive strategies while the learner has control over the learning process. In experimental psychology, the terms can also be contracted methodologically in the sense that under the incidental condition, participants are not instructed about the posttest; under the intentional condition, participants are instructed about it. According to Doughty and Long (2003, p. 356), the distinction refers, strictly speaking, only to the absence or presence of an announcement to

participants in a psychological experiment as to whether they will be tested after the experimental task.

On the other hand, incidental learning is defined by Doughty and Long (2003) as learners' preoccupation with meaning rather than form in the doing of a reading or listening activity. As Schmidt (1994, p. 16) puts it, it is the "learning of one thing … when the learner's primary objective is to do something else" The term is interchangeably expressed as tacit, unintentional, unplanned, experiential, informal, latent, low involvement, or unconscious learning.

In a nutshell, a second language can be learned either incidentally or intentionally. Intentional learning occurs when learners are actively engaged in the process or are aware that they will be tested on the learning outcome. The incidental mode of learning is when learning occurs as a result of another activity or when learners are distracted from the learning of the target material and are not instructed that they will be tested on it.

1.2 Aspects of Vocabulary Knowledge

There exists a consensus as to the conceptualization of the knowledge of a word by relating it to the knowledge of its meaning (Schmitt, 2010); however, there are more aspects to word knowledge. Nation (2001) stated that being knowledgeable about a word encompasses knowledge of its form, meaning, and use (grammatical structure, collocations, and constraints of use).

1.2.1 Knowledge of meaning

A word, as Carter (1998, p. 21) puts it, is "the minimum meaningful unit of language". Thus, the primary function of words is to convey meanings, and the knowledge associated with

word meaning equips the learner with the capacity to express them accurately. According to the semantic view, knowledge of meaning is the fact that one knows what meaning that word denotes and the connotations it holds. The ability to grasp the meanings of certain words can be rather onerous. Bolinger (as cited in Hatch & Brown, 2000) said, “Measures are as elusive as a piece of wet soap in a bathtub” (p. 58), that is, words can have a variety of meanings, and decoding them may depend on various factors. Bolinger’s allegory points out the fact that depicting a word’s meaning can be as slippery as trying to hold wet soap.

1.2.2 Knowledge of form

One more essential aspect of word knowledge is related to knowing how a word is constituted, how it is spelled, and what other words can stick to it to form further words.

1.2.2.1 Written form

The first aspect to be discussed is learners’ capacity to recognize the written form of a word. Miralpeix and Meara (2014) defined written form recognition as a reader's ability to recognize words correctly and without much effort (p. 30). Such knowledge, according to Nation (2001), emerges receptively as the learner encounters the word while reading. There exist certain factors that may influence word recognition, as stated by Miralpeix & Meara (2014); these can range from word length to shape to the structure of the words. They further explained that these difficulties stem from the morphological differences between languages. Thus, it's the teacher’s prerogative to raise awareness among them (p. 30).

1.2.2.2 Spoken form

The aspect that precedes is the learner’s capacity to recognize the spoken form of a word, which is central to its pronunciation. Spoken-form recognition, as put by Milton and

Fitzpatrick (2014), is one's ability to recognize sounds when received aurally, besides being able to produce them correctly (p. 13). Much of the difficulty in spoken-word recognition was discussed in Milton and Fitzpatrick (2014, p. 14). Receptive ones were speed of speech, as the learner is supposed to keep up with the pace; poor processing issues; and pronunciation variants of each single word. The productive ones relate to the fact that the learner is required to produce all the sounds of the language, to exercise word stress properly, and to combine sounds together (connected speech).

1.2.3 Knowledge of Use

Presumably, knowledge of use is the central type of lexis knowledge. This knowledge enables L2 learners to communicate in everyday situations and express themselves correctly. Nation (2006) estimated that a non-native speaker needs 6,000 to 7,000 items of lexicon to intelligibly communicate. Nonetheless, these items must be equipped with grammatical and usage knowledge.

As far as the grammatical usage of vocabulary is concerned, the learner is supposed to know in which grammatical patterns a word can appear and the function of each. Richards (1976, p. 80) explained that "knowing a word means knowing the syntactic behaviour associated with that word". Carter (1998) exemplified this knowledge by illustrating that a learner who knows the word consent must also know that it appears in patterns such as by + adjective + consent or that the verb consent is always followed by the preposition to and never by -ing forms.

Another aspect involves knowing that certain words are not to be used and the reasons behind that constraint. Webb (2020) defines this knowledge as being aware of the restrictions

associated with a number of words and expressions. Nation (2001) mentioned that the teacher is supposed to impart this type of knowledge in class via discussions.

1.2.4 Receptive vs. Productive Word Knowledge

Word knowledge can be classified into two types: productive and receptive knowledge. On the one hand, productive vocabulary knowledge is the fact that the learner is able to produce the piece of vocabulary correctly. On the other hand, receptive vocabulary knowledge is the fact that the learner is able to understand the piece of vocabulary in question once it is received.

Nation (2001) provided a comprehensive framework in which he illustrated how productive and receptive knowledge manifest in the three facets of word knowledge. Concerning the receptive knowledge of word form, the learner is supposed to know what the word looks like (written form) and what it sounds like (spoken form). In the productive one, the learner is supposed to know how it is pronounced and how it is spelled. As far as meaning knowledge is concerned, the learner should receptively know what does the word mean and productively know what forms are used to express that meaning. Last but not least, the use facet of word knowledge manifests receptively in knowing the patterns of use, the collocations and the grammatical structures it can take and productively in being able to apply that knowledge in use.

1.3 Incidental L2 Vocabulary Learning Research

A possible process of incidental learning is the uptake of vocabulary while engaging in other tasks or when learners are not instructed beforehand that they are to take a test. The idea of vocabulary being acquired incidentally was first hypothesized by Krashen (1989), who

maintained that one can develop lexical knowledge naturally as long as they encounter comprehensible input. Similarly, Gass and Selinker (2001) explained that a word is incidentally learnt when the focus is attributed to meaning, not to actually trying to learn it. Thus, Nation (2001) maintained that reading or listening to comprehensible input with no intention to acquire lexis may indeed lead to lexis acquisition.

1.3.1 The use of pseudowords

The present study is of the view that the use of pseudowords is an effective technique to assess incidental L2 vocabulary gains. Pseudowords are widely used in L2 vocabulary research to substitute original words. According to Nordquist (2018), a pseudoword is "a string of letters that resembles a real word (in terms of its orthographic and phonological structure) but doesn't actually exist in the language". Pseudowords are imaginary words or disguised forms which resemble real words so that they are not salient and don't confuse the reader. They are different from non-words which may or may not look like real words.

These structures are made using multiple techniques. One of the techniques is manipulating a stimulus, where the linguist takes an existing word (a stimulus) and inserts, deletes or transposes a character. Other techniques range from selecting high-frequency and legal bi-grams in the language to combining sub-syllabic elements (König, Calude, & Coxhead, 2019). Nation and Webb (2011) clarified that these structures are used in research in order to control previous knowledge of the target words and ensure that further learning can't take place between the immediate and delayed posttests.

1.3.2 Reading studies

Casting the search net in the trajectory of incidental learning of vocabulary from reading has yielded promising results. To date, previous studies have investigated the incidental uptake of single sentences or full texts. Elgort and Warren (2014) investigated the incidental acquisition of L2 vocabulary from reading a long nonfiction book. To this end, participants (N = 48) sat for a vocabulary size test (VST), completed a topic knowledge/attitude questionnaire, and were given the material to read at home while answering general comprehension questions. The text contained 48 target words that were substituted by pseudowords, which were made up by changing letters from the original words. Towards the end of treatment, a meaning generation task was administered to test explicit knowledge of the target words and a lexical decision task to measure tacit knowledge. The results concealed those individual differences (e.g., age, L2 lexical proficiency, gender, learning strategies) together with lexical and text characteristics (e.g., concreteness, frequency, distribution, and saliency of use) all had an impact on L2 lexical development from reading. Researchers attribute the poor learning gains to these factors.

An interesting trend in reading research is the use of eye-tracking as a methodological tool to measure the reading and the fixation duration on the target words and analyse its relationship with vocabulary gains. Pellicer-Sánchez (2015) experimented with the incidental uptake of nonwords from reading through eye-tracking. Participants (N=37) read a story seeded with six nonwords and six control words while their eye movements were being tracked. Results revealed that, after eight exposures, participants managed to recognize the form of 86% of the nonwords, 75% of their meaning, and recalled the meaning of 55% of the nonwords. This study revealed the existence of a robust relationship between the total time spent reading the target

items and the recall of these items' meaning, echoing Godfroid, Boers, and Housen's (2013) research.

1.3.3. Reading-while-listening studies

Empirical reports indicate that richer vocabulary gains were recorded when the text was enhanced by aural materials. In an attempt to compare the conduciveness of the two modes of input: reading-only (RO) and reading-while-listening (RWL) to incidental vocabulary learning, Chen (2021) assigned fifty US undergraduate students to either of the experimental groups and instructed them to read or read and listen to four stories containing the target words. Each of the stories contained eight pseudowords appearing four times. The pseudowords were adopted from Malone (2018), where one letter was different from the original words and followed English spelling and phonological rules. After the treatment, participants were tested on form recognition and form-meaning connection. Besides, they were questioned on their language learning experience and on whether they noticed and tried to intentionally learn the pseudowords. Results revealed the effectiveness of incidental learning via different modes and that of the RWL, suggesting that reading should be reinforced by listening in reading studies. The study further conceals the fact that intentional learning takes place even under incidental learning conditions.

Similarly, Teng's (2016) study aimed at comparing the effects of reading-only and reading-while-listening on incidental vocabulary acquisition, examining the effect of word exposure frequency. Participants (N= 60) were instructed to read and listen to a graded reader; the latter was seeded with pseudowords substituting original, unknown words. After the treatment, participants completed a battery of tests (form recognition, grammar recognition,

meaning recall, and recognition of collocation). Results revealed that word exposure frequency significantly affected incidental vocabulary gains for form and grammar but not meaning and collocation. Moreover, the reading-while-listening condition was more effective as opposed to the reading-only condition. All in all, vocabulary research has shown that bimodal input (text + audio) provides great opportunities for incidental learning to take place.

1.4 Vocabulary Measurements

Lexical knowledge is frequently assessed using different vocabulary tests depending on the assessment objective. Vocabulary tests are utilized for several ends; these ends were classified by Thornbury (2006) as placement purposes, diagnostic purposes, achievement purposes, proficiency purposes, and research purposes. There are several means by which we can measure and assess the lexical knowledge of learners. The present study focuses the on tests that have research-related purposes. These tests take various formats and measure the extent to which a learner has attained knowledge of a particular lexis.

Multiple choice tests are frequently used with collocations, in which learners are given a word and asked to select its collocate from a list of options. However, one shortcoming of this test is that selecting the correct answer does not always imply knowledge of the word, because students can get it by eliminating the other options. Furthermore, it only measures the recognition aspect of knowledge and ignores the productive one (Thornbury, 2006).

Gap fill tests, the learner is supposed to fill in a gap using the correct answer. It measures the recall aspect of knowledge as it requires them to actually produce the target item in a context. The c-test is a variant of this type, and it includes words whose second part is missing. Another variant of the gap-fill test is the word-formation gap-fill test. In this one, learners are given an

item and are asked to fill the gap by converting it to another form depending on the context (Thornbury, 2006).

Concerning the appropriate test type for each aspect of knowledge, Nation (2001) suggested the use of dictation, reading aloud, or cued oral recall for both the spoken and written forms. L1 and L2 translations were suggested for the meaning aspect. Using words in context for grammatical use and detecting word collocations for collocation use. Last but not least, he proposed providing the formal or UK use of the word. Meanwhile, he mentioned that vocabulary interviews can be accommodated to encompass all the above-mentioned aspects. Lastly, proving "I don't know" option within vocabulary tests is recommended to minimise guessing.

Conclusion

In the section at hand, focus was cast on the incidental acquisition of L2 words. Initially, the incidental mode of learning was defined and contrasted against the intentional one. In addition, the various aspects of vocabulary knowledge were specified in general. A review of the literature in this field highlighted the major studies that were done using two modes of input, reading-only, and listening-while-reading. Towards the end, various means by which researchers often measure vocabulary knowledge were presented. This chapter is the bedrock on which the practical chapter of this dissertation will be based, as it provides insights about the nature and efficiency of incidental acquisition of L2 words and the appropriate ways to measure the acquired word knowledge

Section Two: The Spacing Effect in Incidental Learning of L2 Vocabulary

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The succeeding chapter of this manuscript discusses the spacing effect in incidental learning of L2 formulaic sequences. The chapter historically traces this phenomenon in both L1 and L2 contexts; besides, it compares and contrasts its effect in both intentional and incidental learning, where the spaced condition stood the test against the massed condition. Various theories about the phenomenon were then presented.

1.5 What is the Spacing Effect in Learning?

The "spacing effect," that is, distributing study episodes over an estimated time interval, is a robust phenomenon in experimental psychology. It is assumed to be one the most investigated phenomena in the history of cognitive psychology Dempster (1988) said:

> The spacing effect typically refers to a phenomenon that occurs under conditions in which the retention interval between the last presentation and the test is held constant. Thus, one might reason that because the retention interval between the first presentation and the test is shorter under massed conditions, this condition should result in superior performance (p. 7)

Dempster tried to clarify that this effect takes place as the interval between the last presentation and the test is relatively longer under the spaced condition than that of the massed condition. Likewise, Rogers & Cheung (2020, p .616) asserted that it happens "when multiple learning episodes are spread over a longer period of time, resulting in better learning and

retention than massed conditions, that is, when learning is concentrated into a single intensive session”

The spacing effect is possibly the most reliable and repeatable psychological experiment finding. Numerous reviews (e.g., Dempster, 1988) and meta-analyses (e.g., Cepeda,Vul, Pashler, Wixted, & Rohrer, 2006) have found the spacing effect in a range of memory tasks. In this research, learners are often given lists of words on two different learning schedules, massed and spaced, to test their memory. Massed learning schedules give participants a series of learning opportunities all at once. As opposed to this, spaced-learning schedules spread out learning experiences over time. Participants are prompted to identify or recall the phrases they were shown earlier after a brief pause. These researchers’ findings have consistently shown that learners do better over the long run-on spaced learning schedules than on massed learning schedules (e.g., Cepeda et al., 2006).

1.6 Historical Overview

The advent of the word *spacing* was first discussed by Ebbinghaus (1885), and then a plethora of research in this trajectory put massed practice to the test versus distributed practice. The following sections will chronologically highlight the major findings in this field and the way in which they are compatible with Ebbinghaus’s theory.

1.6.1 L1 studies

Scholars who investigated the phenomenon in L1 contexts reported promising results in support of spacing primacy. Most of these were either conducted in laboratories or in classroom settings. The term coinage of “Spacing Effect” first appeared in Ebbinghaus's (1885) experiment. He concluded that the rehearsal of a 12-syllable series sixty-eight times

successively, followed by seven rehearsals over three days, led to errorless retention. He arrived at the conclusion that "with a 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" (p. 89).

One laboratory study exploring the spacing effect in the learning of L1 vocabulary items is that of Keppel (1964). The researcher examined the distributed practice (DP) of a word list within a 24h interval; superiority of DP was found in both learning and retention of the target lists. Likewise, Underwood (1970) recorded a DP superiority, and he noted that failure to retain under the massed practice is due to a lack of attention. The first classroom study was by Bloom & Shuell (1981) and revealed that the use of the 24 hours interval DP can substantially increase the amount of material students can recall in school. Ever since, empirical reports have confirmed the spacing efficacy in authentic classroom settings (e.g., Dempster, 1987; Dempster, 1989; Kornell, 2009).

1.6.2 L2 studies

In the field of L2 learning, reports seem to back up the claim that spaced practice is a robust phenomenon that generally affects learning and L2 vocabulary learning specifically. Studies in this area examined the spacing effects on two modes of vocabulary learning: intentional and incidental.

1.6.2.1 Intentional learning

Researchers who experimented on intentional L2 vocabulary learning reached the consensus that there exists a *spacing effect*, that is, subjects perform substantially better at vocabulary retention tasks when practice is spaced rather than massed. The phenomenon was

documented across various contexts. (Bahrick & Phelps, 1987; Bahrick and Hall, 2005; Cepeda et al., 2009; Kornell, 2009; Sobel, Cepeda, & Kapler, 2010).

1.6.2.2 Incidental learning

Similarly, the phenomenon was investigated to see whether it could affect tacit learning, "when learners incidentally gain knowledge of words in small increments, building upon their previous gains through repeated encounters until a word is known" (Webb, 2008). Although this phenomenon was scantly investigated in the literature; some studies examined the spacing effect in reading (e.g., Elgort & Warren, 2014; Nakata & Elgort), listening (e.g., Brown, Waring, and Donkaewbua, 2008; Vidal, 2011; van Zeeland & Schmitt, 2013; Zubenko, Gavrylenko, Zhyvotovska, and Vasylieva, 2022), and reading-while-listening (e.g., Webb & Chang, 2015; Teng, 2016; Serrano & Huang, 2018). Some findings have shown an advantage of the spaced condition over the massed one.

1.7 Theories in Spacing and Massing Research

A considerable number of theories exist in the literature to account for the underlying mechanisms and mental processes involved in creating the spacing effect. These theories explain a rationale for the robust link between learning and spacing and how the latter enhances memory functions.

1.7.1 Deficient processing theory

Being one of the most prominent theories in the literature, the deficient-processing theory claims a spacing primacy and attributes it to the fact that deficits in processing occur when presentation is successive. Smolen, Zhang, and Byrne (2016) maintained that much of the problem with massed practice lies in the fact that some memory functions are not properly

executed. Rubin (1998) further clarified that as long as items are presented successively; learners don't pay enough attention to the second of two presentations, unlike a new one.

1.7.2 Encoding variability

Another theory that enjoys much popularity in the literature is the encoding variability theory. This theory explains the spacing in two senses.

1.7.2.1 Contextual encoding

This rests on the assumption that the number of study episodes under the DP allows for the presentation of items in various contexts, the thing that hands the learner many contextual cues to use later in the retrieval phase. Hintzman (1974) claimed that variable contextual encoding affects the recognition and recall memory functions.

1.7.2.2 Semantic encoding

As far as the semantic encoding is concerned, the main assumption of this theory is that under the spacing condition the item is semantically encoded many times ,the thing that overweighs DP over MP. In the words of (Hintzman, 1976 p.69): "when the P1, -P2 interval is short, the meaning assigned to the item on P2, is likely to be the same as that given on P1, while if it is long, the interpretation is likely to change."

1.7.3 Study-phase retrieval theory

The study-phase retrieval theory deposits that spacing study episodes reinforce memory as in each episode pieces of information from the preceding episode are being retrieved and reactivated (Smolen, Zhang, and Byrne 2016).

Baddeley (1986) explained that when spacing is involved, information is retrieved from the long-term memory rather than from the working memory during the study-phase which increases the chances of errorless retrieval during the test-phase.

1.7.4 Consolidation theory

The consolidation of memory is a process that transmits information from the short-term to the long-term memory. Drawing on that, the consolidation theory assumes that two spaced presentations consolidate memory better than two massed ones. According to (Hintzman, 1976 p.73), “The consolidation hypothesis postulates an autonomous increase over time in the retrievability of the memory trace. " Bahrick and Phelps (1987) estimated that the longer the interval between the presentations, the more long-term memory traces are consolidated.

1.8 Aspects in Spacing Research

1.8.1 Time intervals

The spacing effect was previously referred to as the distribution of learning sessions over an estimated period of time, that is, within time intervals. Time intervals are the most crucial aspect, and they have been studied since the very first investigation of the phenomenon in the early 1800s. By definition, a time interval is the equivalent of shorter spans of time that result from dividing a long span. Uncovering the ideal time interval that would lead to optimal learning and retention of the material has occupied the interest of scholars. Short intervals were more effective as opposed to long ones, where learners are unable to detect similarities (Nakata and Elgort, 2020).

Scholars had also investigated the difference between expanding time intervals and fixed (or equal) intervals; their reports were conflicting. Kang, Lindsey, Mozer, and Pashler (2014)

found out that expanding intervals between study sessions yielded better results compared with the equivalent intervals; however, Carpenter, Cepeda, Rohrer, Kang, and Pashler (2012) overweighed the equal intervals. Despite the fact that it is not yet quite clear whether expanding or equal intervals are most effective, time intervals are still the basis of the spacing effect. The retention interval also relates to the spacing effect in the sense that it represents the time in which forgetting takes place. Delaney, Verkoeijen, and Spirgel (n.d.) defined it as the period of time between the final presentation and the test.

In a nutshell, the spacing effect takes place due to the existence of intervals either between study episodes or between a study episode and the test. These intervals enhance memory and prevent memory decay from happening.

1.8.2 The Lag effect

Even though the term ‘lag effect’ is often used interchangeably with ‘spacing effect’, Cepeda et al. (2006) called for a distinction between the two. The lag effect is different from the other effect because it is not concerned with the spaced vs. massed practice thing; it is rather concerned with the number of intervals and their duration. According to Küpper-Tetzel, Erdfelder, and Dickhäuser (2013), the lag effect accounts for: “differences in effectiveness of nonzero lags, e.g., a 1-day lag compared to a 10-day lag” (p. 2), i.e., it explains how lag intervals between presentations are effective and why optimal lags are superior to non-lags. Cepeda et al. (2006) deposited that a lag effect doesn’t exist unless retrieval is involved, this represents the plain relation between the lag effect and the retention process of memory.

(Cepeda et al., 2008, 2009, as cited in Küpper et al., 2013) revealed that:

> The optimal lag is dictated by the length of the retention interval and increases with longer retention intervals: For retention after 7 days the optimal lag was 1 day, for retention after 35 days the optimal time for relearning was 11 days, and for retention after a long retention interval of 350 days the optimal lag was 21 days (p. 3)

That is, an optimal lag is required to ensure effective retrieval, and the latter is dependent on the retention lag. The longer the retention lag, the longer the optimal lag.

1.9 Massed vs. Distributed Occurrences

Most of the studies out there about the spacing effect compared massed practice to distributed practice; these studies provided empirical evidence supporting DP primacy over MP. In the report of Dempster (1988), the main concern of massed-versus-distributed practice effect studies was to test the effectiveness of either a zero distribution (massed practice) or a distribution greater than zero (distributed practice). (Underwood, 1970) made an analogy to illustrate the MP-DP distinction:

> If a unit to be learned is presented more than once in a continuous series, the schedule may be by massed practice (MP) or by distributed practice (DP). Under MP, the successive occurrences of an item occupy adjacent positions. Under DP, at least one other item falls between successive occurrences. Thus, for an item (X) presented three times, the MP schedule might be: F, G, B, X, X, X, P, M, etc. For DP, the schedule might be: F, X, G, B, X, P, X, M, etc. (p. 1)

This quote puts forward the notion that the placement of elements both under spaced and massed conditions is not arbitrary. Underwood (1970) explained that under the MP, items should be closely distributed; however, under the DP, items are separated by both time and the occurrence of other items.

This chapter was an attempt to present the spacing effect in a theoretical framework, accounting for both its definition in the literature and the theories that assumed its underlying mechanisms. It particularly attributes attention to this phenomenon in the acquisition of formulaic sequences. The spacing effect in incidental learning of formulaic sequences shall provide insights for the conduct of the experiment in aspects such as: the distribution of the target collocations under the DP and MP conditions.

Chapter Two: Fieldwork

Chapter Two: Fieldwork

The second chapter of this manuscript is a thorough description of the practical procedures undertaken in a private school to test the effectiveness of the "spacing effect" on the incidental uptake of L2 vocabulary from listening-while-reading a text. The current chapter displays an overview of the details that involve the design of the material, the selection of the target words, and the device of the tests. The fieldwork will sequentially present the methodological details of the experimental design and how it was conducted. It will ultimately present, analyze, and interpret the findings of the investigation.

Section One: Methodology

2.1 Research Paradigm

As far as the research philosophy of this manuscript is concerned, a positivist paradigm was adopted, which relies on a purely quantitative approach. According to Duffy and Chenail (2009), this approach is based on the belief that there exists a single, objective truth, and the quest for that truth should be conducted following some rigorous scientific procedures.

2.1.1 Research design

The study used a true between-subjects experimental design. Educational research's quest for establishing causality among variables is best assisted by experimental designs (Nunan, 1992). The research aim is to investigate whether spacing word repetitions would increase incidental L2 vocabulary learning. The nature of the research questions calls for testing the causality between spacing as an independent variable and incidental vocabulary acquisition as a dependent variable.

To approve or disapprove of the cause-and-effect relationship, a true experiment was conducted. By using a random assignment and random selection, the sample was chosen in order to reduce group differences that already exist, and this sample was divided into a control group and an experimental group, which were treated in two different ways. The control group in this case was the massed group, which received the traditional treatment opposite to the treatment of interest, and the experimental group was the spaced group. Both groups were tested using the posttest only method, and there was no pretest.

2.1.2 Setting

The experiment was carried out with 30 intermediate-level (based on the Common European Framework of Reference, CEFR) students in a private school of foreign languages in Jijel. Due to the fact that this was a classroom-based study, the language lab accommodated the participants during all the treatment sessions since it was equipped with a data projector. The latter was needed for displaying the material.

2.2 Sampling Frame

2.2.1 The population of the study

This study targeted adult EFL students at a private institution of languages in Jijel, Algeria. The target population was intermediate students (i.e., A2 on the CEFR scale) who were studying English for communicative purposes. Learners were sorted into this level either by taking a standardized placement test or by passing the level test below (A1).

These students were all native Arabic speakers, with French as their second language and English as their foreign language. The ages of students in this population range from 26 to 18 years old. The rationale for targeting this category is based on the belief that vocabulary learning

is a crucial prerequisite for EFL learners in general and for intermediate ones in particular. One of the researchers in the present study is a part-time instructor at the school. It has been observed that adult intermediate students are usually overwhelmed by the amount of vocabulary in the level's syllabus and struggle to memorize it. As a result, the study was set to test the effectiveness of one of the most influential techniques in memory research "the spacing practice, on the uptake of vocabulary when reading and listening to a text."

2.2.2 The Sample of the Study

Practical constraints make it impossible to experiment on a large number of students; accordingly, a small sample was selected. The total number of intermediate students in the school was eighty (80). Forty-one (41) students (51.52% of the population) were initially assigned in a random way to the two experimental groups: 19 for the massed condition group and 22 for the spaced condition group. The reason why the number of participants in the spaced condition group was higher than that of the other group is due to the fact that the prior was likely to significantly drop throughout the three sessions. Whenever a participant missed one of the treatment sessions, their data was automatically erased. Thus, the spaced condition group ended up with a final number of: 11. The final size of the sample was thirty participants (37.5%) (see Table 1).

Table 1

Final Sample Size for Both Groups

	Original number of participants	The final number of participants
Massed group	19	19
Spaced group	22	11

2.2.3 Ethical consideration

Given the reality that this investigation involved human beings, some research ethics had to be considered. Initially, consent to use one of the private school's classrooms as the venue and its set of equipment for the experimental sessions was granted. Participants were asked to sign a consent form, which reassured them about the privacy and anonymity of their data, as well as the fact that their participation is totally voluntary and they can withdraw at any time (see Appendix A). Despite the fact that subjects are less likely to be exposed to risks in L2 learning research, obtaining the consent form remains an important ethical procedure (Mackey and Gass, 2016). It was mandatory to debrief the subjects at the end of the study. First, students were informed of the true aim of the study. Deception was used to preserve the incidental nature of learning, and students would not intentionally attempt to learn pseudowords to meet the study aim. Second, students were told that the target words were made-up words that had no sense at all and that they couldn't use them in their language production.

2.3 Materials

A variety of materials were utilized in this study as the medium of instruction: the text (reading), the audio (listening), and the target pseudowords.

2.3.1 The text

Since the study is a reading-while-listening one, the material utilized had to be a combination of text and audio. A story script and its equivalent recording were thought to be convenient materials. The material needed to be self-created to quickly meet the experimental requirement of spaced vs. massed repetition; however, the material had to be authentic as well. Fortunately, by using the advance of technology, the ChatGPT managed to generate short stories that included words repeated multiple times when prompted with "short story with repeated

words". Two stories were selected from the output and underwent some modifications in order to encompass as many target words as possible (see Appendix B). The aim was to have the words appear at least eight times in the two stories, in line with the optimal frequency established in the reading literature (Pellicer-Sánchez, 2016).

After thorough polishing and editing of the text, it was uploaded to the Lextutor website (https://www.lextutor.ca/vp/eng) to obtain a report about its level of vocabulary. Some of the difficult words that were beyond students' current level were simplified; however, the researcher made sure that the text was not oversimplified in order to avoid the saliency of the target pseudowords. The text was split into three parts and presented in PowerPoint slides (size: 15.7 × 11 in; font: 18 Times New Roman for the main text, 47.7 Treasure Map Deadhand font for the headings) (see Appendix C).

2.3.2 The audio

The story was accompanied by audio. In line with previous research (Chen, 2021 & Teng, 2016), the rationale behind the use of audio along with the text is to enhance the comprehensibility of the text and attain better results. The audio was recorded by Speechify, a text-to-speech reader (https://speechify.com). The elderly man option was chosen to do the recording as it was thought to be convenient for the short story. The audio was then split into three parts using the audio editing program Audacity (https://www.audacityteam.org). The audio strings were inserted within the slides that contained the story parts accordingly.

2.3.3 The target words

The text contained nine (9) target words (8 nouns, 1 adjective) substituted with pseudowords. The pseudowords were adopted from the ARC nonword database

http://www.cogsci.mq.edu.au/research/resources/nwdb/. The latter was developed by Rastle, Harrington, and Coltheart (2002) to compile a large collection of legal nonwords generated using a rigorous set of phonological and syntactic rules. Pseudowords were carefully chosen to resemble the target words, so they are not too salient in the text. (See Table 2)

Table 2

Pseudowords and their Overall Frequency of Occurrence in the Input

Pseudoword	**Original word**	**Frequency of occurrence**
Surt	Tale	11
Slo	Sea	10
Sture	Treasure	10
Wilge	Island	8
Tuidy	Journey	8
Korse	Cave	7
Tasper	Adventure	7
Hodet	Heart	6
Darrous	Dangerous	6

Our study sought to assess the effect of spacing repetitions of words over three sessions on incidental vocabulary learning from reading-while-listening. To this end, the comparison group encountered the target words in a single session, whereas the spacing group encountered

every target word repeatedly in three sessions. Table 3 shows the distribution of word occurrences across the three sessions.

Table 3

Pseudowords and their Distributed Occurrences across Three Sessions

Pseudoword	**Session 1**	**Session 2**	**Session 3**
Surt	8	1	2
Slo	4	3	3
Sture	3	2	5
Wilge	4	2	2
Tuidy	2	3	3
Korse	2	3	2
Tasper	2	2	3
Hodet	3	1	2
Darrous	2	3	1

2.4 Instruments of the study

2.4.1 The pre-test

Administering a pretest was eliminated from this study for two main reasons:

- In the school's system, the students were already sorted into intermediate level according to the CEFR placement test.
- The use of pseudowords in this study canceled the probability of any previous knowledge about the target words to exist (Nation & Webb, 2011).

2.4.2 The Immediate post-test

Word knowledge can manifest in various forms; thus, it is recommended to test more than one aspect to obtain a thorough understanding. To that end, written form and meaning recognition tests were utilized to measure knowledge of vocabulary in this research paper. The rationale for using recognition over recall is due to the fact that the prior is easier. The use of pseudowords as the target words in this particular study was owing to the fact that these are technically more difficult to be learnt. The battery of pencil-and-paper tests was handed to the participants immediately after the treatment. The following section will give details about each:

2.4.2.1 The form recognition test

The test measured the acquisition of the pseudowords' written form. The latter included the target word, two distractors and an 'I don't know' option; participants were instructed to circle the correct option (see Appendix D).

2.4.2.2 The meaning recognition test

The test aimed at measuring the recognition of meaning. Participants were instructed to match each pseudoword with its English language equivalent, and which was accompanied with the Arabic translation The test included one extra distracting answer (see Appendix E).

2.5 The Experimental Procedure

In the first week, participants signed a consent form (see Appendix A) after being informed about the nature of the study. The true aim of the story was not revealed; thus, students were told that they were going to participate in a study about reading comprehension. The subjects were randomly assigned to either the experimental group (spaced group) or the comparison group (the massed group).

In the second week, massed group participants entered the experiment's venue and took their seats. Participants were told that their IDs were the numerical codes that were attached to the tables. Participants read and listened to the full story over three parts in one session. They were first instructed to do a silent reading individually. Afterwards, they read while listening to the story on the PowerPoint slides. The reading-while-listening was divided into three parts. Every part was followed by three general comprehension questions and an open-ended one (see Appendix F), to which students had to respond. After the last comprehension question of the last part, subjects took a break and were given incentives (e.g., chocolate and cupcakes) to thank them for participating in the study. We believe that the use of incentives in this particular study had no influence on subjects' decision-making (Grant and Sugarman, 2004); incentives are unethical when they are meant to exercise undue influence, involve risks, or potentially impact autonomy or dignity. After that, the form recognition test was handed out first to the participants. They were asked to first copy the numerical code on the table into their answer sheets. The meaning recognition test was administered when we collected all the answer sheets for the form test. The rationale for this sequential distribution is that the meaning recognition test included the correct written forms; thus, we had to distribute form tests before meaning tests to prevent participants from altering their form test answers (Webb, 2008).

The above procedure was applied to the spaced group as well. The only difference was that participants read and listened to the story over three sessions with a 24 h interval. During each session, participants read and listened to one part of the story (i.e., one slide) and responded to the follow-up questions. In the last session, participants took the immediate posttest after receiving incentives. The overall experiment procedure and schedule are illustrated in Figure 1.

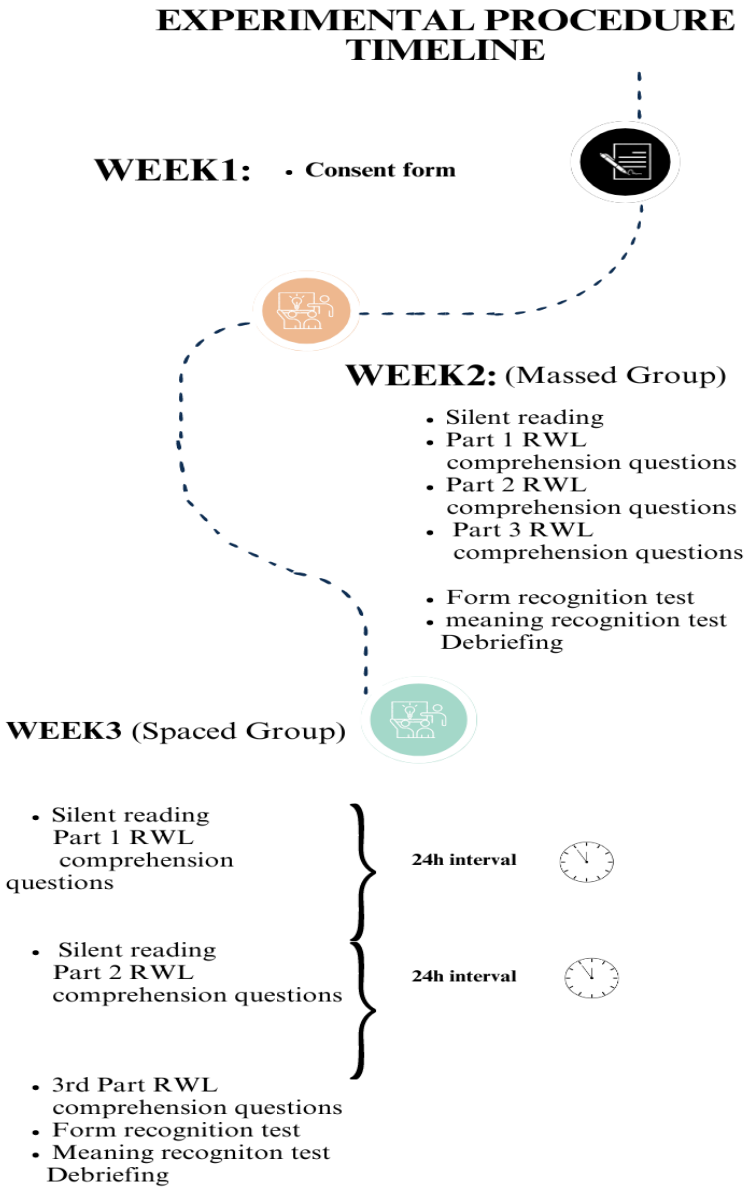


Figure 1. *The experiment procedure and schedule*

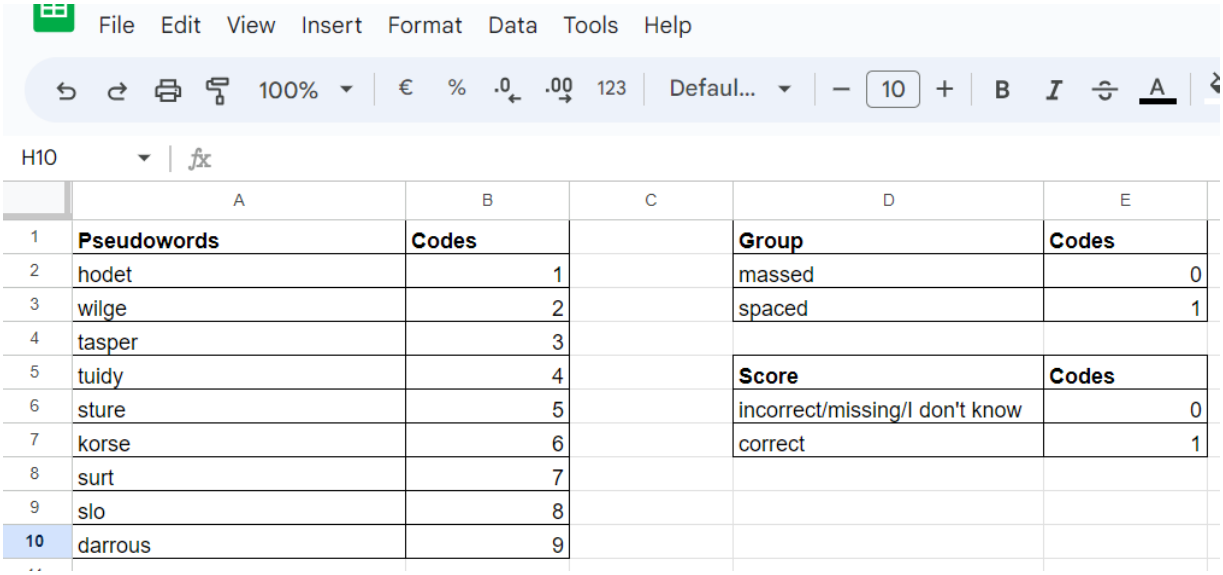
Section Two: Data Analysis

Section Two: Data Analysis

The current section is chiefly devoted to the analysis of the data obtained from the experiment. The latter sought to measure contextual word learning gains obtained from two different study schedules. The first was based on distributing word encounters over three sessions within a 24h-interval between them, while the other one was based on presenting the target items massed during a single study session. The learning gains were measured by means of a form recognition multiple-choice test and a meaning recognition matching test.

2.6 Data Coding

The dependent measure data in this research paper was coded using a binary system, that is, correct answers were coded (1) and incorrect answers were coded (0) (i.e., categorica). Group variable was also coded dichotomously with 0 as massed and 1 as spaced. The full coding is explained in Figure 2.



	A	B	C	D	E
1	**Pseudowords**	**Codes**		**Group**	**Codes**
2	hodet	1		massed	0
3	wilge	2		spaced	1
4	tasper	3			
5	tuidy	4		**Score**	**Codes**
6	sture	5		incorrect/missing/I don't know	0
7	korse	6		correct	1
8	surt	7			
9	slo	8			
10	darrous	9			

Figure 2 *The codebook in Excel*

2.7 Hypothesis-Testing

The use of dichotomous coding calls for the conduct of a logistic regression analysis. In this analysis, Score was the dependent variable and Group was the independent variable. We also controlled for the effect of the frequency of occurrence by including the values of this covariate in the analysis.

Section Three: Results and Discussion

Research Question 1: Word form recognition

Are repeated word occurrences spaced over multiple reading-while-listening sessions more conducive to the incidental acquisition of word form than occurrences massed in a single session?

The descriptive statistics for the form recognition test can be visualised in Figure 3.

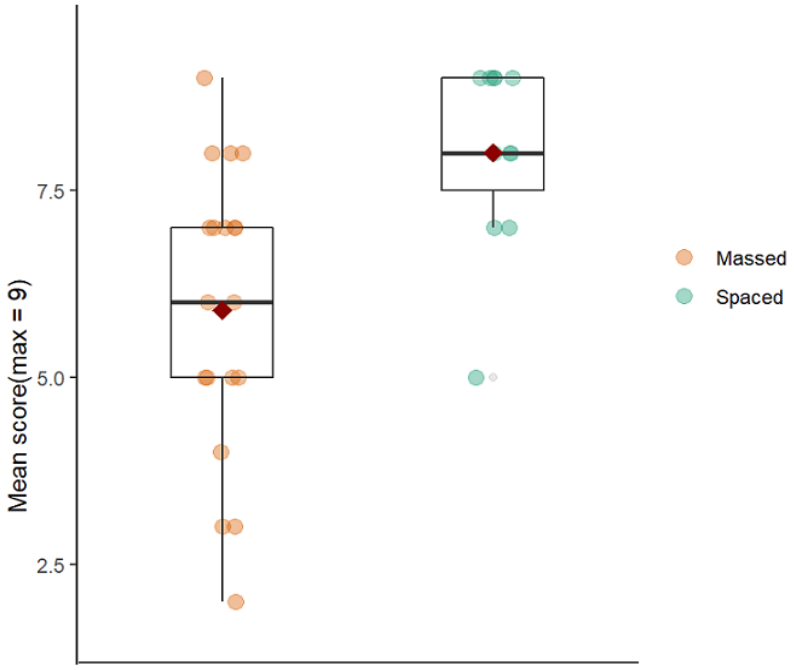


Figure 3. Boxplot showing mean accuracy in the form recognition test
Spaced (Mean = 8; Standard deviation = 1,98)
Massed (Mean = 5,89; Standard deviation = 1,94).

Figure 3 compares the performance of massed and spaced group participants on the written form recognition test. Overall, the graph shows that the spaced group did substantially well on the test as opposed to the massed group. Both groups had participants that achieved the maximum score (i.e., 9). However, the lowest scores were 5 and 2 for the spaced and massed group, respectively. The graph also displays mean scores. The highest mean was found in the spaced group (8) compared with the massed group (5.89). It is observed that the spaced practice was perhaps more conducive to incidental acquisition of word forms. However, with the unequal sample sizes, caution must be applied, as the findings might not determine a clear-cut difference; only inferential statistics can.

To test whether the disparity observed in the graph is statistically significant, a logistic regression analysis was performed. The results are reported in Table 4. The table shows a significant effect of group on the dependent variable ($p < .001$). In other words, the written form recognition accuracy depended on whether pseudowords were spaced or massed.

Table 4.

Inferential Statistics for Written Form Recognition Scores

Variables	*B*	*SE*	*p-values*	*Odds Ratio (EXP (B))*
Intercept	-0.03	0.70	0.971	0.98
Frequency	0.08	0.08	0.33	1.09
Group = Spaced	1.44	0.36	*******	**4.23**

*** = p <.001.

Specifically, the fourth column (Odds Ratio) indicates that participants that encountered target words over three sessions were 4 times (4.23) more likely to recognise the written forms at the immediate test than participants that encountered words in one session.

Discussion

We tested the hypothesis that Participants who were exposed to the target words under the spaced condition would overscore the ones who were exposed to the same words under the massed condition. Descriptive statistics indicated that, on average, spaced participants recognised the written form of 8 pseudowords, while massed participants recognised the form of almost 6 pseudowords. Inferential statistics revealed that the outperformance of the spaced group in written form test was statistically significant. In other words, the study rejected the null hypothesis and accepted the alternative hypothesis that spaced repetitions of words contribute to greater gains of word forms than crammed repetitions.

These findings confirm the association between spaced practice and contextual L2 vocabulary learning from listening-while-reading. The results will now be compared to the findings of previous work. The results confirm those of previous, including recent, studies. Wegener et al. (2022) reported the apparent magnitude of the spacing effect on children's L2 orthographic learning. Similarly, the spacing effect on unintentional word form learning was found with adult readers as well (Joseph, Wonnacott, Forbes, & Nation, 2014; Nakata & Webb, 2016) and in contextual orthographic learning of pseudowords and nonwords (Pérez-Serrano, Nogueroles-López, & Duñabeitia, 2021).

A number of factors may explain the causal relationship between spacing and form acquisition. In the literature, there exist a number of theories that account for the reason why distributed practice has such an enormous impact on learning. The consolidation theory (Hintzman, 1976) deemed spaced practice effective in consolidating memory by transforming segments of information from the short-term to the long-term memory. Hintzman (1974) clarified the contextual variability, i.e., the fact that spaced practice provides the learner with various decoding opportunities to encode information over several spaced study episodes. This theory indicates that the difference between the groups was due to the fact that participants in the spaced practice group listened to and read the written form in various contexts, which might've led to the fact that they remembered orthographic forms on the second session and reinforced them in the third one. Another plausible explanation might be the fact that most of our word form learning has been acquired through implicit reading since childhood (Wegener et al., 2022).

Research Question 2: Meaning Recognition

Are repeated word occurrences spaced over multiple reading-while-listening sessions more conducive to the incidental acquisition of *word meaning* than occurrences massed in a session?

The descriptive statistics for the meaning recognition test were calculated and are presented in Figure 4. The graph depicts the performance of the two groups on the meaning recognition test. A growth in meaning knowledge of the target items can be observed in both groups, with a mean score that is slightly above 4. Both groups hit the top score (i.e., 9). The lowest score was found in the massed practice group "0", while the lowest score in the massed one was estimated at "2". Computing inferential statistics will account for whether there is a significant difference between the groups.

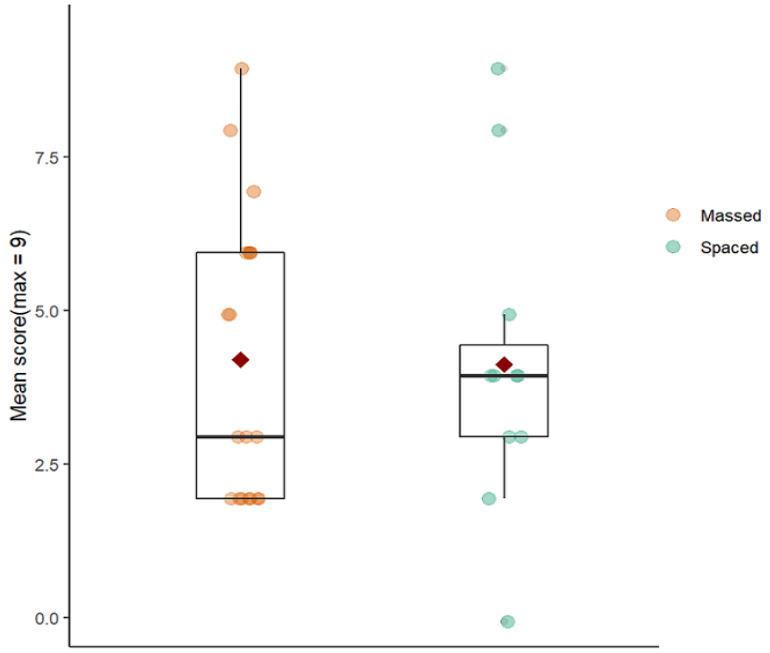


Figure 4. Boxplot showing mean accuracy in meaning recognition test
Spaced (Mean = 4,18; Standard deviation = 2,52)
Massed (Mean = 4,26; Standard Deviation = 2,33).

Table 5

Inferential Statistics for Meaning Recognition Scores

Variables	*B*	*SE*	*p-values*	*Odds Ratio (EXP (B))*
Intercept	0.71	0.60	.24	2.03
Frequency	-0.10	0.07	.16	0.91
Group = Spaced	-0.08	0.25	**.78**	0.93

Contrary to expectations, this study did not find a significant difference between the spaced group and the massed group (p =.78) at the level of meaning recognition knowledge.

Discussion

We tested the hypothesis that repeated word occurrences spaced over multiple reading-while-listening sessions are more conducive to incidental acquisition of word meaning than occurrences massed in a single session. The results were not as expected. It was somewhat surprising that there was no significant difference between the two groups.

These results are consistent with those of Webb et al. (2020), who revealed a significant variance in gains that result from meaning-focused learning by examining the effect of exposure to L2 meaning-focused information on incidental vocabulary development. Otherwise, there are some other studies that do not support the findings of the current study, for instance, the study of Nakata & Elgort (2020), in which spacing effects were assessed using semantic priming, meaning recall, a meaning-form posttest in order to test the hypothesis that spacing effects may differentially affect the development of explicit or tacit word knowledge. The meaning-form matching and meaning recall posttests revealed that spaced learning outperformed mass learning.

These results contradict recent results from the study of Ghebghoub (2021) which found a spacing effect in listening-while-reading on acquisition of meaning but not form. However, her study was based on extensive input and not a short story. Our analysis indicated that, although in the mass condition there was a beneficial impact on the meaning learning of the target words, the spaced condition also had an influence on it.

General Conclusion

General Conclusion

This manuscript discussed one of the most robust phenomena in experimental psychology; that is spacing effect. The latter avows spacing is more effective than cramming and that better learning occurs when study episodes are allocated over time. A plethora of empirical evidence exists to back up the efficacy of spacing in the learning and teaching of vocabulary. Initial attempts to demonstrate this effect were purely laboratory-based but later expanded to test it in authentic classroom settings. To date, most of the evidence confirms this effect in the context where vocabulary is intentionally learnt; however, evidence of this effect in the context of unconscious learning is still inconclusive.

The current study investigated the impact of spacing on the incidental learning of vocabulary through reading-while-listening as the mode of input. The researchers intended to see whether significant learning gains would be recorded when students are exposed to the distributed target items embedded in a meaning-focused type of instruction by comparing it to the massed target items. Findings revealed that the phenomenon under study had a large effect on orthographic learning and revealed no significant difference between the groups on meaning recognition. The utility of these findings lies in the fact that they went in line with certain dominant studies in the field, meanwhile, it contradicted others. This calls for further research to be conducted in order to get more insights into the phenomenon. Furthermore, this investigation provided more insights about the phenomenon under study and contributed to fill the existing gap in the literature. Last but not least, the present study provided practical implications to SLA and EFL practitioners.

Limitations of the Study

Any piece of research is open to criticism and vulnerable to constraints and limitations. The writers of this piece of research acknowledge this fact and admit that the quest to answer the research questions was seeded with obstacles.

- The use of pseudowords was a limitation of the study due to the fact that subjects had to learn nonsense words that would not be of any use to their second language learning. The researchers had to either pursue the seemingly unattainable task of adopting a text with real low-frequency words or go with the pseudowords option. The rationale behind adopting the latter choice was to control the chances of pre-existing knowledge of the target words and hence spare us from the need for a pre-test. Another reason why pseudowords were used in this contextual word learning study is due to the fact that when they replace real words, it makes it way easier for learners to deduce their meaning by providing more contextual clues (Nation & Webb, 2011). Although the researchers attempted not to embed salient target pseudowords , some of the participants did actually notice them and draw attention to them by asking about their meaning. Owing to the fact that this was a purely incidental word learning study, researchers couldn't explicitly provide the meaning of the target words. We wanted to direct word learning to happen as a result of doing another activity (i.e., incidentally), so we encouraged them to guess it from the context.
- Another difficulty of the study lay in the phase of material development. That process was incredibly time-consuming and especially tricky. The researchers initially opted for adopting an authentic graded reader as the material of the study; however, the task of locating a story that included high frequency suitable words within a short period of time

was daunting. Instead, an AI generated text, which was easy to manipulate by augmenting the frequency of the target words and equally distributing them throughout the three parts of the story, was adopted. The audio input for listening was another concern. Access to native voice over workers was not possible; as a result, help was again sought from AI services. The text was uploaded to a website, and we had it recorded into an mp3 format in a digital voice based on a human voice. The subjects of the study were volunteers with the absolute freedom to withdraw from the study at any time. This was another limitation of the study. Under the spaced condition, many participants either chose not to attend the remaining sessions or had personal circumstances that hindered their attendance. Given that, we had to erase the data of nine participants who could not make it through all three treatment sessions. The sample number for that experimental group decreased to 11.

- The fact that the researchers didn't opt for a delayed posttest was owing to constraints of time and availability of participants. This accounts as a limitation of the study because the long-term retention was not put to test.

Pedagogical Implications

The conduct of research in applied linguistics is meant to provide practical insights about any area in which language is of central concern. Accordingly, the highly controlled manipulation of learning conditions in this study revealed insightful results. The fact that learners were able to orthographically learn words that were seeded multiple times throughout the text gives insights for:

EFL Material Developers: to create learning materials that contain lexical items occurring multiple times throughout the material rather than massed to provide learners with various word encounter opportunities.

EFL Instructors: to seek to present target vocabulary more often, both in written and spoken forms, to enhance orthographic memory and retention.

The use of the application Speechify proved practical and effective. Prompt access to natural audio-recording of any text is an incredible opportunity for teachers and learners. We recommend that teachers implement it, especially in listening-while-reading activities, both in the classroom and as homework. The results of the study corroborate the long-held assumption that word form is easier to learn than meaning (e.g., Godfroid et al., 2018).

EFL learners: it gives insights to EFL learners about the fact that they can incidentally acquire orthographic forms, which encourage them to read more, encounter more word forms, and therefore develop their spelling skills.

Recommendations For Further Research

Given the limitations and constraints faced during the conduct of this investigation, the authors would recommend the following:

The fact that various designs and methodological tools might be used to investigate any research topic is common sense. Thus, this particular topic could be explored by means of a qualitative approach to broaden its scope and obtain more subjective findings. Furthermore, the effect of spaced practice can be studied in other contexts, with larger samples or using different materials. Based on one of the limitations of this study, further researchers may opt for larger intervals (48 h, 72 h, a one-week interval, etc.) under the spaced condition in order to more accurately account

for an authentic spacing effect. The effect of spacing on unintentional learning might be further explored by measuring meaning and form recall rather than meaning and form recognition so that a better understanding of the topic will be obtained. Further studies may as well opt for a delayed posttest along with the immediate posttest.

References

Audacity. (2019, May 13). Audacity ® | Free, open source, cross-platform audio software for multi-track recording and editing. Retrieved from Audacityteam.org website: https://www.audacityteam.org

Baddeley, A. D. (1986). *Working Memory*. Oxford University Press, USA.

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

Bahrick, H. P., & Phelphs, E. (1987). Retention of Spanish vocabulary over 8 years. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *13*(2), 344–349. https://doi.org/10.1037/0278-7393.13.2.344

Bereiter, C., & Scardamalia, M. (1989). Intentional learning as a goal of instruction. *Lawrence Erlbaum Associates, Inc.*

Bloom, K. C., & Shuell, T. J. (1981). Effects of Massed and Distributed Practice on the Learning and Retention of Second-Language Vocabulary. *The Journal of Educational Research*, *74*(4), 245–248. https://doi.org/10.1080/00220671.1981.10885317

Brown, R., Waring , R., & Donkaewbua , S. (2008, October). Incidental vocabulary acquisition from reading, reading-while-listening,and listening to stories .

Carpenter, S. K., Cepeda, N. J., Rohrer, D., Kang, S. H. K., & Pashler, H. (2012). Using Spacing to Enhance Diverse Forms of Learning: Review of Recent Research and Implications for Instruction. *Educational Psychology Review*, *24*(3), 369–378. https://doi.org/10.1007/s10648-012-9205-z

Carter, R. (1998). *Vocabulary : applied linguistic perspectives*. London: Routledge.

Cepeda, N. J., Coburn, N., Rohrer, D., Wixted, J. T., Mozer, M. C., & Pashler, H. (2009). Optimizing Distributed Practice. *Experimental Psychology*, *56*(4), 236–246. https://doi.org/10.1027/1618-3169.56.4.236

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

Chen, Y. (2021). Comparing incidental vocabulary learning from reading-only and reading-while-listening. *System*, *97*, 102442. https://doi.org/10.1016/j.system.2020.102442

Compleat Lexical Tutor. (2010). Retrieved from Lextutor.ca website: https://www.lextutor.ca

Delaney, P., Verkoeijen, P., & Spirgel, A. (n.d.). *Spacing and Testing Effects: A Deeply Critical, Lengthy, and At Times Discursive Review of the Literature*. https://doi.org/10.1016/S0079-7421(10)53003-2

Dempster, F. N. (1987). Effects of variable encoding and spaced presentations on vocabulary learning. *Journal of Educational Psychology*, *79*(2), 162–170. https://doi.org/10.1037/0022-0663.79.2.162

Dempster, F. N. (1988). The spacing effect: A case study in the failure to apply the results of psychological research. *American Psychologist*, *43*(8), 627–634. https://doi.org/10.1037/0003-066x.43.8.627

Dempster, F. N. (1989). Spacing effects and their implications for theory and practice. *Educational Psychology Review*, *1*(4), 309–330. https://doi.org/10.1007/bf01320097

Doughty, C., & Long, M. H. (2003). *The handbook of second language acquisition*. Malden, Ma: Blackwell Pub.

Duffy, M., & Chenail, R. J. (2009). Values in Qualitative and Quantitative Research. *Counseling and Values*, *53*(1), 22–38. https://doi.org/10.1002/j.2161-007x.2009.tb00111.x

Ebbinghaus, H. (1885). Memory: A Contribution to Experimental Psychology. *Annals of Neurosciences*, *20*(4). https://doi.org/10.5214/ans.0972.7531.200408

Elgort, I., & Warren, P. (2014). L2 Vocabulary Learning from Reading: Explicit and Tacit Lexical Knowledge and the Role of Learner and Item Variables. *Language Learning*, *64*(2), 365–414. https://doi.org/10.1111/lang.12052

Elgort, I., Brysbaert, M., Stevens, M., & Van Assche, E. (2018). Contextual word learning during reading in a second language. *Studies in Second Language Acquisition*, *40*(2), 341–366. https://doi.org/10.1017/s0272263117000109

Gass, S. M., & Selinker, L. (2001). *Second language acquisition : an introductory course*. Mahwah: Lawrence Erlbaum Associates.

Ghebghoub, S. (2021). Imagery in L2 captioned video: Investigating incidental vocabulary learning from extensive viewing as a function of modality, contiguity, and spacing. *[Doctoral Dissertation, University of York]*.

Godfroid, A., Ahn, J., Choi, I., Ballard, L., Cui, Y., Johenston, S., … Yoon, H.-J. (2017b). Incidental vocabulary learning in a natural reading context: an eye-tracking study. *Bilingualism: Language and Cognition*, *21*(3), 563–584. https://doi.org/10.1017/s1366728917000219

Godfroid, A., Boers, F., & Housen, A. (2013). An Eye For words. *Studies in Second Language Acquisition*, *35*(3), 483–517. https://doi.org/10.1017/s0272263113000119

Grant, R., & Sugarman, J. (2004). Ethics in Human Subjects Research: Do Incentives

Matter? *The Journal of Medicine and Philosophy*, *29*(6), 717–738. https://doi.org/10.1080/03605310490883046

Hatch, E., & Brown, C. (1998). *Vocabulary, semantics, and language education.* New York: Cambridge University Press.

Hintzman, D. L. (1974). Theoretical implications of the spacing effect. Retrieved from https://psycnet.apa.org/record/1975-00291-001

Hintzman, D. L. (1976). Repetition and memory. *Psychology of Learning and Motivation*, *10*, 47–91. https://doi.org/10.1016/s0079-7421(08)60464-8

Joseph, H. S. S. L., Wonnacott, E., Forbes, P., & Nation, K. (2014). Becoming a written word: Eye movements reveal order of acquisition effects following incidental exposure to new words during silent reading. *Cognition*, *133*(1), 238–248. https://doi.org/10.1016/j.cognition.2014.06.015

Kang, S. H. K., Lindsey, R. V., Mozer, M. C., & Pashler, H. (2014). Retrieval practice over the long term: Should spacing be expanding or equal-interval? *Psychonomic Bulletin & Review*, *21*(6), 1544–1550. https://doi.org/10.3758/s13423-014-0636-z

Keppel, G. (1964). Facilitation in short- and long-term retention of paired associates following distributed practice in learning. *Journal of Verbal Learning and Verbal Behavior*, *3*(2), 91–111. https://doi.org/10.1016/s0022-5371(64)80027-x

Kim, S. (2022). Spaced Practice and Second Language Vocabulary Learning. *Electronic Thesis and Dissertation Repository.*, *8600*. Retrieved from https://ir.lib.uwo.ca/etd/8600

König, J., Calude, A. S., & Coxhead, A. (2019). Using Character-Grams to Automatically Generate Pseudowords and How to Evaluate Them. *Applied Linguistics*.

https://doi.org/10.1093/applin/amz045

Kornell, N. (2009). Optimising learning using flashcards: Spacing is more effective than cramming. *Applied Cognitive Psychology*, *23*(9), 1297–1317. https://doi.org/10.1002/acp.1537

Krashen, S. (1989). We Acquire Vocabulary and Spelling by Reading: Additional Evidence for the Input Hypothesis. *The Modern Language Journal*, *73*(4), 440–464. https://doi.org/10.1111/j.1540-4781.1989.tb05325.x

Küpper-Tetzel, C. E., Erdfelder, E., & Dickhäuser, O. (2013). The lag effect in secondary school classrooms: Enhancing students' memory for vocabulary. *Instructional Science*, *42*(3), 373–388. https://doi.org/10.1007/s11251-013-9285-2

Mackey, A., & Gass, S. M. (2016). *Second language research : methodology and design*. London: Routledge.

Milton, J., & Fitzpatrick, T. (2014). *Dimensions of vocabulary knowledge*. Basingstoke: Palgrave Macmillan.

Nakata, T., & Elgort, I. (2020). Effects of spacing on contextual vocabulary learning: Spacing facilitates the acquisition of explicit, but not tacit, vocabulary knowledge. *Second Language Research*, 026765832092776. https://doi.org/10.1177/0267658320927764

Nakata, T., & Webb, S. (2016). *Does studying vocabulary in smaller sets increase learning*? *Studies in Second Language Acquisition*, *38*(3), 523–552. https://doi.org/10.1017/s0272263115000236

Nation, & Webb. (2011). *Researching and analyzing vocabulary*. Boston, Ma: Heinle, Cengage Learning.

Nation, I. (2006). How Large a Vocabulary is Needed for Reading and Listening? *Canadian*

Modern Language Review, *63*(1), 59–82. https://doi.org/10.3138/cmlr.63.1.59

Nation, I. S. P. (2001). *Learning vocabulary in another language*. Cambridge: Cambridge University Press.

Nordquist, R. (2018). Definition and Examples of Pseudowords. Retrieved from ThoughtCo website: https://www.thoughtco.com/pseudoword-definition-1691549

Nunan, D. (1992). *Research methods in language learning*. Cambridge: Cambridge University Press.

OpenAI. (2023). ChatGPT. Retrieved from chat.openai.com website: https://chat.openai.com/chat

Pavia, N., Webb, S., & Faez, F. (2019). Incidental vocabulary learning through listening to songs . *Studies in Second Language Acquisition*, 1–24. https://doi.org/10.1017/s0272263119000020

Pellicer-Sánchez, A. (2016). Incidental L2 vocabulary acquisition from and while reading . *Studios in Second Language Acquisition*, *38*(1), 97–130. https://doi.org/10.1017/s0272263115000224

Pérez-Serrano, M., Nogueroles-López, M., & Duñabeitia, J. A. (2021). Incidental vocabulary learning with subtitles in a new language: Orthographic markedness and number of exposures. *PLoS ONE*, *16*(2), e0246933. https://doi.org/10.1371/journal.pone.0246933

Rastle, K., Harrington, J., & Coltheart, M. (2002). 358,534 nonwords: The ARC Nonword Database. *The Quarterly Journal of Experimental Psychology Section A*, *55*(4), 1339–1362. https://doi.org/10.1080/02724980244000099

Richards , Jack. C. (1976). The Role of Vocabulary teaching . Retrieved from

https://www.jstor.org/stable/3585941

Rogers, J., & Cheung, A. (2020). Input spacing and the learning of L2 vocabulary in a classroom context. *Language Teaching Research*, 136216881880525. https://doi.org/10.1177/1362168818805251

Rubin, K. B. D. C. (1998). The Spacing Effect Depends on an Encoding Deficit, Retrieval, and Time in Working Memory: Evidence. *Memory*, *6*(1), 37–66. https://doi.org/10.1080/741941599

Schmitt, N. (2010). *Researching vocabulary : a vocabulary research manual*. Basingstoke: Palgrave McMillan.

Schmitt, N., Schmitt, D., & Clapham, C. (2001). Developing and exploring the behaviour of two new versions of the Vocabulary Levels Test. *Language Testing*, *18*(1), 55–88. https://doi.org/10.1177/026553220101800103

Seel, N. M. (Ed.). (2012). *Encyclopaedia of the Sciences of Learning*. https://doi.org/10.1007/978-1-4419-1428-6

Serrano, R., & Huang, H.-Y. (2018). Learning vocabulary through assisted repeated reading: How much time should there be between repetitions of the same text? *TESOL Quarterly*, *52*(4), 971–994. https://doi.org/10.1002/tesq.445

Smolen, P., Zhang, Y., & Byrne, J. H. (2016). The right time to learn: mechanisms and optimization of spaced learning. *Nature Reviews Neuroscience*, *17*(2), 77–88. https://doi.org/10.1038/nrn.2015.18

Sobel, H. S., Cepeda, N. J., & Kapler, I. V. (2010). Spacing effects in real-world classroom vocabulary learning. *Applied Cognitive Psychology*, *25*(5), 763–767. https://doi.org/10.1002/acp.1747

Speechify. (n.d.). Retrieved from speechify.com website: https://speechify.com

Teng, F. (2016). Incidental vocabulary acquisition from reading-only and reading-while-listening: a multi-dimensional approach. *Innovation in Language Learning and Teaching*, *12*(3), 274–288. https://doi.org/10.1080/17501229.2016.1203328

Thornbury, S. (2006). *How to Teach Vocabulary*. Pearson Education India.

Van Zeeland, H., & Schmitt, N. (2013). Incidental vocabulary acquisition through L2 listening: A dimensions approach. *System*, *41*(3), 609–624. https://doi.org/10.1016/j.system.2013.07.012

Vidal, K. (2011). A Comparison of the Effects of Reading and Listening on Incidental Vocabulary Acquisition. *Language Learning*, *61*(1), 219–258. https://doi.org/10.1111/j.1467-9922.2010.00593.x

Webb , S. (2008). the effects of context on incidental vocabulary learning . *Reading in a Foreign Language*, *20*(2), 1–14.

Webb, S. (2020). *The Routledge handbook of vocabulary studies*. London New York, Ny.

Webb, S., & Chang, A. C-S. (2015). Second language vocabulary learning through extensive reading with audio support: How do frequency and distribution of occurrence affect learning? *Language Teaching Research*, *19*(6), 667–686. https://doi.org/10.1177/1362168814559800

Wegener, S., Wang, H.-C., Beyersmann, E., Nation, K., Colenbrander, D., & Castles, A. (2022). The effects of spacing and massing on children's orthographic learning. *Journal of Experimental Child Psychology*, *214*, 105309. https://doi.org/10.1016/j.jecp.2021.105309

Zubenko, T., Gavrylenko, A., Zhyvotovska, T., & Vasylieva, N. (2022). Spaced vocabulary

acquisition while incidental listening by ESL university students. *Advanced Education*, 79–87. https://doi.org/10.20535/2410-8286.250501

Appendices

Appendix A

Consent form

University of Mohamed Seddik BenYahia

Faculty of Letters and Languages

Department of English

Informed Consent Form:

We ,***Grimes Latifa & Laouet Nousseiba***, are currently carrying out a research project to examine the use of graded readers as a mode of input in L2 learning.

The following will provide you with information about the experiment that will help you in deciding whether or not you wish to participate. If you agree to participate, please be aware that you are free to withdraw at any point throughout the duration of the experiment.

In this study we will ask you to:

- Read and listen to the graded reader
- Answer the general understanding questions

Once you have agreed to participate in the study you will either be allocated to either of the experimental groups.

- If you were allocated to Exp 1, you will have to attend only one session which would take approximately more than 1 hour.
- If you were allocated to Exp 2, you will have to attend three shorter sessions over the course of a week.

- If for any reason during this study you do not feel comfortable, you may leave the classroom and receive credit for the time you participated and your information will be discarded.

All information you provide will remain confidential and will not be associated with your name. When this study is complete you will be provided with the results of the experiment if you request them, and you will be free to ask any questions.

Please indicate with your signature on the space below that you understand your rights and agree to participate in the experiment.

Your participation is solicited, yet strictly voluntary. All information will be kept confidential and your name will not be associated with any research findings.

_____

_

These statements confirm that you have read and understood the above. Pick the statements that apply.

I understand my role as participant in the study

I understand that my data will be kept secret

I understand that my participation is voluntary and that I can withdraw at any time

I agree to follow all the instructions provided by the researchers

I agree to participate in the study

_____ _____

Signature of the Participant Name of the Participant

Appendix B

The text

(Part 1)

In a small village, there lived a girl named Emily. Emily had a secret. a secret she carried deep within her hodet. Every night, she would go out through her bedroom window and walk through the streets to a park near her house. a tuidy that she had made several times. Once, in the shadows of the park, Emily discovered an old, forgotten library. A library filled with dusty books and forgotten surts Awakened by Emily's touch, the books came alive. alive with the magic of their surts. Surts that danced off the pages, flying around Emily like a symphony of taspers. Taspers of all types: in the slo, in the desert, in the mountains, in the forests, or even on a wilge! These surts were dear to Emily's hodet because lives were forever changed when Emily shared her surts. Today's book was about a man who went on a tuidy and faced a lot of darrous situations, therefore learning a life lesson. It reads: "Once upon a time, in a small town, there lived a young fisherman named Ben." Ben was known for his passion for the slo. Every day, he would set out on his boat and sail through the slo in order to fish and then sell what he got in the town market. One sunny morning, as Ben sailed further into the deep blue slo, he noticed a strange light in the distance. Interested, he sailed towards it. To his surprise, he discovered a bottle resting on the coast. Ben couldn't believe what he saw, as it felt like surts where the hero finds a sture and then his life turns into a happily ever after. Hodet full of excitement, Ben carefully opened the bottle. Inside, he found a map--a map that showed the location of a wilge said to hold unimaginable riches. Not able to resist the call of tasper, Ben called all his friends and told them that he was going on vacation to a nearby wilge for relaxation. Ben didn't mention

anything about the sture to his friends. He really wanted to share the sture with his friends, but he first needed to test their loyalty.

(Part 2)

Ben and his friends' tuidy wasn't easy; it was rather darrous and risky, but Ben's fascination with the slo and his love for tasper were above all risks, as he knew that the greatest reward lay ahead of him--the sture wilge. As they set sail, Ben felt super excited. He had prepared for this tuidy for months now, and nothing could stop him from achieving his goal. But as they sailed through the waters, they faced a series of darrous challenges. First, there were the storms over the slo. But with the help of his trusty friends, they managed to sail safely. A tasper in the slo is never a tasper without the pirates, who were ready to attack small ships. But Ben and his friends were united and courageously fought against the pirates. Days turned into weeks as Ben and his friends sailed through the darrous storms. Finally, they arrived on the wilge. With the map as their guide, they walked through its forests and rivers. After what felt like another longer tuidy, Ben and his friends stumbled upon a korse entrance.

"Guys! Would you please wait for me here? "I need to make sure of something." Ben said. With a deep breath, he stepped inside, his hodet filled with anticipation. As he went deeper into the korse, Ben couldn't believe his eyes. Exactly like in surts, in the korse there was a sture beyond his dreams.

(Part 3)

He called his friends, who were way more surprised, and they started collecting the golden coins. Leaving the wilge, Ben gazed upon the beautiful view of the slo , happy for the sture he had found that was not gold but the lessons he had learned on his tuidy. The sture was the friendships he had strengthened, realizing that true wealth was in the friendships that were put

to the test. Ben felt like a rich man as he shared his surts with people, narrating about the a tasper and all the darrous things they faced on the wilge. The sture he had found in the korse was nothing in comparison to the memories he had collected throughout his tuidy. The sture was every moment of the tasper, knowing that it had turned him into a better version of himself.

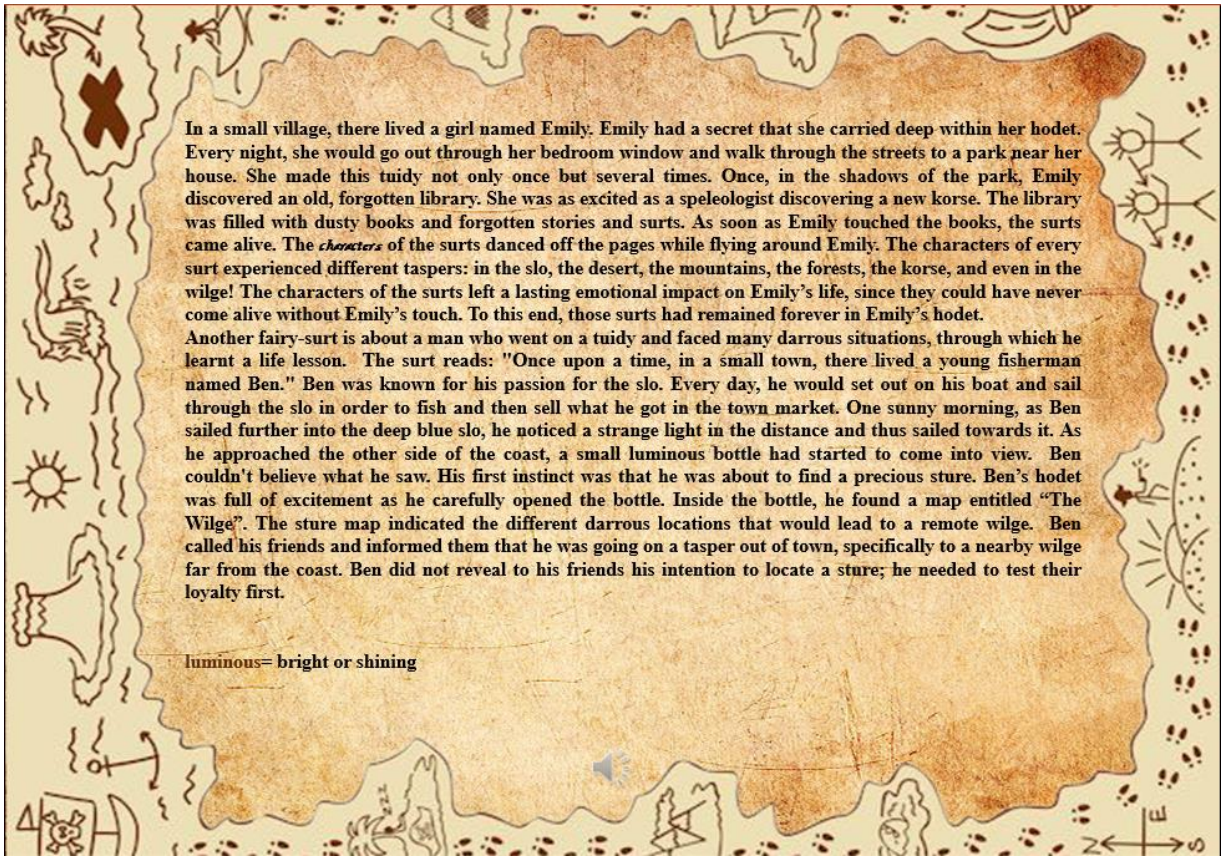
The true beauty of his tasper was not only in the riches he had found but, in the experiences, he had lived along the way--the darrous situations he faced, the friendships strengthened, and the self-discovery achieved.

With a new life lesson, Ben left the korse, carrying a lighter load but a much fuller hodet. As he sailed back to his town, he shared surts of his tasper, inspiring others to go on their own tuidy. From that day forward, Ben was no longer a fisherman, but his love for the slo was never over. And in his eyes, the greatest sture of all was the lesson he learnt from that tuidy.

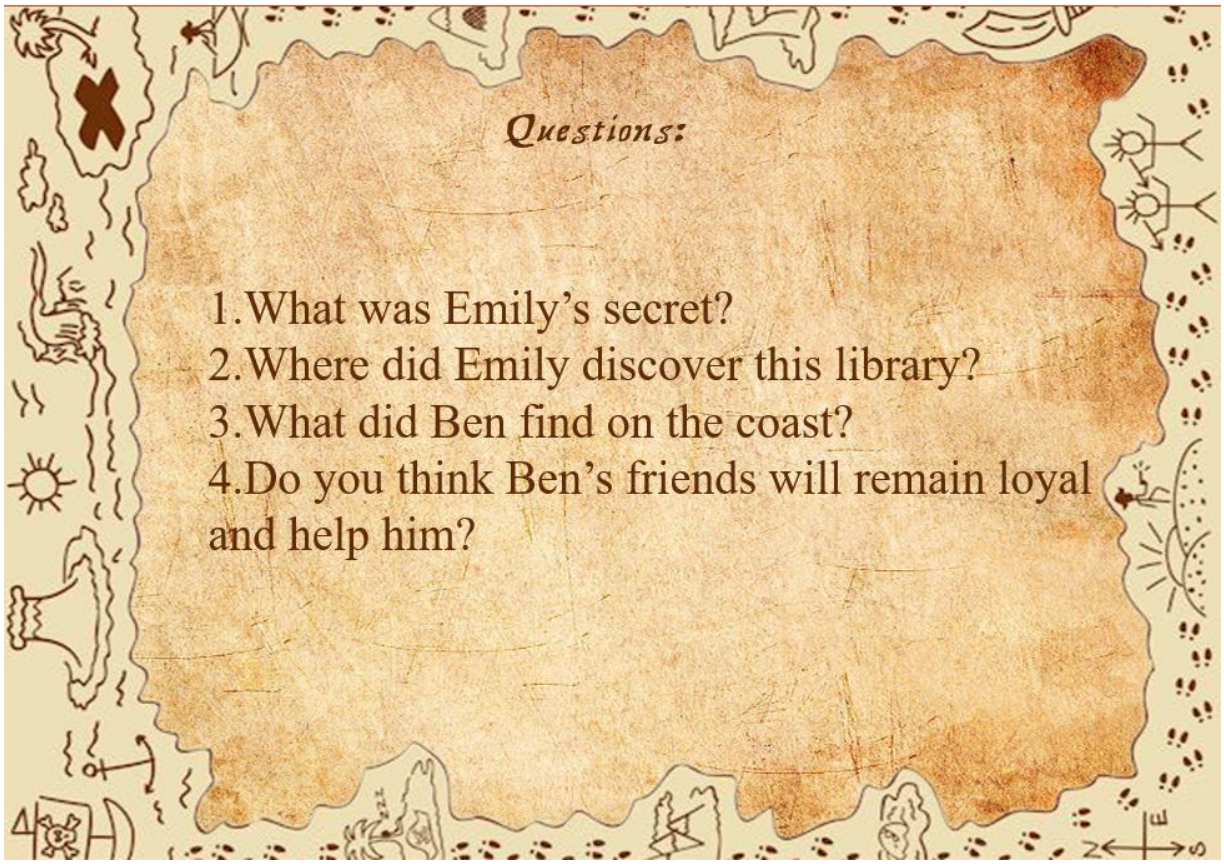
Appendix C

PowerPoint Slides

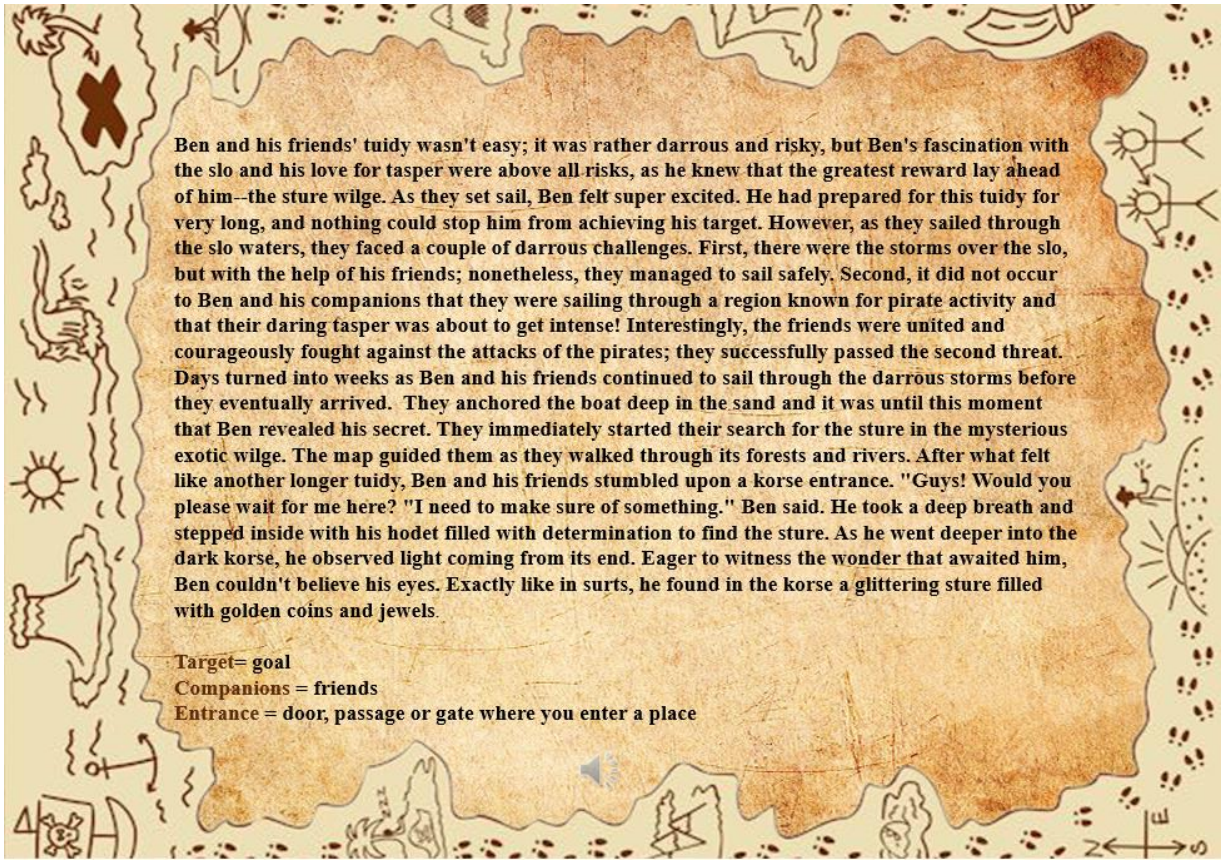
Slide 1



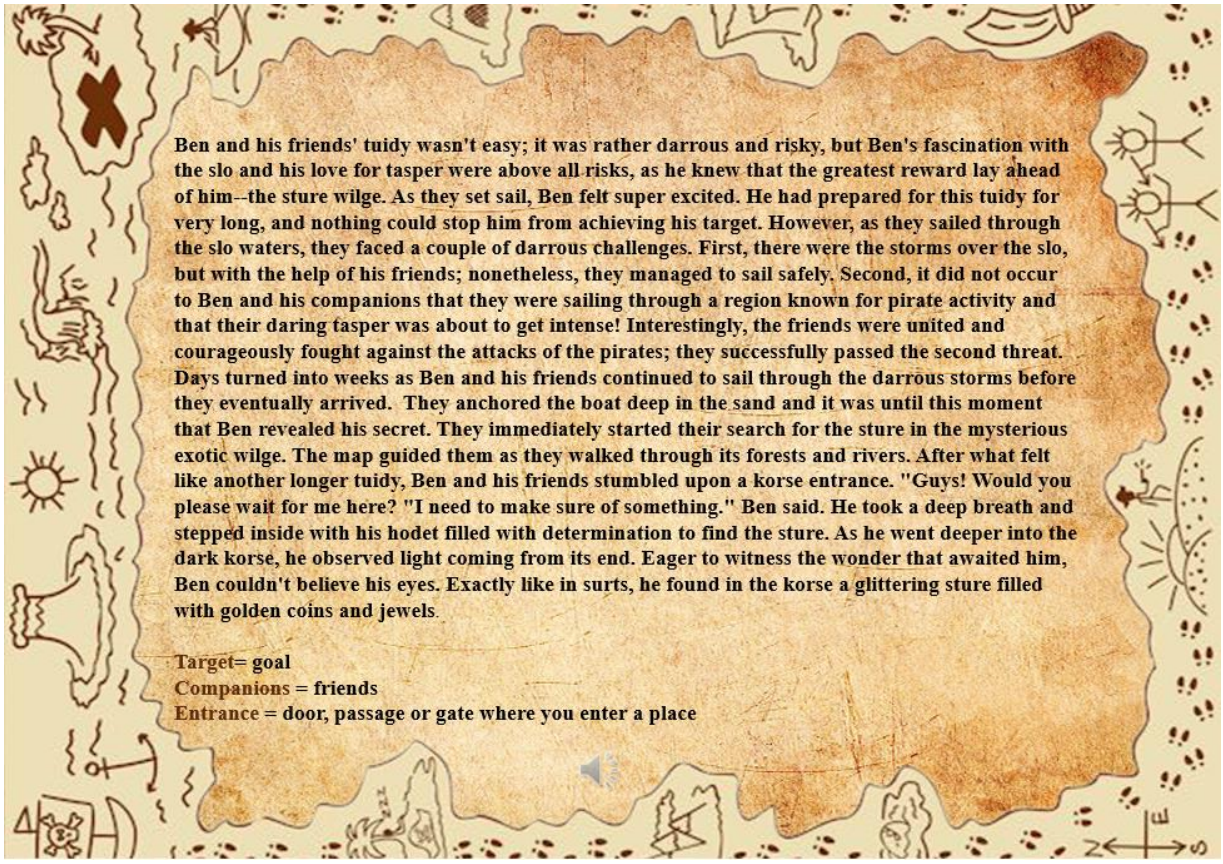
Slide 2


Questions:
1.What was Emily's secret?
2.Where did Emily discover this library?
3.What did Ben find on the coast?
4.Do you think Ben's friends will remain loyal and help him?

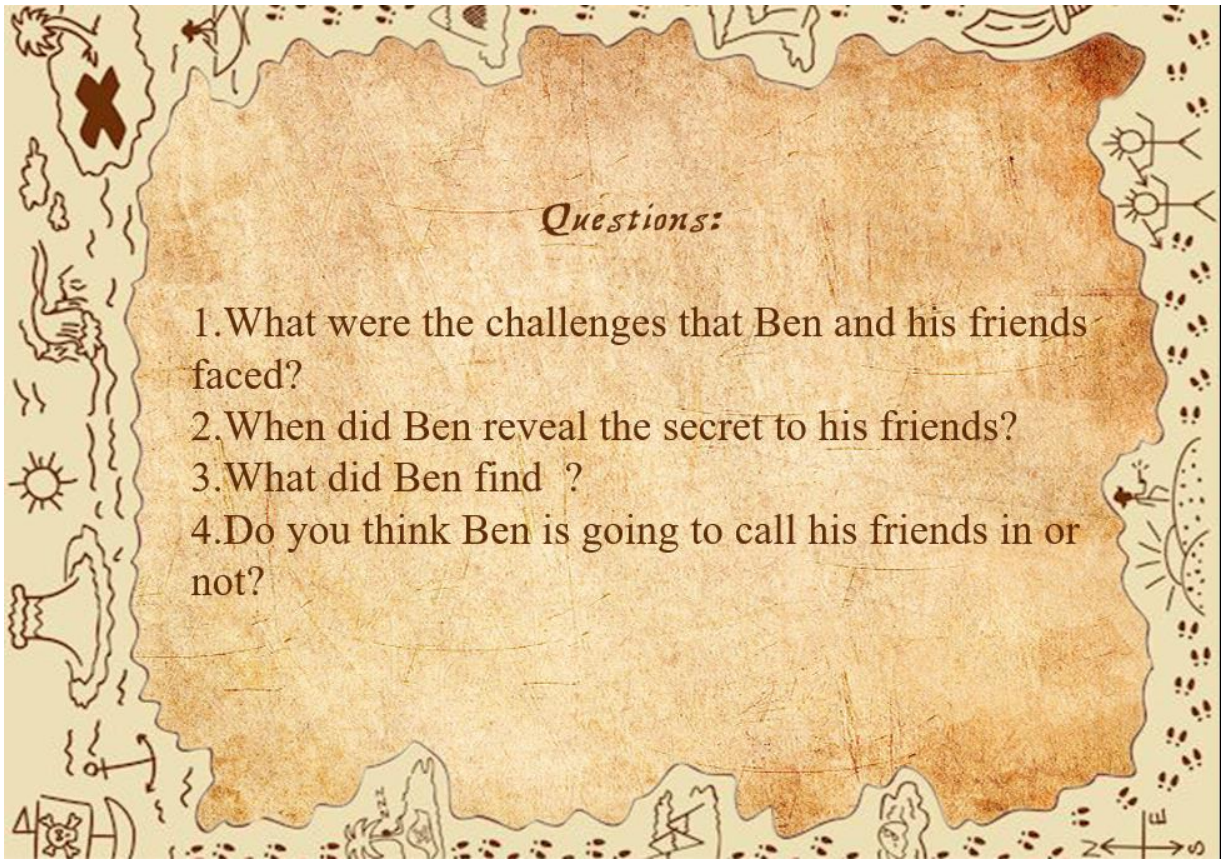
Slide 3


Ben and his friends' tuidy wasn't easy; it was rather darrous and risky, but Ben's fascination with the slo and his love for tasper were above all risks, as he knew that the greatest reward lay ahead of him--the sture wilge. As they set sail, Ben felt super excited. He had prepared for this tuidy for very long, and nothing could stop him from achieving his target. However, as they sailed through the slo waters, they faced a couple of darrous challenges. First, there were the storms over the slo, but with the help of his friends; nonetheless, they managed to sail safely. Second, it did not occur to Ben and his companions that they were sailing through a region known for pirate activity and that their daring tasper was about to get intense! Interestingly, the friends were united and courageously fought against the attacks of the pirates; they successfully passed the second threat. Days turned into weeks as Ben and his friends continued to sail through the darrous storms before they eventually arrived. They anchored the boat deep in the sand and it was until this moment that Ben revealed his secret. They immediately started their search for the sture in the mysterious exotic wilge. The map guided them as they walked through its forests and rivers. After what felt like another longer tuidy, Ben and his friends stumbled upon a korse entrance. "Guys! Would you please wait for me here? "I need to make sure of something." Ben said. He took a deep breath and stepped inside with his hodet filled with determination to find the sture. As he went deeper into the dark korse, he observed light coming from its end. Eager to witness the wonder that awaited him, Ben couldn't believe his eyes. Exactly like in surts, he found in the korse a glittering sture filled with golden coins and jewels.
Target= goal
Companions = friends
Entrance = door, passage or gate where you enter a place

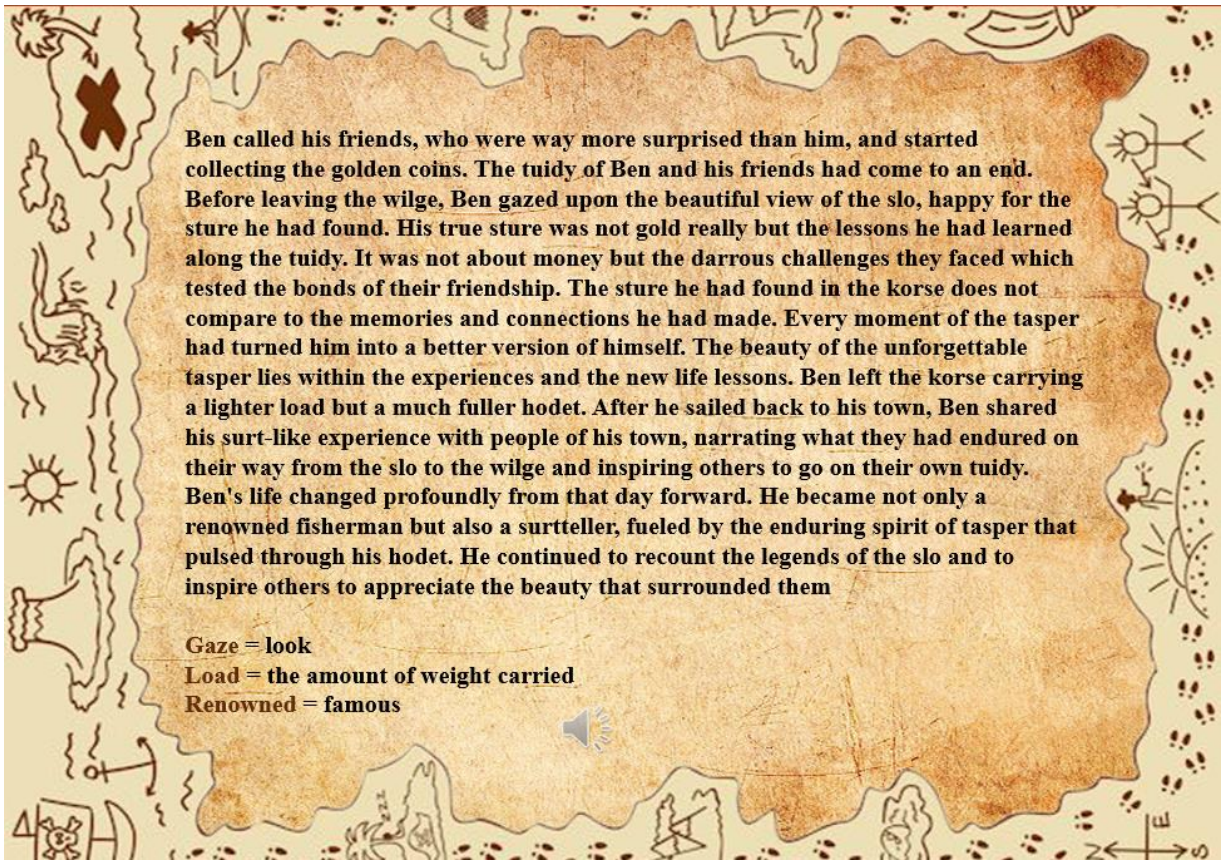
Slide 4


Ben and his friends' tuidy wasn't easy; it was rather darrous and risky, but Ben's fascination with the slo and his love for tasper were above all risks, as he knew that the greatest reward lay ahead of him--the sture wilge. As they set sail, Ben felt super excited. He had prepared for this tuidy for very long, and nothing could stop him from achieving his target. However, as they sailed through the slo waters, they faced a couple of darrous challenges. First, there were the storms over the slo, but with the help of his friends; nonetheless, they managed to sail safely. Second, it did not occur to Ben and his companions that they were sailing through a region known for pirate activity and that their daring tasper was about to get intense! Interestingly, the friends were united and courageously fought against the attacks of the pirates; they successfully passed the second threat. Days turned into weeks as Ben and his friends continued to sail through the darrous storms before they eventually arrived. They anchored the boat deep in the sand and it was until this moment that Ben revealed his secret. They immediately started their search for the sture in the mysterious exotic wilge. The map guided them as they walked through its forests and rivers. After what felt like another longer tuidy, Ben and his friends stumbled upon a korse entrance. "Guys! Would you please wait for me here? "I need to make sure of something." Ben said. He took a deep breath and stepped inside with his hodet filled with determination to find the sture. As he went deeper into the dark korse, he observed light coming from its end. Eager to witness the wonder that awaited him, Ben couldn't believe his eyes. Exactly like in surts, he found in the korse a glittering sture filled with golden coins and jewels.
Target= goal
Companions = friends
Entrance = door, passage or gate where you enter a place

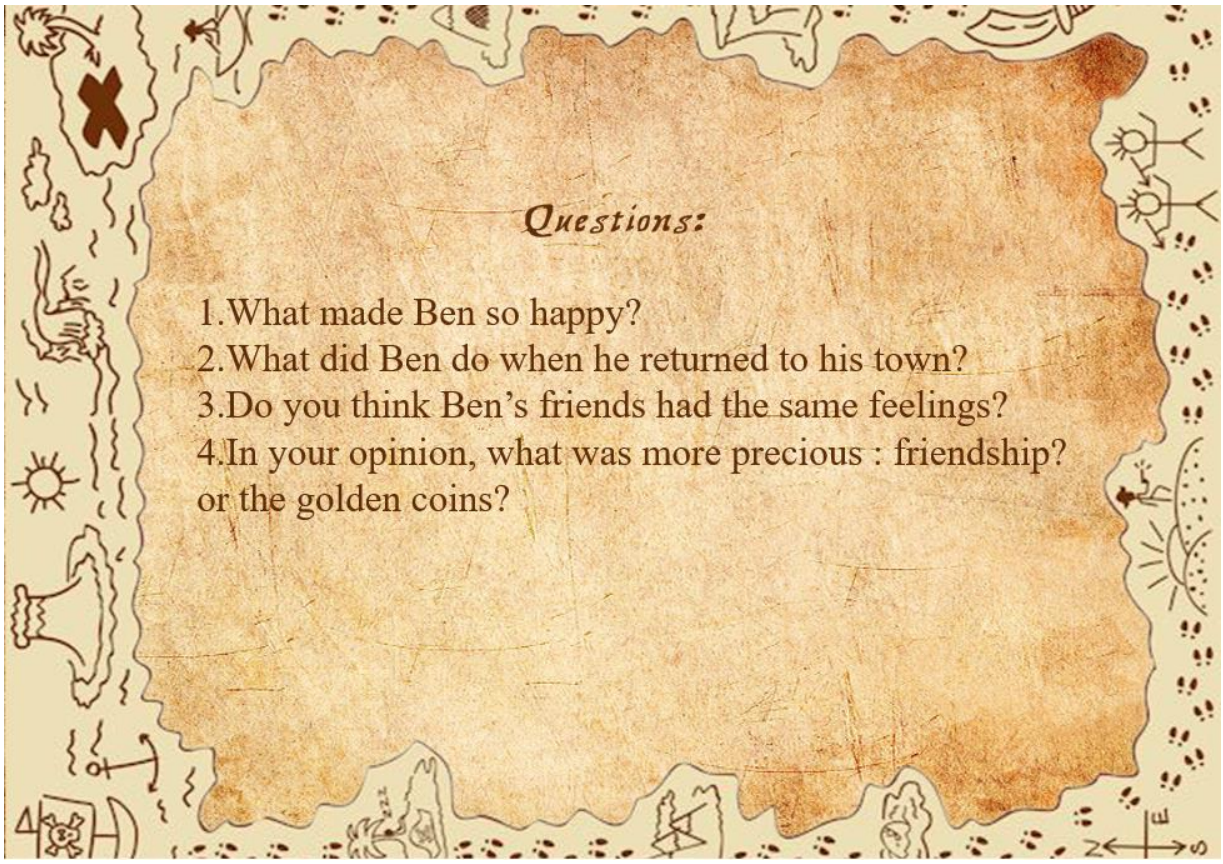
Slide 5


Questions:
1.What were the challenges that Ben and his friends faced?
2.When did Ben reveal the secret to his friends?
3.What did Ben find ?
4.Do you think Ben is going to call his friends in or not?

Slide 6


Ben called his friends, who were way more surprised than him, and started collecting the golden coins. The tuidy of Ben and his friends had come to an end. Before leaving the wilge, Ben gazed upon the beautiful view of the slo, happy for the sture he had found. His true sture was not gold really but the lessons he had learned along the tuidy. It was not about money but the darrous challenges they faced which tested the bonds of their friendship. The sture he had found in the korse does not compare to the memories and connections he had made. Every moment of the tasper had turned him into a better version of himself. The beauty of the unforgettable tasper lies within the experiences and the new life lessons. Ben left the korse carrying a lighter load but a much fuller hodet. After he sailed back to his town, Ben shared his surt-like experience with people of his town, narrating what they had endured on their way from the slo to the wilge and inspiring others to go on their own tuidy. Ben's life changed profoundly from that day forward. He became not only a renowned fisherman but also a surtteller, fueled by the enduring spirit of tasper that pulsed through his hodet. He continued to recount the legends of the slo and to inspire others to appreciate the beauty that surrounded them
Gaze = look
Load = the amount of weight carried
Renowned = famous

Slide 7


Questions:
1.What made Ben so happy?
2.What did Ben do when he returned to his town?
3.Do you think Ben's friends had the same feelings?
4.In your opinion, what was more precious : friendship?
or the golden coins?

Appendix D

Written Form recognition test

Participant ID

Written Form Recognition Test

Question: Choose the correct spelling without guessing. Choose (d) if you don't' know the answer.

1. a) hedet b) hodet c) hodt d) I don't know

2. a) wilge b) wildge c) wildg d) I don't know

3. a) tasper b) taspert c) taspere d) I don't know

4. a) tudy b) tudie c) tuidy d) I don't know

5. a) stur b) sture c) stere d) I don't know

6. a) korse b) kurse c) kors d) I don't know

7. a) sert b) sortt c) surt d) I don't know

8. a) slu b) slo c) sluo d) I don't know

9. a) darrous b) darrus c) darous d) I don't know

Appendix E

Meaning Recognition

Participant ID

Meaning Recognition Test

Question: BASED ON THE STORIES YOU READ, match each word on the left side to its equivalent meaning on the right side. Pease note that one meaning was added for distraction.

1. hodet	**- sea**	البحر
2. wilge	**- adventure**	مغامرة
3. tasper	**- cave**	كهف
4. tuidy	**- heart**	قلب
5. sture	**- dangerous**	خطير
6. korse	**- journey**	رحلة
7. surt	**- treasure**	كنز
8. slo	**- island**	جزيرة
9. darrous	**- town**	مدينة
	- tale	حكاية

Appendix F

Comprehension Questions

Part 1's questions

1. What was Emily's secret?
2. Where did Emily discover this library?
3. What did Ben find on the coast?
4. Do you think Ben's friends will remain loyal and help him?

Part 2's questions

1. What were the challenges that Ben and his friends faced?
2. When did Ben reveal the secret to his friends?
3. What did Ben find ?
4. Do you think Ben is going to call his friends in or not?

Part 3's questions

1. What made Ben so happy?
2. What did Ben do when he returned to his town?
3. Do you think Ben's friends had the same feelings?
4. In your opinion, what was more precious : friendship? or the golden coins?

ملخص

هدف هذا البحث إلى دراسة مدى تأثير توزيع تكرار الكلمات على عدة حصص استماع و قراءة (التباعد) على التعلم العرضي لمفردات اللغة الأجنبية . لأجل تلك الغاية تمت الاستعانة بتصميم تجريبي بين المجموعات المستقلة . ضم التصميم واحد و أربعين تلميذا من المستوى المتوسط لتعلم الإنجليزية حيث تم تعيينهم عشوائيا إلى مجموعة الممارسة المتباعدة أو إلى مجموعة ضابطة (التكثيف). ضمن مجموعة التباعد قام المشاركون بقراءة و الاستماع للقصة التي تضمنت تسع كلمات زائفة على مدى ثلاث حصص يفصلها يوم واحد بين الحصة و الأخرى. في الوقت ذاته قامت المجموعة الضابطة بنفس الشيء لكن خلال حصة واحدة .لإختبار مدى معرفة المفردات تمت الإستعانة باختبارين فوريين دونما سابق إنذار: الإختبار الأول كان حول التعرف على الشكل المكتوب أما الثاني فكان حول التعرف على المعنى انطلقت الدراسة بناءا على فرضية انه سوف يكون هناك اختلاف كبير بين المجموعتين في تعلم الكلمات الزائفة إلا أن نتائج تحليل الانحدار اللوجستي كشفت أن التباعد كان له تأثير كبير على معرفة الشكل الكتابي للكلمات لأن القيمة الاحتمالية كانت أكبر من .0001 على عكس اختبار التعرف على المعنى والذي كانت القيمة الاحتمالية فيه تساوي .78، ومنه تم التوصل لاستنتاج التالي: أن التعلم العرضي من خلال التباعد كان أنجع بأربع مرات مقارنة بالمجموعة الأخرى. و في الأخير تمت مناقشة الى أي مدى يمكن تطبيق النتائج تربويا

الكلمات المفتاحية : التباعد ؛ مفردات ؛ استماع أثناء القراءة؛ كلمات زائفة

Résumé

Cette étude visait à enquêter sur l'effet de la distribution des occurrences de mots sur plusieurs sessions d'écoute pendant la lecture (pratique espacée) sur l'apprentissage accidentel du vocabulaire L2. Dans ce but, un Plan d'expérience inter-participants a été mis en place, avec quarante et un apprenants algériens de "l'anglais comme langue étrangère" niveaux intermédiaires assignés au hasard soit à un groupe de pratique espacé, soit à un groupe témoin (massif). Les participants à la pratique espacée ont lu et écouté deux histoires courtes contenant neuf pseudo-mots, sur trois sessions d'un jour d'intervalle, tandis que le groupe témoin a lu et écouté la même entrée en une seule session. La connaissance du vocabulaire a été évaluée à l'aide de deux post-tests immédiats inopinés : la reconnaissance de la forme écrite et la reconnaissance du sens. Il a été prédit qu'il y aurait une différence significative entre le groupe espacé et le groupe témoin dans les gains de pseudo-mots pour la forme et le sens. Les résultats d'une analyse de régression logistique ont montré un effet positif des rencontres répétées espacées pour la reconnaissance de la forme écrite ($p < 0,001$) mais pas pour la reconnaissance du sens ($p = 0,78$). Les participants à la pratique distribuée étaient quatre fois plus susceptibles de reconnaître avec précision les formes écrites que les participants au groupe de practice massif. Les implications pédagogiques sont discutées vers la fin.

Mots-clés : espacement, vocabulaire, pratique distribuée, lecture-écoute, pseudo-mots