

EFFECTS OF FIRST LANGUAGE AND SECOND LANGUAGE GLOSSES ON LEARNERS' READING COMPREHENSION AND VOCABULARY RETENTION

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Abstract: While previous studies suggest that textual glosses presented along with reading text facilitate deeper textual understanding and vocabulary uptakes, the extent to which such effects vary in different conditions remain obscure. Employing a quantitative research design, the authors specifically focused on the interplay between glossing languages (L1 and L2) and learners' language proficiency (intermediate and advanced), and the effects of glosses on learners' textual comprehension and incidental vocabulary learning. In this study, 180 learners were divided into two groups according to their proficiency level (intermediate or advanced). Within each group, the treatment conditions (control, glossing in native language, and glossing in second language) provided the foundation for further division into three sub-group of 60 students. ANOVA and t-test analysis show that the use of glosses led to deeper comprehension and incidental vocabulary learning. Two-way ANOVAs indicate that L1 glosses generated deeper comprehension and recall ability in intermediate learners than L2 glosses, and inversely, advanced learners performed better in reading and vocabulary tests when given L2 glosses. Finally, the authors proposed some implications for vocabulary learning and teaching in accordance with the relative differences in L1 and L2, and intermediate and advanced levels.

Keywords: glosses, reading comprehension, incidental vocabulary learning, EFL learners

1. Introduction

Numerous studies have elucidated the link between reading comprehension, competent linguistic knowledge, and decoding skills (Nation, 2001). Specifically, a proficient command of language structures, encompassing grammar, syntax, and vocabulary, is vital for readers to assimilate the text's meaning by comprehending the connections between words. Alternatively, proficient decoding skills are critical in facilitating the quick and accurate identification and processing of words, thereby enhancing fluency and comprehension. As such, readers who lack adequate decoding skills may struggle with word recognition, impeding their understanding of the text's meaning, while those equipped with this faculty can focus their cognitive resources on comprehension, improving their overall reading ability. Consequently, regarding improvement in reading comprehension skills, adequate attention should be paid to vocabulary instruction to refine word recognition skills (National Reading Panel, 2000; Tindall & Nisbet, 2010; Ma & Lin, 2015) as a way to promote textual understanding. Vocabulary instruction

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assists in improving the comprehension of or – at the very least – guesswork related to the lexical resources of a given text, and in turn, leading to reading fluency, thereby enabling readers to devote cognitive resources to maximize comprehension. Moreover, the acquisition of new vocabulary helps expand preexisting knowledge, an essential component of deciphering complex texts.

Effective vocabulary instruction is often linked to contextualizing vocabulary meaning as a measure to protract lexical retention. Due to the general belief that reading is context-driven (Weaver et al., 1996), generating great contextual cues for vocabulary units is expected to cement the reading-vocabulary relationship by ensuring concrete vocabulary gains. Martin-Chang et al.'s (2007) study support this idea with the conclusion that children's ability to identify word meanings is more contingent on context training than isolated training. Furthermore, contextualized vocabulary instruction is believed to prompt natural and incidental vocabulary acquisition if interaction with the textual source leads to comprehension (Hulstijn, 2011; Hunt & Beglar, 2002; Schmitt, 2008). Thus, it can be concluded that verbal comprehension positively correlates with a breadth of vocabulary, and contextualized vocabulary teaching yields incidental lexical acquisition and, simultaneously, a more extended recollection of word meaning. In this sense, glossing words can be considered a practical approach to context training as it allows for a meaning deduction from both original meanings and immediate contextual meanings (Boers, 2022; Gallai, 2022; Ramenzanali et al., 2021).

Bearing these ideas in mind, the present study was conducted to investigate whether deeper reading comprehension would result from an increased supply of word meanings in the form of glosses. This study hypothesises that when given an advantage in lexical understanding, learners would better understand the textual sources. After the intervention period, learners could recall more words from the text. To widen the scope of previous studies, the current research also examined the effect of glosses across intermediate and advanced learners of English as a foreign language (EFL). The three research questions are as follows:

- 1) *Does lexical glossing (in first language and second language) result in deeper understanding of the reading materials among advanced and intermediate learners?*
- 2) *Does glossing language cause difference in short-term vocabulary retention among advanced and intermediate learners?*
- 3) *Is there interaction between glossing language and proficiency level on reading comprehension and short-term vocabulary retention amongst readers of glossed texts?*

2. Literature Review

2.1. L1 and L2 in Vocabulary Learning

The acquisition of target vocabulary necessitates a strong link between form and meaning, deemed as “the first and most essential lexical aspect” (Schmitt, 2008, p. 333). This belief leads to the question of whether first language (L1) or second/foreign language (L2) is the superior medium through which words are defined (Wagner & Toth, 2013).

On one end of the spectrum, Krashen's (1982) theories of language learning (i.e., monitor theory and comprehensible input hypothesis) lay solid arguments for the exclusive L2 use in language teaching, as this might ensure higher learning outcomes and be effective against the possible pitfalls of L1 (Swain & Lapkin, 2013; Tognini & Oliver, 2012). This notion resonates well among EFL teachers, who believe that when unknown words are defined in L2, they offer learners the chance for extended L2 exposure. In his study comparing the use of L1

translations and L2 definitions on vocabulary learning, Joyce (2018) concluded that if the aim is towards general language development, learning through L2 definitions has the edge over L1. This idea is also supported by Perez et al. (2013), who found that exclusive use of L2 showed more significant potential than other forms of translation, such as L1 subtitles. The practice of teaching words in L1 was censured by Temperley (as cited in Shin et al., 2020), who likened L1 to a “crutch” that discouraged long-term memorization of new vocabulary.

On the other end, a revisiting of L1, and its use in L2 language development, in recent years has overturned some adamant beliefs of L2 pre-eminence. Studies into the role of L1 in language learning reveal a strong tie between L1 and the success of language learning and a positive connection between L1 and L2 learning (Chen et al., 2020; Wang & Abe, 2008; Yamashita, 2007), and that L2 proficiency level plays a specific part in this relationship (DiCamilla & Anton, 2012; Lee & Schallert, 1997). Specifically, L1 is primarily chosen by L2 learners for ease in completing lexical tasks, such as elaborating on word meanings, recalling linguistic forms, and making out the L2 text’s meaning (Proctor et al., 2010; Storch & Aldosari, 2010; Storch & Wigglesworth, 2003). In vocabulary learning, L1 is regarded as an effective middleman (Lantolf et al., 2015; Storch & Wigglesworth, 2003), bridging the conceptual gap between L1 and L2 (Swan, 1997) and thereby facilitating the mapping of L2 vocabulary items onto their native language at the form-meaning stage (Ringbom, 1987). Another way of explaining this connection is that L1 is active during L2 processing (Jiang, 2002; Sunderman & Kroll, 2006), so it can offer a shortcut to acquisition (Scott & Fuente, 2008). Several studies have lent support to this claim, concluding that the translation of words into learners’ mother tongue helps sustain a higher number of vocabulary intakes (Latsanyphone & Bouangeune, 2009; Laufer & Girsai, 2008; Ramachandran & Rahim, 2004). Nonetheless, the samples in these studies lacked variety in language proficiency, which, according to Ko (2012), might account for the inconclusive conception of gloss effectiveness. Moreover, earlier researchers (Carter, 1987; Cohen & Apeh, 1980; Schmitt, 2000) believe that, while explicit vocabulary instructions match lower-proficiency learners’ needs, intermediate- and above learners would benefit from a more complex, context-based vocabulary learning than mere form-meaning approach. The mismatch between the language used for teaching and testing is also mentioned as a factor which might explain the mixed findings on gloss effects. Therefore, in the present research, the authors focused on how the difference in proficiency level might relate to the differential effects of glossing types.

2.2. Gloss and the Benefits of Gloss in Language Learning

The promotion of incidental vocabulary learning is often associated with extensive reading activities where learners naturally derive vocabulary from leisure reading (Choi et al., 2014; Huckin & Coady, 1999). Although it generally concurs that this activity provides grounds for extensive lexical development (Chun et al., 2012; Nation & Wang, 1999; Waring & Takaki, 2003), reservations persist as the practicality of this practice is often crippled by several factors, including limited attentional resources (Schmidt, 1994), print conditions (Jiang, 2000), word density (Hu & Nation, 2000), the strength of contextual clues (Nagy, Anderson, & Herman, 1987), and language proficiency (Hazenbergh & Hulstijn, 1996). Facilitation of incidental vocabulary learning in reading activities, thus, necessitates an answer to these problems, to which end glosses are devised.

Glosses are nowadays predominantly found in textbooks or academically-inclined readings. One long-running series of books endorsing glosses is the Webster Korean (Chinese/Japanese) Thesaurus Editions of books such as Jane Austen, Sherlock, A Midsummer Night’s

Dream, etc. In this series, glosses of several languages were appended to each page at the margins for learning and easier reading. However, attempts to define glosses began decades ago. Pak (1986) thinks of glosses as explanations, in the form of definitions, of the meaning of a word, and later, Nation (2001) adds that either L1 and L2 synonyms of the words can also be considered gloss. Perhaps Richgels and Mateja's (1984) definition is the most comprehensive, conceptualising glosses as short definitions, explanations or translations of words or phrases unfamiliar to the readers. Gloss is also referred to as 'marginal gloss' because its placement is at the margin of the page, either at the bottom or on either side.

A review of the literature provides evidence to substantiate the claim that glosses tend to exert positive effects on vocabulary learning and reading comprehension as they shift the learner's focus on forms (Nagata, 1999; Bowles, 2004; Yanguas, 2009), offer an effortless understanding of the text (Koren, 1999), help readers avoid incorrect meaning inference or guesses (Nation, 2001), trigger top-down processing, thereby "form-meaning connection conducive to vocabulary learning" (Pulido, 2009, p. 33) and engender active lexical processing that causes word retention (Jacobs et al., 1994). Particularly, these brief explanations or translations of unfamiliar words can facilitate a focus on word form by highlighting the structure and meaning of words, including their prefixes, roots, and suffixes. When encountering unfamiliar words, recognizing their structure or form can enable readers to understand their meaning. For instance, readers can recognize the prefix "un-" and root word "believe" in the word "unbelievable," inferring that it means "not able to be believed." When this practice of contextual inference is developed into a sustainable reading habit, learners can autonomously decode and understand unfamiliar words, achieving reading fluency. Further research inspecting differing glossing types offers empirical evidence of gloss efficiency in vocabulary learning in different forms, namely paper-based glosses (Cheng & Good, 2009; Lin & Huang, 2008) and electronic glosses (Bowles, 2004; Huang & Liou, 2007; Nagata, 1999; Shahrokni, 2009; Yanguas, 2009; Yoshii, 2006). Although it is beyond the purport of this study to investigate the values of other forms of gloss, it is appropriate to mention some successful diversifications of gloss types that help build readers' lexis, such as pictorial gloss (Segler, Pain, & Sorace, 2001; Yoshii & Flaitz, 2002), aural gloss (Al-Seghayer, 2001), and pictorial-textual gloss (Yeh & Wang, 2003; Yanguas, 2009).

With glosses gaining popularity for their effectiveness in prompting vocabulary uptakes and reading comprehension, researchers shifted their attention to the conditions in which such optimized effects would manifest. Specifically, several researchers (Gettys et al., 2001; Nagata, 1999; Watanabe, 1997) compared the relative efficiency of L1 and L2 glosses, revealing mixed findings about the usage of each type. In determining the interplay between gloss languages and reading comprehension, it was concluded in Chen's (2002) study on 85 Taiwanese college students reading three versions of the text (L1, L2, and no gloss) that although participants reading glossed text performed better at the comprehension test, there was no discernible difference between L1 and L2 gloss groups. Similarly, research by Bowles (2004), Cheng and Good (2009), Lee and Lee (2015), Plass et al. (2003) and Yanguas (2009) also added to the obscurity, as they could only affirm the effectiveness of glosses over no gloss, but were unable to show how changes in glossing languages might manifest themselves. The same results were mirrored in investigating glossing types and their effects on incidental vocabulary learning. A study by Jacobs et al. (1994) revealed that participants under gloss conditions could recall more target items regardless of type. However, the difference between the choice of glossing types was unclear.

2.3. Previous Studies on the Effects of Gloss

Earlier research by Jacobs et al. (1994) created a model of methods that is still pertinent to research into gloss. In this study, 85 English-speaking learners of Spanish as L2 were assigned one of the three groups to read the L1 (English) glossed, L2 (Spanish) glossed, and baseline (no gloss) version of the exact 613-word text with 32 target items glossed. The participants then took an immediate and four-week delayed test on their recall ability of the glossed words. Jacobs et al. (1994) mentioned the accretion of lexical items following the treatment while pointing out that the recollection of form meaning was inevitably weakened over four weeks. In the same vein, Chen (2002) inspected how 85 Taiwanese college students responded to L1 and L2 glosses treatment regarding their understanding and ability to pick up words incidentally. While adopting the same group assignment as Jacobs (with L1 being Chinese and L2 being English), he shortened the passage to 193 words, glossing 20 of them. This study reached the same conclusion favouring the use of glosses in incidental vocabulary learning while facing difficulty distinguishing the efficacies of L1 and L2 glosses. Investigating how 240 Chinese EFL learners retained vocabulary from the glossed text, Teng (2020) concluded that the introduction of L1 glosses enabled more vocabulary retention irrespective of the vocabulary knowledge dimension. Specifically, over five weeks with 15 target lexical items for each of the five texts, participants who received L1 gloss treatment consistently outperformed the control group in the active recall, passive recall, active recognition, and passive recognition tests. Ko's (2012) research took into consideration the perspectives of L2 learners. After the treatment, participants were asked to give their opinion on how they perceived the glosses and, as the results showed, most preferred L2 glosses.

While previous researchers focused on intermediate learners, one recent study by Vela (2015) focused on a more inclusive sample with both intermediate and advanced Persian English learners. The effects of L1 (Persian) and L2 (English) glosses on the reading and listening comprehension of 120 students were examined, postulating a more vital link between L1 gloss, reading comprehension and incidental vocabulary learning, at the same time illustrating that L2 is more suitable among advanced L2 learners. It is also noteworthy that she used TOEFL Reading and Listening passages to measure the degree of task completion in her research. Compared to the studies, Choi (2016) made several changes to the research methods. While striving for the same aims, Choi adopted pseudo-words to preclude the off-chance that learners might be exposed to the target items before, during, or after their contact with the glossed text, thus tainting the reliability of the data (Webb, 2007). Along with that, a total of 180 Korean learners of English were tested for their recall ability for spaced phrases of testing (immediately, one week after, three weeks after, and five weeks after), the results of which showed that participants reading the glossed versions exhibited overall better, however modestly, comprehension of the text. At the same time, the difference between L1 and L2 failed to reach statistical significance.

Kim et al. (2020) conducted a meta-analysis on the effect of glosses on reading comprehension and vocabulary learning across 26 studies with 30 independent samples (N=2,189). Analysis of immediate post-tests and reading comprehension tests supported the conclusion that L1 glosses were more effective than L2, although the target outcome measure might influence the effect size. Additionally, the study found that the participants' language proficiency also contributed to the relative effectiveness; beginner learners, in particular, were more likely to benefit from the lexical support than their intermediate counterparts.

The current research aimed to investigate further the gap in the literature. First, as

mentioned in the review of previous research on incidental vocabulary learning, a widened scope into advanced and intermediate is called to account for the difference in proficiency placement in the success of incidental vocabulary learning. Additionally, since previous studies focused on a reasonably small population, the present study would cover a larger sample for straightforward generalization. Second, previous researchers employed a multiple-choice approach to testing, which may offer test-taking clues, thereby interfering with actual recall ability. To rectify this, the researchers approached the testing of language recall in a freer light, giving open-ended questions inquiring about the definition of words. Finally, the researchers adopted a few modifications by Choi (2016), including the use of pseudo-words and consistent vocabulary recall tests. Previous researchers attempted to measure the degree of vocabulary retention through various meaning recall tests. The present research tested the learners' vocabulary recall ability through several forms of the same tests, each with a different mnemonic trigger. The specifics will be discussed in the methodology section.

3. Methods

3.1. Research Design

Taking on an experimental research design, the present study aims at comparing the relative effects of L1 and L2 glosses on reading comprehension and incidental vocabulary learning in intermediate and advanced learners. Data were collected through reading comprehension tests from the Cambridge Reading Exam Database, and two spaced vocabulary recall tests.

3.2. Participants and Setting

The study took place in the academic year 2020-2021 in Vietnam. The study employed purposive sampling, a non-random sampling technique wherein the researchers established proficiency levels as the basis for administration and categorization, to facilitate the understanding of particular subgroups and allow the participants to be representative of their respective population. Specifically, 180 Vietnamese EFL eleven-graders were chosen to take part in the project. Regarding reading proficiency, 180 participants were divided into two subgroups of intermediate and advanced according to their reading performance in an IELTS reading test. The IELTS test was chosen due to its ability to test the full-range of proficiency. The researchers qualified participants with an IELTS score range of 4.0-5.0 and 6.5-7.5 to as intermediate and advanced L2 learners respectively, and accordingly as suitable participants for the research. According to their performance on IELTS, there were no significant differences among the three subgroups in the intermediate L2 learners ($F(2, 87) = .095, p = .910$), as well as among the three subgroups in the advanced L2 learners ($F(2, 87) = .084, p = .920$). Levene's tests of Homogeneity of variance were not violated in the intermediate and advanced groups ($p = .728, p = .543$). 90 participants identified as intermediate L2 learners were distributed into three groups to read either the L1 glossed (Vietnamese), L2 glossed (English), or baseline version of the text, and this assignment was applied for the other 90 advanced L2 learners.

Table 1

Learners' Performance in Pre-Test (IELTS)

Learner group	N	Min	Max	M	SD
B1+L1	30	4.0	5.5	4.60	0.42

B1+L2	30	4.0	5.5	4.77	0.37
B1+∅	30	4.0	5.5	4.63	0.41
B2+L1	30	6.5	7.5	6.69	0.36
B2+L2	30	6.5	7.0	6.72	0.37
B2+∅	30	6.5	7.5	6.75	0.39

Table 2

ANOVA of Learners' Performance in Pre-test (IELTS)

Learner group	F(2,87)	p
Intermediate	.095	.910
Advanced	.084	.920

3.3. Data Collection Instruments

3.3.1. Experimental Text and Target Words

Two different texts were selected from the Cambridge Reading Exams Database in accordance with the learners' proficiency. For each text separately, three versions of the experimental text were provided: (a) baseline version (no gloss), (b) L1 version (baseline + L1 marginal glosses), and (c) L2 version (baseline + L2 marginal glosses). The B1 text, titled "The world's weirdest food", was 445 words in length, 94.92% of which were diagnosed at A1-B1 level by Text Inspector (Williams, 2018), and had a Flesch Reading Ease score of 63.3, Flesch-Kincaid Grade Level score of 9.04. The C1 text, "Are we losing the art of conversation" was 522 words long with 99.13% of the words being within the A1-C1 proficiency range, and had scores of 60.01 and 9.48 for the Flesch Reading Ease and Flesch-Kincaid Grade Level, respectively. After the introduction of the glosses (20 words for each text), the percentage of comprehensible input for each text (defined by learners' approximate proficiency levels and the lexical level of the text) was 94.92% and 95.4% respectively, practically meeting the requirement for comparability with proficiency and comprehensible input (96-98%) (Krashen, 1985). The glossed vocabularies were pseudowords generated from the ARC pseudowords database and constrained by orthographically existing onsets and bodies and legal bigrams (Rastle et al., 2002), word lengths (four to six) and number of syllables (one to two). In a B1 glossed text, for example, the pseudoword "stryne" substitutes for the real word "stream", and thus is glossed with the definitions of "stream". Pseudowords were chosen primarily for their effectiveness in reducing chance-learning pre- and during intervention, thereby undermining the validity of the research (Webb, 2007)

Table 3

Target Words and L1 and L2 Glosses

Target words	Glosses for advanced learners			Glosses for intermediate learners		
	PoS ^a	L2 gloss	L1 gloss	PoS	L2 gloss	L1 gloss
fusk	adj	communicate	giao tiếp	v	famous	nổi tiếng
spresh	v	affect	thay đổi	v	mix	trộn
plail	adj	juggle	tung hứng	n	common	phổ biến

flane	v	parent	phụ huynh	v	eat	ăn
stryne	adj	concern	mối nghi ngại	n	important	quan trọng
tarb	n	fascinate	làm kinh ngạc	v	street	đường
slont	n	homework	bài tập về nhà	n	leg	chân
dyme	v	red	đỏ	n	describe	miêu tả
clett	v	real-life	ngoài đời thực	adj	smell	phát ra mùi
boathe	adj	silence	sự im lặng	n	available	sẵn có
wrag	adj	danger	mối nguy	n	raw	sống
merth	v	generation	thế hệ	n	consist	bao gồm
noor	adj	alone	một mình	adj	careful	cẩn thận
scoar	n	experience	trải nghiệm	v	poison	độc
gere	v	art	nghệ thuật	n	train	đào tạo
drey	n	agree	đồng ý	v	excitement	sự thích thú
feer	n	emoticon	biểu tượng cảm xúc	n	food	đồ ăn
slirp	n	superficial	không sâu sắc	adj	level	mức độ
fawl	v	deprive	tước đi	adj	traditional	truyền thống
rync	v	technology	công nghệ	n	disturb	quấy rầy

^a Part of Speech

3.3.2. Vocabulary Recall Tests

Two vocabulary recall (VR) tests were administered during the research to test vocabulary retention. Immediately after reading, students were administered a passive recall vocabulary test. This test served to measure participants' ability to provide an L1 translation (Vietnamese) or L2 meaning (English) of the L2 target word. An example of the item on the test was as follows.

1. Fusk _____

The raters might count synonyms such as 'tiếp xúc, trao đổi' or 'converse, talk' as correct should the synonym is of semantic relevance. However, synonyms with different connotations, such as 'connect' or 'giao thiệp' were not accepted. In the following week, the participants were administered the "active recall" test, which tested the retrieval of form for a given meaning; specifically, the learners' ability to provide L2 target words that fitted the meaning prompt. In this test, clues in the form of English hyponym (i.e., intended word for recall: spoon; given hyponym: cutlery) were given. Below is one item presented in this test.

1. Communication _____

All the tests had a Cronbach's alpha coefficient of .944, ensuring its internal reliability. We decided not to apply the repeated measure for the vocabulary recall; that is, repeating the same test, as this would increase the risk of increased exposure to the target words.

3.3.3. Reading Comprehension Test

A reading comprehension (RC) task was conducted to test subjects' grasp of the

materials. The comprehension test was not given until the 15-minute reading-only session was over and the texts were all collected back. This was to ensure that participants would not be distracted by the task of “completing the exercise”, which takes the focus from understanding the textual source. The maximum score for the RC task was eight - one for each correct answer. The Cronbach’s alpha coefficient for the RC test was .75, making it acceptable.

3.4. Procedure

The study was conducted over two weeks. In the first week, participants were instructed on the procedure of the study and later read the texts and completed the 15-minute RC test and the passive recall VR test. In the second week, the active recall VR test was administered. When given the reading, learners were encouraged to read the materials for total comprehension, as the spontaneous acquisition of new words takes place upon the learner's reflection on the story's general context (Huckin & Coady, 1999). They were also told that the reading would be retracted during the RC test. Participants were not informed of the subsequent vocabulary recall tests, as this might significantly reduce opportunities for genuine "incidental vocabulary learning". In the vocabulary recall tests, learners were given 25 minutes to finish the tasks.

4. Results & Discussions

In this section, the findings of the study are presented and analyzed. Specifically, the researchers presented a comprehensive and detailed account of the research results, gathered through rigorous experimentation and statistical analysis, entailing the test performance in various data collection instruments and insight into possible interpretations of such results.

4.1. Test Performance

Table 4 presents the frequency analysis of test performance among different groups. In general, participants from the experimental groups (B1+L1, B1+L2, C1+L1, C1+L2) outperformed those in the control group (CG1, CG2) in respective reading comprehension tests by approximately two correct questions. Regarding vocabulary retention, there was a noticeable drop in the number of words learners could recall between the immediate passive recall test and the one-week delayed active recall test. However, among intermediate learners, participants who read the L1-glossed text consistently had higher performance in both passive and active recall tests than those given L2 glosses. At the same time, the inverse trend was observed for the advanced learners.

Table 4

Descriptive Statistics on Test Performances

Variable	Condition	Intermediate learners (B1)				Advanced learners (C1)			
		Min	Max	M	SD	Min	Max	M	SD
RC test	CG	4.0	7.0	5.25	0.78	4.0	8.0	5.18	0.98
	L1	5.0	8.0	7.50	0.66	5.0	8.0	6.80	0.85
	L2	5.0	8.0	7.08	0.71	6.0	8.0	7.25	0.72
Passive recall	CG	-	-	-	-	-	-	-	-
	L1	15.0	20.0	17.47	1.08	15.0	19.0	17.11	0.93
	L2	13.0	19.0	16.03	1.60	16.0	20.0	18.23	0.97

Active recall	CG	-	-	-	-	-	-	-	-
	L1	12.0	17.0	13.63	1.31	11.0	15.0	13.32	1.16
	L2	9.0	15.0	12.63	1.67	12.0	18.0	15.23	1.22

4.1.1. Effects of Glossing Language and Proficiency Level on Reading Comprehension and Vocabulary Recall

Several two-way ANOVAs were conducted to examine any possible interaction between language proficiency and glossing language on reading comprehension and vocabulary retention. There was a statistically significant interaction between the effects of glossing language and proficiency level on textual comprehension ($F(1, 174) = 3.585, p = .030$), passive recall ability ($F(1, 116) = 35.107, p < .0001$), and active recall ability ($F(1, 116) = 34.578, p < .0001$). Specifically, this interaction explained for around 23% of the variance in two recall tests and 4% of that in the reading comprehension test.

Table 5

Two-Way ANOVA Results on Interaction Between Proficiency Levels and Treatment on Reading Comprehension and Vocabulary Recall Tests

Dependent variable	Effects	df	Mean square	F	p	η_p^2
Reading comprehension	Proficiency	1	2.939	4.706	.031	.026
	Glossing language	2	78.822	126.212	.000	.592
	Proficiency * Glossing language	2	2.239	3.585	.030	.040
Passive recall	Proficiency	1	25.669	18.478	.000	.137
	Glossing language	1	.752	.541	.463	.005
	Proficiency * Glossing language	1	48.769	35.107	.000	.232
Active recall	Proficiency	1	39.102	21.191	.000	.154
	Glossing language	1	6.302	3.415	.067	.029
	Proficiency * Glossing language	1	63.802	34.578	.000	.230

Table 6

Simple Main Effects Analysis

Variable	Source	Sum of squares	df	Mean square	F	p
Reading comprehension	Treatment at					
	L1 Glosses	91.250	2	45.625	73.056	.000
	L2 Glosses	70.872	2	35.436	56.741	.000
	Error	108.667	174	.625		
Passive recall	Treatment at					
	L1 Glosses	30.817	1	30.817	22.184	.000
	L2 Glosses	18.704	1	18.704	13.464	.000
	Error	161.142	116	1.389		

		Treatment at				
Active recall	L1 Glosses	1.504	1	1.504	.815	.368
	L2 Glosses	101.400	1	101.400	54.954	.000
	Error	214.042	116	1.845		

For reading comprehension, simple main effects analysis showed that intermediate learners did significantly better in reading comprehension test ($F(2, 174) = 73.056, p < .001$) and passive recall test ($F(1, 116) = 22.184, p < .001$) when given L1 glosses, while the opposite was true for advanced learners ($F(2, 174) = 56.741, p < .001$; $F(1, 116) = 13.464, p < .001$). However, in the active vocabulary tests, although L2 glosses led to higher scores among advanced learners ($F(1, 116) = 54.954, p < .001$), glossing language had no effect ($F(1, 116) = .815, p = .368$)

4.1.2. Effects of Glossing Language on Reading Comprehension and Vocabulary Retention

In order to test if the difference in test performance was attributable to the introduction of glosses, a series of ANOVAs were conducted. Results from the Tests of homogeneity of variances (Table 7) indicated that the data did not violate the assumption of equal variances. ANOVA analysis revealed a statistically significant effect of glossing language on RC among intermediate learners ($F(2, 87) = 83.261, p < .0005$) and advanced learners ($F(2, 87) = 48.614, p < .0005$). Regarding vocabulary retention, it was also revealed through a series of one-way ANOVAs that there was a statistically significant difference in Passive recall for the B1 ($F(1, 58) = 16.408, p < .0005$) and C1 ($F(1, 58) = 20.779, p < .0005$) which can be attributed to glossing language. Similarly, this difference in glossing condition also affected Active recall among both B1 ($F(1, 58) = 6.619, p = .013$) and C1 groups ($F(1, 58) = 38.689, p < .0005$).

Table 7

One-Way ANOVA Between Glossing Language and Reading Comprehension Tests

Measures		<i>f</i>	Mean square	<i>F</i>	<i>p</i>	η_p^2
(B1) RC	Between groups	2	42.986	83.261	.000	.657
	Within groups	87	.516			
	Total	89				
(B1) Passive recall	Between groups	1	.30.817	16.408	.000	.220
	Within groups	58	1.878			
	Total	59				
(B1) Active recall	Between groups	1	15.000	6.619	.013	.102
	Within groups	58	2.266			
	Total	59				
(C1) RC	Between groups	2	35.436	48.614	.000	.528
	Within groups	87	.729			
	Total	89				

(C1) Passive recall	Between groups	1	18.704	20.779	.000	.264
	Within groups	8	.900			
	Total	59				
(C1) Active recall	Between groups	1	55.104	38.689	.000	.400
	Within groups	58	1.424			
	Total	9				

According to Tukey’s post hoc test, the experimental groups outdid the control group by a wide margin (both $p < 0.001$) while there was no statistically significant difference recorded in the degree of effectiveness of L1 and L2 glosses ($p = 0.057$, $d = 0.59$). Treatments of L1 and L2 glosses recorded large effect sizes ($d = 2.85$ and $d = 2.32$ respectively) but the relative effectiveness across the two experimental group failed to reach statistical significance ($p = 0.057$) although effect size of L1 against L2 gloss could be considered medium ($d = 0.59$). Tukey’s post hoc test suggested that advanced learners shared the tendency to perform better at reading test had they been given glosses (both $p < 0.001$), regardless of whichever type, and similarly, no significant difference in the relative efficacies of L1 and L2 glosses was detected ($p = 0.108$). Additionally, L1 and L2 treatments were associated with large effect sizes ($d = 1.65$; $d = 2.11$)

Table 8

Tukey HSD Results for Reading Comprehension

Group comparison	Mean difference (I – J)	Std. Error	p	Cohen’s d
B1+L1 – CG	2.317	0.179	<0.001	2.85
B1+L2 – CG	1.900	0.179	<0.001	2.32
(B1+L1) – (B1+L2)	0.416	0.179	0.057	-
C1+L1 – CG	1.617	0.220	<0.001	1.65
C1+L2 – CG	2.067	0.220	<0.001	2.11
(C1+L1) – (C1+L2)	-0.450	0.220	0.108	-

Independent samples t-tests were conducted to compare the VR ability of the learners when under different glossing conditions. As can be seen from Table 9, intermediate learners from the L1 group recalled significantly more words than those from the L2 group ($t = 4.051$, $p < .001$), although the difference was not statistically significant during the second test. In contrast, there was a significant difference among the intermediate learners in both the passive recall ($t = -4.558$, $p < .001$) and active recall ($t = -6.220$, $p < .001$) tests.

Table 9

Independent Sample T-Test Results for Vocabulary Retention Rate

Testing time	Group comparison	t	p	Mean difference	Cohen’s d
Passive recall	B1+L1 – B1+L2	4.051	<0.001	1.433	0.89
Active recall	B1+L1 – B1+L2	2.573	0.13	1.000	-
Passive recall	C1+L1 – C1+L2	-4.558	<0.001	-1.117	1.19
Active recall	C1+L1 – C1+L2	-6.220	<0.001	-1.917	1.65

4.2. Discussion

The present research examined the relative effects of L1 and L2 glosses on textual comprehension and vocabulary retention among intermediate and advanced learners. Accordingly, it was found that marginal glosses generally deepened comprehension. Moreover, there was an interaction between the effects of L2 proficiency and glossing language, leading to a difference in test performance between intermediate and advanced learners.

Firstly, the results suggest that marginal glossing promotes deeper reading comprehension among L2 learners regardless of glossing languages. Glosses led to a statistically significant difference in the reading comprehension test among both intermediate ($F(2, 87) = 83.261, p < .0005$) and advanced learners ($F(2, 87) = 48.614, p < .0005$). This finding is consistent with previous researchers (Vela, 2015; Kim et al., 2020; Kang et al., 2020), thereby substantiating the claim that gloss is efficacious in promoting comprehension among learners of different language proficiency, from intermediate to highly proficient. Specifically, when learners are unfamiliar with the words in the reading, they tend to create a time-consuming fixation on working out the meaning, thus risking a decrease in concentration on the passage (Hulstijn, 1992; Ko, 2012). By removing lexical barricades to understanding, marginal glosses allow readers to deduce contextual meaning quickly and maintain the flow of the reading activity. From the cognitive load theory perspective, there is a limit to the amount of cognitive processing that can take place at any one time (Sweller, 2011; Plass et al., 2010). Consequently, more mental power would be allocated to essential and generative processing activities, namely building text base or integrating reading content with relevant prior knowledge (Bahrani & Sim, 2011; Kintsch, 2005), which might lead to optimal comprehension. Accordingly, the provision of glosses minimizes the amount of extraneous processing, the process by which learners infer word meaning from context, and frees up space for necessary and generative processing (Bahrani & Sim, 2011).

Secondly, the difference in glossing language led to significant variance in the active ($t = -4.558, p < 0.005$) and passive recall tests ($t = -6.220, p < 0.005$) among advanced learners and in the active recall test among intermediate learners ($t = 4.051, p < 0.005$). The present study examined the use of glosses in facilitating vocabulary retention rather than acquisition since acquisition is a complicated process that involves more than remembering the words. Several factors affecting vocabulary retention, such as length of the word, chance learning, and frequency of exposure, were controlled in the current study to ensure that learners only interacted with the target lexical items when reading the passage and in subsequent meaning-recall vocabulary tests. As such, the findings supported previous researchers' (Choi, 2016; Vela, 2015) belief that glosses led to incidental vocabulary learning at least within one week after the first exposure to the target words. In contrast, the study refuted the conclusion drawn by Jacobs et al. (1994), who did not consider glossing to impact recall ability. However, compared to studies with similar output measures (Choi, 2016; Kang et al., 2020), the average percentage of recallable vocabulary seems much higher among intermediate and advanced learners. Kang et al. (2020), for instance, concluded in their research that L2 glosses helped reinforce form-meaning association but not in acquiring word forms. One likely explanation for this finding lies in the difference in the orthographic system between Vietnamese (alphabetical) and Korean (alphabetic syllabary). Previous studies in the first language (Cunningham et al., 1990; Olson et al., 1989) had theorized the differential contribution of orthographic knowledge to the reading process, suggesting that L2 readers relied on their L1 orthographic processing strategies when they were reading in English as an L2. In essence,

since participants in the current study might not have had to overcome orthographic disparities, most likely compounded by the introduction of pseudowords, they performed relatively better in reading comprehension and word recall.

Thirdly, two-way ANOVA results show an interaction between English proficiency level and glossing language on three dependent variables: reading comprehension, active, and passive recall. Specifically, L2 glosses led to higher performance in test results among advanced learners, while L1 glosses promoted deeper comprehension and immediate vocabulary retention. However, this interaction was much more pronounced in the vocabulary tests ($\eta^2 = .230$, $\eta^2 .232$) than in the reading comprehension ($\eta^2 = .040$). This result, in effect, supports Ko's conclusion (2012) that for intermediate-level backwards, the glossing languages do not offer distinct comparative differences; however, when higher proficiency is reached, L2 glosses are far more effective. In the present study, data analysis demonstrates that, on average, intermediate learners had higher test scores when provided with L1 glosses (as compared to L2 glosses), and L2 glosses helped advanced learners perform better (as compared to L1 glosses). This apparent proclivity could be explained by the difference in vocabulary sizes among the learner groups, which intuitively leads to the disparity in the word association network. In other words, since high-proficiency learners are more well-versed in the language, L2 glosses can help the process of meaning register better by assigning the new words to the already established groups of words with similar denotation or conceptual meanings.

In contrast, L1 learners – more familiar with the native language – would benefit more from L1 translations. Notably, the mismatch between proficiency and glossing language might even render glosses counterproductive as the L2 readers might spend extra time decoding and reprocessing, stagnating reading speed and disrupting reading fluency (Kang et al., 2020). Similarly, as proposed by Emirmustafaoğlu and Gökmen (2015), while the role of L1 in language learning proves vital in the earlier stages of acquisition, it naturally subsides as higher competence in the language allows more efficient, direct links to L2.

With the differences in reading scores and vocabulary test scores among the control and experimental group amounting to statistical significance, the present study corroborated previous studies by Ko (2012), Jacobs et al. (1994), and Vela (2016). Moreover, the results help to reconcile previous arguments about whether the learning of lexis requires the conceptual links to L1 counterparts (Barcroft, 2002; Swan, 1997) or whether longer vocabulary retention would be better facilitated when words are learned through definitions and synonyms in the native language (Joyce, 2018). With renewed importance placed on L1, researchers generally maintain that the tie between L1 and L2 learning is perennial as L1 is crucial in the processing of the L2 language and the eventual intake of L2 forms and usages (Chen et al., 2020; Jiang, 2002; Scott & Fuente, 2008; Sunderman & Kroll, 2006). They espouse that lexical glosses cement understanding of the text sources and facilitate incidental vocabulary learning. This idea is evidenced in the current study, as even advanced learners might still profit from having access to the translation of unfamiliar words into their mother tongue. However, the results also suggest that as learners reach higher proficiency, this association might be overpowered by a more substantial reliance on a second language as a medium for vocabulary retention.

5. Conclusion

5.1. Summary of Findings

The current study attempted to include a more inclusive sample and extend the testing

time frame to explore the efficacy as a tool for deepening reading comprehension and increasing vocabulary gains. Comprehension and meaning-recall vocabulary test scores were analyzed using one-way ANOVAs, two-way ANOVAs and t-tests. The results suggest that marginal glosses generally promoted a deeper understanding of the text regardless of glossing languages. However, this proclivity for comprehension might differ for each experimental group. While intermediate L2 learners generally score higher in reading comprehension tests and meaning-recall vocabulary tests when given L1 glosses, their highly proficient counterparts tend to outperform when L2 glosses are provided. Results of two-way ANOVAs revealed that these differences were of statistical significance. Secondly, glossing language does cause differential effects among learner groups in their performance at the meaning-recall vocabulary tests. While intermediate L2 learners could consistently recount the meanings of more words when words are glossed in L1, the more proficient learners with L2 glosses could recall more word meanings.

5.2. Implications

The research dealt with L2 reading and the learning of vocabulary. It tested whether students could learn incidental vocabulary when provided with the meanings of unknown lexical items. The results bear implications for L2 learners, L2 instructional material designers and L2 teachers. Firstly, there was a pattern for intermediate L2 learners to benefit more from the L1 gloss and advanced learners to benefit more from the L2 gloss. Considering this, designers of textbooks may consider integrating the appropriate gloss for academic reading materials. This implies that, as learners begin to transition from the intermediate to upper-intermediate level of linguistic proficiency, it is vital that they should be exposed to more L2 gloss while the employment of L1 is subsumed. In a broader sense, the explicit teaching of vocabulary should take an appropriate medium for introducing new words. Accordingly, to accommodate deeper memorization of lexical items, while intermediate learners should be exposed to L1 definition, advanced learners are to be given meanings of words in L2.

Secondly, the results suggest that material designers should consider developing L2 reading materials in a new light, for example, incorporating glosses in novels and books, especially those for extensive reading purposes. Glossing, while repurposed as an indirect method of teaching vocabulary, should help accommodate understanding and promote reading powers, as exposure to authentic materials and input would promote authentic language acquisition. Another implication is that with lexical analysis and deeper processing of the target words, the inclusion of glosses will achieve its full potential (Hulstijn et al., 1996). Additionally, the recall test scores revealed that the vocabulary gained during frequent contact with the provided textual gloss could be easily forgotten without practical usage. Therefore, after introducing glossed words or new words through authentic materials, teachers must generally incorporate intentional learning activities to strengthen form-meaning connection and lexical recollection.

Additionally, L2 learners are encouraged to attempt personalizing the lexical items by producing practical use of the words to foster vocabulary acquisition. Furthermore, while learners showed signs of vocabulary retention with the help of gloss, it is noteworthy that L2 learners should be able to develop and exercise the ability to infer the meaning from the contextual clues. This is to say that certain appropriate lexical items within a passage should be left un-glossed if they can be guessed from the context of the reading.

5.3. Limitations

The current study suffers from certain limitations, which can be addressed in future research. Firstly, the current study discounted the need for vocabulary test performance from the control group, assuming that since they could not have possibly been exposed to pseudowords, any difference in vocabulary recall would be a self-explanatory consequence. However, data analysis hinted at the possibility of differences in the orthographic system being another cause of variation in vocabulary recall test scores between this and previous studies. Hence, a closer look at the orthographic projection in the context of gloss usage might be warranted. Secondly, the findings of this research might be restricted in terms of generalization. Most learners in the current study were enrolled in specialized high schools or esteemed institutions and had records of intellectual capacity. Therefore, the vocabulary recall tests might be construed from a conservative perspective as memory tests where these learners especially had an advantage. A future study might eliminate the confounding variable of memory capacity through more rigorous testing measures. Thirdly, although the current study has controlled for word length, frequency, and prior learning, other factors, such as cognateness, might have affected incidental vocabulary learning (Tonzar et al., 2009; Willis & Ohashi, 2012) and polysemy (Laufer, 1990). Future studies, thus, should address this issue to increase the experiment's authenticity.

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TÁC ĐỘNG CỦA VIỆC GIẢI NGHĨA BẰNG NGÔN NGỮ ĐẦU TIÊN VÀ NGÔN NGỮ THỨ HAI TỚI KHẢ NĂNG ĐỌC HIỂU VÀ GHI NHỚ TỪ VỰNG CỦA NGƯỜI HỌC

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Tóm tắt: Các nghiên cứu trước đây cho thấy việc cung cấp giải nghĩa trong văn bản giúp cải thiện việc đọc hiểu văn bản và học từ vựng tự nhiên, tuy nhiên, mức độ tác động của phương pháp này trong các điều kiện khác nhau vẫn còn mơ hồ. Với thiết kế nghiên cứu định lượng, nghiên cứu này tập trung đặc biệt vào tương tác giữa ngôn ngữ giải nghĩa (L1 và L2) và trình độ tiếng của người học (trung cấp và nâng cao), cũng như tác động của việc cung cấp giải nghĩa đến đọc hiểu văn bản và học từ vựng ngẫu nhiên của người học. Trong nghiên cứu này, 180 người học được chia thành hai nhóm dựa trên trình độ tiếng (trung cấp hoặc nâng cao). Trong mỗi nhóm trình độ, người học được chia nhỏ thành ba nhóm phụ (60 người/ nhóm) với ba điều kiện khác nhau (đối chứng, giải nghĩa bằng ngôn ngữ mẹ đẻ và giải nghĩa bằng ngôn ngữ thứ hai). Phân tích ANOVA một chiều và t-test cho thấy việc sử dụng giải nghĩa dẫn đến sự hiểu biết sâu hơn và học từ vựng ngẫu nhiên. Phân tích ANOVA hai chiều cho thấy giải nghĩa bằng ngôn ngữ thứ nhất (L1) tạo ra sự hiểu biết sâu hơn và khả năng ghi nhớ tốt hơn ở người học trung cấp so với giải nghĩa bằng ngôn ngữ thứ hai (L2), và ngược lại, người học nâng cao có kết quả tốt hơn trong bài kiểm tra đọc và từ vựng khi được cung cấp giải nghĩa bằng L2. Cuối cùng, các tác giả đưa ra một số kiến nghị cho việc học và dạy từ vựng phù hợp với sự khác biệt tương đối giữa L1 và L2, và trình độ trung cấp và nâng cao.

Từ khóa: bảng chú giải, khả năng đọc hiểu, học từ vựng ngẫu nhiên, người học tiếng Anh như một ngoại ngữ (EFL)