



Incidental EFL Vocabulary Learning: The Effects of Interactive Multiple-Choice Glosses

Nataporn Srichamnong

Lancaster University

Lancaster, United Kingdom

E-mail: n.srichamnong@lancaster.ac.uk

Abstract

An important role of vocabulary in language learning has been recognised as lexical knowledge is very likely to determine a mastery of language. Teachers and researchers then have been attempting to find ways to improve both quantity and quality of learners' vocabulary repertoire.

It is commonly accepted that reading is one of major sources of vocabulary learning. Words can be acquired incidentally through reading (Nagy, Herman et al. 1985; Day, Omura et al. 1991; Hulstijn 1992; Dupay and Krashen 1993; Nation 2001; Krashen 2004; Waring and Nation 2004; Horst 2005; Pigada and Schmitt 2006; Huang and Liou 2007; Min 2008; Schmitt 2008). However, the efficiency and efficacy of this method has been challenged (Zimmerman 1997; Waring and Takaki 2003). Vocabulary gains from only-reading are usually found small. Thus, an efficient way that helps strengthen and speed up lexical acquisition process is called for. One possible way could be the use of glosses (e.g. Hulstijn, Hollander, & Greidanus, 1996), particularly a computerised interactive gloss (Nagata 1999).

The present study examines whether or not incidental vocabulary learning through (online) reading can be facilitated by the use of interactive multiple-choice glosses (IMG). Forty-five Thai intermediate-level EFL learners were put into two different experimental groups. Group 1 (G1) could consult IMG while reading the texts. As opposed to G1, the second group (G2) read the texts without IMG. The vocabulary post-tests reveal that interactive multiple-choice glosses (IMG) positively impact on acquisition and retention of words. Students who accessed to IMG while reading learned words significantly more than those who simply read with no glosses measured on both immediate and delayed post-tests. Furthermore, learned words are decayed over two-week time. Yet, the provision of IMG is associated with better long-term retention of learned words.

***"While without grammar very little can be conveyed,
without vocabulary nothing can be conveyed"***
(Wilkin 1972)

1. Introduction

The above statement clearly illustrates a pivotal role in communication and language learning. It is no doubt that learning vocabulary is an essential part for language mastery (Schmitt 2008); and that developing a rich vocabulary is a top priority but an on-going challenge for both L1 and L2 learners (Belisle 1997). However, neither a clear understanding how a word is acquired nor a method that best enhances vocabulary learning has not been accomplished, partly due to the fact that lexical learning is a complicated multifaceted learning influenced by a wide variety of factors (Meara 1996; cited in Yongqui-Gu, 2003; Nation 2001; Schmitt 2008). A large amount of research during the recent decades has been attempting to achieve the aforementioned goals. Likewise, the present aims to introduce and investigate an innovative way to enhance incidental second language (L2)/foreign language (FL) vocabulary acquisition.

2. Background information on ESL/EFL vocabulary acquisition

2.1 Incidental vocabulary learning through reading

It is apparent that lexical items can be acquired incidentally through reading (Hulstijn 2001; Rieder 2003; Schmitt 2008). However, incidental vocabulary learning through reading is not always effective especially for ESL/EFL learners (Laufer 2001). Frequently, L2 vocabulary gains from reading are relatively small and not necessarily efficient (Day, Omura et al. 1991; Hulstijn 1992; Day and Bamford 1998; Horst, Cobb et al. 1998; Zahar, Cobb et al. 2001; e.g. Brown, Waring et al. 2008; Min 2008). Such small gains of words learned solely by reading could be attributed by several factors. One of major factors could be the lack of noticing. Schmidt (1995) emphasises that conscious attention is necessary for learning to take place; and noticing is generally the first stage of learning. However, it is highly possible that while reading, learners usually fail to notice unfamiliar words especially when they can understand the global message of the text without knowing those words. As the words go unnoticed, lexical learning then is unlikely to occur. Therefore, promoting the noticing of words while reading may help increase vocabulary gains. This could be achieved by the use of gloss.

2.2 Interactive multiple-choice glosses

The use of gloss is beneficial to incidental vocabulary learning through reading; because it helps direct learners' attention to particular words (Bowles 2004), yet it seldom interferes with text comprehension (Nation 2001; Rott and Williams 2003). Previous studies have shown that glosses or annotations positively impact on vocabulary learning as well as on reading comprehension (Davis 1989; Chun and Plass 1996; Hulstijn, Hollander et al. 1996; Watanabe 1997; Lomicka 1998; e.g. Al-Seghayer 2001; Rott, Williams et al. 2002; Yoshii and Flaitz 2002; Wang 2005; Yoshii 2006).

Regarding textual glosses, there are two major glossing types - single gloss (SG) and multiple-choice gloss (MG). It is suggested that MG is likely to be advantageous as it encourages meaning inferring. It is believed that a word of which meaning is inferred is retained better and longer since it involves deeper processing (Craik and Lockhart 1972; Craik and Tulving 1975) or greater mental effort (Hulstijn, 2001). At the same time, MG also helps reduce the chances of wrong meaning inferencing (Hulstijn 1992). Nonetheless, the advantage of MG does not always occur. Although multiple-choice glosses may help reduce chances of wrong meaning inferencing, it is not impossible that learners make wrong guesses. Moreover, they are unlikely to have any chances to realise that they have made wrong meaning inferring as traditional multiple-choice glosses usually lack the provision of meaning verification. Grace (1998) supports that the verification of meaning facilitates retention of words that have been learned incidentally or at least lessen difficulties in vocabulary learning, because the learners are assured of "the correctness of their guesses while they are guessing the meanings of the words" (p. 535). Thus, interactive multiple-choice glosses (IMG) have been developed in the hope that they may compensate for the advantages of traditional MG as IMG includes prompt feedback option enabling meaning verification. The effectiveness of the application of interactive glosses on vocabulary learning while reading was evidenced in Nagata's (1999) study. Yet, the number of empirical studies regarding the use of interactive glosses to facilitate incidental vocabulary learning through reading are limited.

3. Research Questions

The current study is carried out with an attempt to investigate the effectiveness of incidental vocabulary learning through reading, measured by fairly sensitive tests, with the application of interactive multiple-choice glosses. Two major research questions are addressed:

1. Do interactive multiple-choice glosses (IMG) have any effects on vocabulary learning and retention across the time?
2. Do interactive multiple-choice glosses (IMG) have any effects on long-term retention of learned words?

4. Method

4.1 Design

A mixed experimental design was adopted. A between-subjects design was applied to measure the effects of the application of IMG. To assess the difference in outcome between short-term and long-term word retention, a within-subjects was employed.

4.2 Participants

The participants were 45 Thai intermediate learners of English at a public university in Thailand. The students were assigned to one of two experimental groups (+IMG or -IMG). Based on the pre-test results administered prior to the experiment, neither their English proficiency level nor the previous knowledge of target words was significantly different.

4.3 Materials

Text and target words

Two roughly-equivalent non-fictional texts were used – Rules of Attraction by Kate Douglas and How to Pick a Perfect Mate by Martie G. Haselton. The texts were modified and simplified. Both texts were quite similar in terms of readability, lexical profiles, and genre. After piloting, 16 potential target words (eight verbs and eight adjectives) were selected. Specifically, the number of new target words per text were eight. This number was appropriate as it yielded more than 95% text coverage conforming to what suggested by previous researchers (Liu and Nation 1985; Laufer 1989; Hu and Nation 2000). This means that the reading texts were not too difficult for the students to understand, or to infer meanings of new words. All target words were of Coxhead's (2000) Academic Word List (AWL).

Interactive multiple-choice glosse (IMG)

A small-scale computer reading programme with IMG was developed by .NET. It then was uploaded to the website <http://srichamn.ac.webfusion.co.uk/view.htm>. In each reading passage, eight newly-encountered target words were glossed. The students reading the texts with IMG were encouraged to click the highlighted words. Then the interactive multiple-choice gloss (IMG) appeared in the right marginal frame of the screen. An IMG consisted of a particular target word, three possible L1 (Thai) equivalents (one correct, one semantically related and one opposite meaning translations). The interactive prompt feedback was provided through the check-answer button so that the learners could verify whether the selected choice was correct or wrong. (See Appendix A)

Reading comprehension tests

The reading comprehension tests corresponding to each of the reading texts were given to the students after they finished reading. Each test consisted of 10 items. The purpose of reading test was to assess their understanding of the texts. However, the results of the reading tests were not included in this paper.

Vocabulary tests

Vocabulary pre-test and post-tests were administered to all participants. The pre-test was done prior to the experiment mainly to check if any of them had previous knowledge of the target words. The test required the students to write down the meanings of the given English words. They could write in Thai or English. They were also told to write as many meanings as they know. The vocabulary post-test, on the other hand, aimed to measure the learners' target word knowledge incidentally acquired during the reading activities. The tests were developed primarily on the basis of the vocabulary strength tests proposed by Laufer, Elder, & Congdon (2004) and Laufer & Goldstein (2004). The tests measured learners' receptive and productive vocabulary knowledge, mainly involving form-meaning connection. The vocabulary posttest battery consisted of three subtests – (1) cued-active recall (i.e. the learners had to actively recall and write down the correct English forms corresponding to the given Thai meaning translations.), (2) passive recall (i.e. the students were presented English target forms and

were asked to supply the meanings for those words.), and (3) passive recognition tests (i.e. the participants needed to match meaning translations to English target words (Appendix B). Two versions of the tests were made to prevent the students copying answers from their peers. The contents of two versions were identical, yet in different orders.

4.4 Data Collection Procedure

The study was carried out over a period of six weeks. The experimental sessions took place as extra curriculum activities. The experiment was comprised of three major stages: 1) a pre-test and programme training, 2) two reading sessions and immediate post-test, and 3) a delayed post-test. The reading sessions were computer-based. All tests, however, were done with paper and pen. The detailed schedule of data collection is illustrated in Appendix C.

4.5 Data Analysis

The scores of the vocabulary tests were calculated into percentages and submitted to SPSS for further analyses. The significance level was set at $p < .05$.

5. Results

RQ1: Do interactive multiple-choice glosses (IMG) have any effects on vocabulary learning and retention across the time?

Table 1: Descriptive Statistics: Glossing

| Glossing | Mean | Std. Deviation | Std. Error Mean | N |
|----------|-------|----------------|-----------------|----|
| + IMG | 45.13 | 16.623 | 3.466 | 23 |
| - IMG | 22.21 | 14.007 | 2.986 | 22 |

Table 2: Repeated Measures ANOVA

| | df | Mean Square | F | Sig. | Partial Eta Squared |
|---------------|----|-------------|---------|--------|---------------------|
| Time | 1 | 7768.927 | 266.756 | .000** | .861 |
| Glossing | 1 | 11807.641 | 24.891 | .000** | .367 |
| Time*Glossing | 1 | 29.723 | 1.021 | .318 | .023 |
| Error (Time) | 43 | 29.124 | | | |
| Error (Gloss) | 43 | 474.365 | | | |

** $p < .001$

The analysis of repeated measures ANOVA, as shown in Table 1 and Table 2 above, demonstrates that the main effect of interactive multiple-choice glosses is highly significant; $F(1, 43) = 24.89$, $p < .001$. This means that, overall, the students, who could consult the interactive glosses while reading, performed significantly better on the tests than those who read without any glosses. Also, the partial-eta-squared number (.367) indicates that the effect size is very large according to Cohen's (1988) guidelines about effect size (.01 = small, .06 = moderate, .14 = large). Nevertheless, the main effect does not tell much about the differential effects (if any) of IMG on each test time. Therefore, Independent t-test was applied to further examine whether IMG affects short-term and long-term retention of words. The figures of t-test are presented in Table 3 and Table 4.

Table 3: Descriptive Statistics: Time*Glossing

| | Gloss | N | Mean | Std. Deviation | Std. Error Mean |
|----------------|-------|----|---------|----------------|-----------------|
| Immediate Test | + IMG | 23 | 54.9939 | 17.12040 | 3.56985 |
| | - IMG | 22 | 30.9305 | 17.51040 | 3.73323 |
| Delayed Test | + IMG | 23 | 35.2578 | 16.81280 | 3.50571 |
| | - IMG | 22 | 13.4936 | 11.00648 | 2.34659 |

Table 4: Independent Samples Test: Glossing

| | | Independent Samples Test | | | | | | | | | |
|---------|-----------------------------|-----------------------------------------|------|-------|--------|------------------------------|-----------------|-----------------------|-------------------------------------------|----------|--|
| | | Levene's Test for Equality of Variances | | | | t-test for Equality of Means | | | | | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | | |
| | | | | | | | | | Lower | Upper | |
| PTotImm | Equal variance: assumed | .131 | .720 | 4.661 | 43 | .000 | 24.06346 | 5.16270 | 13.65187 | 34.47504 | |
| | Equal variance: not assumed | | | 4.659 | 42.802 | .000 | 24.06346 | 5.16535 | 13.64515 | 34.48177 | |
| PTotDel | Equal variance: assumed | 3.395 | .072 | 5.112 | 43 | .000 | 21.76419 | 4.25713 | 13.17887 | 30.34951 | |
| | Equal variance: not assumed | | | 5.159 | 38.115 | .000 | 21.76419 | 4.21859 | 13.22495 | 30.30343 | |

Regarding short-term retention, a significantly beneficial effect of IMG is found. The t-test shows that the difference in scores on the immediate post-test between the IMG-group ($M = 54.99$, $SE = 3.57$) and the non-IMG-group ($M = 30.93$, $SE = 3.73$) is highly significant, $t(43) = 4.66$, $p < .001$. The higher vocabulary gains found in the group reading with IMG represents a substantive effect of IMG on short-term retention as the effect size is large ($=.58$).

Likewise, it is apparent that IMG also has a positive impact on long-term retention of learned words. That is, on the delayed post-test, the students who read with glosses significantly outperformed those who read without glosses as the mean of the former was about three times higher than that of the latter group ($M = 35.26$, $SE = 3.50$; and $M = 13.49$, $SE = 2.35$, respectively; $t(43) = 5.11$, $p < .000$). The effect size also yields a large effect ($=.38$).

RQ2: Do interactive multiple-choice glosses (IMG) have any effects on retention of learned words?

The statistical results were shown in Table 2 and Table 5. As seen in Table 2, the main effect of time is highly significant; $F(1, 43) = 266.76$, $p < .001$. That is, the lexical knowledge developed while reading dramatically decayed two weeks later. The eta-squared index supports that the effect of time is very substantive ($=.861$). Paired t-test was also applied to further investigate whether or not IMG resulted in a more effective retention of learned words.

Table 5: Descriptive Statistics: Time

| Time | Mean | Std. Deviation | Std. Error Mean | N |
|-----------------------|-------|----------------|-----------------|----|
| 1 (Immediate Test) | 43.23 | 20.997 | 3.130 | 45 |
| 2 (Delayed Test) | 24.62 | 17.894 | 2.668 | 45 |

As shown in Table 5 and 7, both groups demonstrated the decay of learned words: $t(22) = 13.91$, $p < .001$, for the IMG group and $t(21) = 9.72$, $p < .001$ for the non-IMG group. However, it is apparent that the IMG group has retained more words than the without-IMG group. For the students who only read, more than half of the words previously learned decayed in two-week time; whereas, only about one-third of developed lexical knowledge were lost for those who read with interactive multiple-choice glosses.

Table 6: Paired t-test Descriptive Statistics

| | | Mean | N | Std. Deviation | Std. Error Mean |
|-----------------|-----------|---------|----|----------------|-----------------|
| + IMG Pair 1 | Immediate | 54.9939 | 23 | 17.12040 | 3.56985 |
| | Delayed | 35.2578 | 23 | 16.81280 | 3.50571 |
| - IMG Pair 1 | Immediate | 30.9305 | 22 | 17.51040 | 3.73323 |
| | Delayed | 13.4936 | 22 | 11.00648 | 2.34659 |

Table 7: Paired t-test

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|-------------------------|----------------------------|--------------------|----------------|-----------------|-------------------------------------------|----------|--------|----|--------------------|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| + IMG Pair 1 | Immediate vs Delayed | 19.74 | 6.80511 | 1.41896 | 16.79334 | 22.67884 | 13.909 | 22 | .000 |
| - IMG Pair 1 | Immediate Vs Delayed | 17.44 | 8.41154 | 1.79335 | 13.70735 | 21.16628 | 9.723 | 21 | .000 |

To summarise, the main findings are:

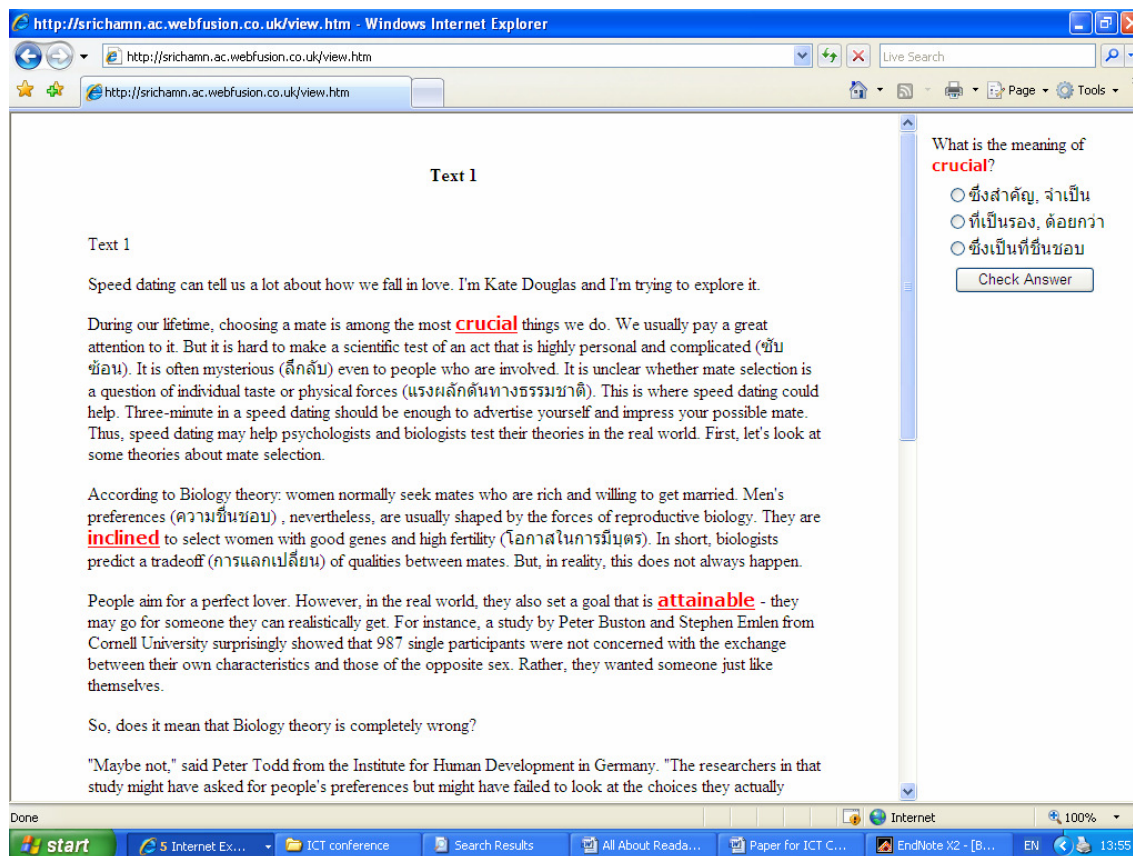
1. Interactive multiple-choice glosses (IMG) positively impact on acquisition and retention of words: Students who accessed to IMG while reading learned words significantly more than those who simply read with no glosses measured on both immediate and delayed post-tests.
2. Learned words are decayed over two-week time. Yet, the provision of IMG is associated with better long-term retention of learned words.

6. Discussion, conclusion, and implication for future research

The findings of this study conform to previous studies that incidental vocabulary learning from solely reading is possible but small and ineffective (Laufer 2001) and that glosses, particularly multiple-choice glosses, enhance vocabulary learning (Hulstijn, Hollander et al. 1996; Watanabe 1997; Rott, Williams et al. 2002; Wang 2005; Yoshii 2006). This study also supports the effectiveness of computerised interactive glosses as suggested by Nakata (1999). The advantages of IMG over only-reading could be attributed by several explanations. Firstly, glosses in multiple-choice format help promote input noticing as well as deeper level of processing. Once the target words are noticed, they are likely to be further processed, leading to an opportunity for successful learning. Also, in reading with IMG, the learners put more efforts in processing input – they tried to infer the correct meaning from context based on the choices provided in the glosses. Finally, with the provision of immediate feedback, the students were able to verify the meaning they selected. Consequently, having access to IMG while reading helps students learn new words more and better. In addition, the students tended to retain words they had learned more, provided that they had read with IMG. Again, this could be contributed by typical features of IMG: encouraging greater mental efforts, enabling meaning verification, and offering more word exposures.

Teachers could make use of this study’s findings by incorporating the use of IMG into teaching-learning approach. Furthermore, learning vocabulary from reading with IMG can promote learner autonomy as the students can read and learn new words at their own pace, regardless time or place. Nevertheless, the present research yielded only tentative findings that indicate the beneficial effect of IMG. Broad generalisations may not be applicable due to the limited framework of the research. Future studies with a larger sample of participants are needed. Moreover, this study only concerns on form-meaning connection aspect. It would be interesting if future studies employ other assessment techniques which shed light on deeper level of lexical knowledge. Further research also needs to explore more effective ways of applying glosses with other methods to promote better retention of words in the long term.

Appendix A: Screenshot of Reading Programme with Interactive Multiple-Choice Glosses



Appendix B: Three Subtests in Vocabulary Posttest Battery

| Tests | Task Description | Examples |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sub-Test 1: Active Recall Test | To supply a correct L2 form corresponding to the given L1 meaning translations | ที่มีเหตุผล (sensible)* = R_____ |
| Sub-Test 2: Passive Recall Test | To supply correct meaning (either in L1 or L2) for a given L2 form | Rational = _____ |
| Sub-Test 3: Passive Recognition Test | To match correct meaning (L1 meaning translations) to a given L2 form, from a set of four options | 1. Attainable _____ 2. Concurrent _____ ที่มีเหตุผล (sensible) 3. Discrete _____ ที่สามารถทำให้สำเร็จได้ (can be achieved) 4. Inaccessible _____ ซึ่งมีแนวโน้มที่จะ (being likely to) 5. Inclined _____ ซึ่งยากที่จะเข้าถึง (difficult to get) 6. Miserable _____ 7. Rational _____ 8. Successive _____ |

* English definitions (in parenthesis) are provided here as references. In the real tests, only L1 translations were given.

Appendix C: Data collection procedure

| | Group 1 (G1) [+IMG] | Group 2 (G2) [-IMG] |
|----------------------------|-----------------------------------------------|---------------------------------------------------|
| Prior to Experiment | Participant Consent | |
| Week 1 | Pretest (about 45 mins) | |
| Week 2 | Programme Training | |
| Week 3 | Session 1 (40 mins) | Session 1 (40 mins) |
| | 1. Text 1 Reading With IMG 2. Reading Test | 1. Text 1 Reading without IMG 2. Reading Test |
| Week 4 | Session 2 (40 mins) | Session 2 (40 mins) |
| | 1. Text 2 Reading With IMG 2. Reading Test | 1. Text 2 Reading with out IMG 2. Reading Test |
| | Vocabulary Immediate Posttest (about 45 mins) | |
| Week 6 | Vocabulary Delayed Posttest (about 45 mins) | |

*IMG = Interactive Multiple-Choice Glosses

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