Meaning-Inferred Gloss and Meaning-Given Gloss on Incidental Vocabulary Learning

Chih-cheng Lin
Department of English
National Taiwan Normal University

Hui-min Huang
National Chang-hua Senior High School

Abstract

The purpose of the present study is to examine whether meaning-inferred gloss (MI), involving mental processing of new words through decision-making process, generates better vocabulary learning than meaning-given gloss (MG) does. Also, it is our concern whether proficiency levels (High and Low) enhance vocabulary learning together with the two gloss types in question. The participants in the present study were 175 English learners from four intact classes in a senior high school in central Taiwan: two classes were third-year students (High) and the other two first-year students (Low). One class in each year was assigned to MI and the other MG. The treatments were that, when reading two passages, participants of the MI group were given three alternatives of each target word in L1 while those of the MG group were given single L1 translation of each target word. All participants were repeatedly tested on the target words before, immediately after, and two weeks after reading the passages. The results of this two-by-two factorial design analyzed by two-way ANOVA confirmed, in both vocabulary gain and retention, that the two glosses are beneficial for incidental vocabulary learning and that the effects of meaning-inferred gloss are greater than those of meaning-given gloss. The factor of proficiency levels, on the other hand, was found non-significant in both vocabulary gain and retention.

Keywords: Gloss types; incidental vocabulary learning; meaning-given gloss; meaning-inferred gloss; proficiency levels
Introduction

Over the last decade, there has been much discussion of the effectiveness of various reading text enhancement for enhancing incidental vocabulary learning. It is generally accepted that the use of gloss is facilitative for learners’ incidental vocabulary learning while reading (Hulstijn, Hollander, & Greidanus, 1996; Jacobs, Dufon, & Fong, 1994; Mondria, 2003; Nagata, 1999; Rott, 2005; Rott & William, 2003; Watanabe, 1997; Yoshii, 2006). The positive effects of gloss on fostering incidental vocabulary learning can be attributed to several factors. First, gloss is more accessible and easier to use than dictionary in that it provides accurate meanings for words that might be guessed incorrectly (Hulstijn et al., 1996). With its bold-faced design, gloss salience can draw learners’ attention to target words, supporting the notion of “consciousness-raising” and “input-enhancement” (Nagata, 1999). Gloss also helps to connect word forms to meanings with minimal interruption of reading process and consolidate the form-meaning connection (Rott & William, 2003). The presence of gloss finally encourages learners to read back and forth between the target words and gloss, triggering more lexical processing, which in turn leads to word retention (Jacobs et al., 1994).

In view of the positive findings of the effectiveness of gloss, researchers have shifted their focus from gloss effects to gloss types (Gettys, Imhof, & Kautz, 2001; Grace, 1998, 2000; Nagata, 1999; Watanabe, 1997). That is, an attempt to determine what gloss types generate positive learning effects. One of the issues on gloss types is whether gloss should involve learners’ decision-making process or not (Hulstijn et al., 1996; Mondria, 2003; Rott, 2005; Rott and William, 2003; Watanabe, 1997). The concern about whether to involve decision-making process comes from the argument that the use of gloss might deprive learners of the opportunities to infer, which, in turn, reduces the amount of processing. As a compromise between inferring the meaning from context and understanding the meaning from gloss, Hulstijn (1992) suggests providing multiple-choice meaning-inferred gloss rather than direct meaning-given gloss because the former can activate learners’ processing by enhancing their involvement through need, search and evaluation of the meaning of unknown words.

Findings of previous research examining the effects of meaning-given gloss and meaning-inferred gloss, however, are inconsistent (Mondria, 2003; Nagata, 1999; Rott, 2005; Rott and William, 2003; Watanabe, 1997). Watanabe (1997) found no significant difference between the effects of meaning-given gloss and meaning-inferred gloss; Mondria (2003) found meaning-inferred method more time-consuming. Contrarily, Nagata (1999), Rott (2005) and Rott and William (2003) found meaning-inferred gloss through multiple choices facilitative for incidental vocabulary learning.

Within the extensive literature on the effectiveness of different gloss types, little research has comparatively focused on the relationship between the effects of meaning-inferred gloss and learners’ proficiency level. The necessity to take learners’ proficiency level into consideration is supported by the claim that a precondition for vocabulary learning to take place through inferring is correct inference, which is affected by rich contextual clue, learners’ knowledge of the context words and learners’ skills at inferring (Mondria, 2003). Learners’ proficiency level, therefore, may play a part in the effects of meaning-inferred gloss because it determines whether learners have sufficient knowledge for the
context words and affects their inferring skills.

Because of the mixed findings of the effects of meaning-inferred gloss and meaning-given gloss, we consider it necessary to re-examine the effects of meaning-inferred gloss and meaning-given gloss on learners of different proficiency levels with a pedagogical view to providing more thoughts for English teachers to ponder over while designing and enhancing reading materials via gloss.

The research questions in the present study are as follows: Does meaning-inferred multiple-choice gloss generate greater effects on vocabulary gain and vocabulary retention than meaning-given singular gloss does? Does learners’ proficiency affect vocabulary learning in meaning-given and meaning-inferred conditions?

**Literature Review**

The practice of asking learners to infer word meanings from context has been debated for decades. Cognitively speaking, inferring word meanings is accepted as the most common strategy that learners resort to while reading, and successful inferences are believed to foster reading comprehension and aid vocabulary learning. Ellis (1994), for example, included inferring word meanings from context, aside from noticing and attending to new words, as one important strategy to enhance vocabulary learning. Many others contended (Fraser, 1999; Hulstijn, 1992; Rott, 2005; Rott and William, 2003) that inferring word meanings triggers learners’ mental processing while they are formulating and testing hypotheses about word meanings. The robust mental and linguistic context provided by reading text is considered to serve as a cognitive hook for the memory of the new words. Popular as it may be, inferring word meanings from context creates problems for language practitioners. Pedagogical concerns about the effectiveness of the word inferring method arise when the relationship between the accuracy of learners’ inference and their limited vocabulary knowledge are considered. The major concern is that learners’ inferences may be imprecise; moreover, meaning-inferring usually needs time for cognitive processing, which delays or interrupts reading fluency; and, meaning-inferring is effective only when the context is well-understood. For learners to succeed in inferring correct word meanings, it requires learners’ sufficient vocabulary knowledge and good reading strategies, which many learners lack.

**Glosses, Text Enhancement**

Glosses are needed because of problems found in extensive reading (Paribakht & Wesche, 1999; Parry, 1993, 1997; Watanabe, 1997). Describing drawbacks of learning vocabulary from learners’ free reading, Shu, Anderson, and Zhang (1995) maintained that learners’ attention may mainly be directed to comprehending text, and little attention is paid to knowing the meanings of unknown words. Furthermore, clues offered for the unknown words may vary greatly; that is, some contexts offer clear clues of the meanings of the unknown words while most offer opaque or partial information. Both result in unsuccessful vocabulary learning. Similarly, Hulstijn et al. (1996) argued that incidental vocabulary learning would not occur because learners failed to learn meanings of unfamiliar words. Reasons are as follows. When reading mainly for comprehension, learners tended to ignore most
unknown words considered irrelevant to main ideas. Their ignorance of unknown words accounted for their failure in vocabulary learning, because the premise for vocabulary learning to take place was learners’ noticing and attention to unknown words. Learners also overestimated their vocabulary size; that is, there were some unfamiliar words that learners thought they knew but in fact did not know. Furthermore, contextual information might direct learners’ attention solely to the meanings, but not the forms, of unknown words. The fact that learners failed to form the essential connection between form and meaning of unknown words is considered unsuccessful vocabulary learning. Learners’ inference of unknown words, finally, might be incorrect, which in turn caused them to retain the incorrect meaning of the words.

In view of the limitations of incidental vocabulary learning, considerable concerns have arisen over the applications of text enhancement by inserting glosses (Hulstijn, 1992; Hulstijn et al., 1996; Jacob et al., 1994; Nagata, 1999; Watanabe, 1997). Glosses, by definition, are notes that are written in L1 or a simpler form in L2 to facilitate learners’ reading. To attract learners’ attention, glossed words or information can be boldface typed or underlined (Roby, 1999). With the provided information next to unknown words, learners know their meanings immediately and proceed with minimum interruption of reading process (Lomicka, 1998; Nagata, 1999). Glosses are viewed as a valuable tool that facilitates reading in a foreign language (Richgels & Hansen, 1984; Watanabe, 1997). They are largely used in materials that textbook writers include potential unknown words or words of low frequency to L2 learners (Davis, 1989).

Using glosses on reading and vocabulary learning have advantages. Boldfaced or underlined, glosses can make unfamiliar words salient to the learners and lead them to pay more attention to the unknown words, which in turn enhance their vocabulary learning (Jacobs et al., 1994, Kost, Foss, & Lenzini, 1999; Nagata, 1999). The presence of gloss enables learners to look back and forth between the text and target words, which creates multiple encounters of the words to facilitate word retention (Watanabe, 1997). Also, glosses make reading process more enjoyable for learners because of the easy accessibility to the meaning of unknown words in a text (Jacobs et al., 1994). Because of the salience of glossed words, learners retain more information in the text than those who have no access to glosses (Stewart & Cross, 1991).

L1 or L2 Glosses

Glossing whether in L1 or in L2 has not yet come to an agreement. While participants preferred lexical help in their mother tongue (L1), their performances on vocabulary tests showed slight differences between the glosses presented in L1 and those in L2. Three studies below addressing the language issue are reviewed below.

Jacobs et al. (1994) had 85 Spanish learners whose native language was English read a Spanish text under three conditions: reading with no gloss, reading with English glosses and reading with Spanish glosses. After reading, the participants were required to write a recall protocol about the text for reading comprehension, to translate 32 glossed words for incidental vocabulary learning and to finish a questionnaire on their attitude toward the glosses. The same translation task was given four weeks later to measure their vocabulary retention. The results showed that glosses had no significant effects on reading comprehension; however, the participants with glosses, either English or Spanish,
performed better than those without glosses on the immediate word translation task, but the difference did not exist on the delayed post-test. In other words, glosses benefit incidental vocabulary learning, but not in vocabulary retention. Moreover, the result showed no significant difference between L1 gloss and L2 gloss although the questionnaire revealed learners’ preference for L1 gloss to L2 gloss.

Chang (2002) had 92 twelfth-graders read a short story under three conditions: reading with L1 marginal glosses, reading with electronic dictionaries and reading with no assistance. After reading, participants were given three vocabulary tests on sixteen target words and one reading comprehension test; two weeks later, participants received the same vocabulary test. The results showed no significant difference in reading comprehension test; however, on incidental vocabulary learning, it was found that marginal glosses had greater effects than electronic dictionaries on immediate test, but the positive effects that marginal glosses generated vanished on the delayed test for retention. The participants reading with L1 marginal glosses could acquire eighteen percent of the target words and retain two percent; those with electronic dictionary could acquire fifteen percent and retain four percent; and, those without any assistance acquire three percent and retain less than one percent (0.6%) of the target words.

Hulstijn et al. (1996) assumed that incidental vocabulary learning did happen while reading, but it did so in an incremental way with small quantity because of low incidence of correct or spontaneous inferring. Thus, the authors investigated how marginal gloss or dictionaries could redress the incorrect inferences and how reoccurrence of unknown words could foster incidental vocabulary learning through reading. Subjects of her study were 78 French-learners. They read a French story in one of the three text reading conditions: marginal gloss condition with L1 translations of target words, dictionary condition with availability for a bilingual dictionary and the control text with no additional information. After reading, a recall test of 16 words that had appeared once or three times in the text was given to the students. The study revealed the following findings. Word occurrence frequency had clearly positive effects on vocabulary learning; the occurrences of marginal gloss contributed to better retention of words than the availability of a bilingual dictionary; students in dictionary group seldom used their dictionary; and, when students in the dictionary group did resort to dictionary, their retention of the word meaning was greater than that in the marginal gloss group. Based on the above findings, Hulstijn et al. claimed that the effects of L1 marginal gloss were greater than the effects of dictionary, because learners tended to regard dictionary as the last resort as they didn’t want to interrupt their reading or they couldn’t find the correct meanings among so many entries in the dictionary. The authors also stated that the reoccurrence of words in marginal gloss could reinforce learners’ form-meaning connection, entailing the important role of word encounter frequency in vocabulary learning through reading; and, the provision of marginal gloss could solve the problems of learners’ ignoring new words and wrong inference of word meanings.

**Single or Multiple-choice Glosses**

The practice of single gloss is commonly found in textbooks; however, learners are deprived of chances for in-depth processing. To help learners learn and retain vocabulary items, multiple-choice glosses are designed. Most studies of the two gloss types favored the latter, that is, multiple-choice glosses outperform single glosses (Hulstijn, 1992; Rott, William, & Cameron, 2002).
Comparing the effects of meaning-inferred procedure and meaning-given procedure, Hulstijn (1992) had 45 adult Dutch learners read an article under two conditions: texts with synonyms for unknown words and texts with multiple-choice gloss for unknown words. After reading, learners were given a reading comprehension task, followed by unexpected vocabulary tests. The results indicated participants reading text with multiple-choice gloss performed significantly better in incidental vocabulary learning than those reading text with synonyms for unknown words. Multiple-choice gloss was later concluded to possess advantages of both meaning-inferred procedure and meaning-given procedure; it also balances the low incidence of students’ inferring and high incidence of incorrect inferring; and, it increases students’ encounter frequency with the target words.

With a view to finding out if multiple-choice glosses, said to require more mental effort from learners, can increase vocabulary retention, Rott et al. (2002) had 76 fourth-semester learners of German read a text in one of the four conditions: L1 multiple-choice glosses, L2 text reconstruction, combined treatments and control condition. After reading, learners were given an immediate test on productive and receptive vocabulary knowledge for measurements of their word gain; five weeks later, the same test was administered to assess their vocabulary retention. Findings of the study indicated that multiple-choice gloss generated significantly deeper productive and receptive word gains immediately after the treatment.

One of the problems that multiple-choice glosses bring to learners and language teachers is the incorrect guess. To rectify the flaw in the gloss design of multiple-choice, two studies (Watanabe, 1997; Nagata, 1999) need to be mentioned: the Watanabe’s pointing out the flaw and the Nagata’s offering immediate feedback by the computer program.

Watanabe (1997) had 231 Japanese college students randomly assigned to read a 500-word article under four conditions: reading without any explanation, reading with appositives as explanations, reading with single glosses on the margin and reading with multiple-choice glosses on the margin. The multiple-choice glosses in the study were intended to trigger learners’ deeper processing of the target words. The results showed that learners with single gloss and learners with multiple-choice gloss performed better than those with appositives and those without any explanations on the immediate post-test and the unexpected delayed post-tests. Watanabe explained that marginal glosses, either single or multiple, provided more input frequencies and had explicit connections with the target words for learners to take notice of. It was also found that learners with appositives did not perform better than those without any access to word meanings. Watanabe pointed out that appositives were not easy to be recognized by students because of their lack of manifest connections with the target words. As for the effects of two gloss types, there was no significant difference between single gloss and multiple-choice gloss. Watanabe’s study demonstrated that gloss is a facilitative tool to enhance learners’ vocabulary. It provides an explicit connection between word form and word meaning for learners to take notice of and arouse their attention to the unknown words. Marginal glosses, moreover, provided learners with extra opportunity to be exposed to the target words, which also caused another effect of frequency factor.

Addressing the possible problem of Watanabe’s study (1997), in which students in the multiple-choice group were not informed of correct answers, Nagata (1999) replicated Watanabe’s study and investigated the effectiveness of meaning-inferred gloss and meaning-given gloss. He used a computer program called BANAZI READINGS, which offered reading text accompanied by gloss to
Gloss Types on Vocabulary Learning

enhance reading comprehension. The meaning-inferred gloss was multiple-choice gloss, consisting of two possible L1 alternatives; immediate feedback followed in response to learners' selections. As for the meaning-given gloss, BANAZI provided a single English translation for each target word in the reading text. The subjects in the study were 26 English-speaking students learning Japanese, assigned to either a single-gloss group or a multiple-choice group. In either group, subjects read one of the readings from BANAZI READINGS, in which twenty target words were glossed either in single translation or multiple-choice format. Before the reading session, the subjects took a pretest on target words, in which they were required to translate the target words into English. The reading session lasted forty minutes and subjects in the study were told that they would be asked about the content of the reading text, but not informed of post-test on vocabulary. The result of Nagata's study showed that multiple-choice gloss was more effective than the single gloss for recalling of the target words. Nagata maintained that the significant effect of multiple-choice gloss resulted from the more required active involvement load, which in turn increased the lexical processing, leading to more retention of words. He also suggested using a computer to provide on-going, immediate feedback regarding mistaken selections to avoid the problems of wrong selection of meanings. Overall, he summarized that multiple-choice gloss augmented by immediate feedback could generate better effects than a single gloss procedure.

A series of study by Rott and William (2003) and Rott (2005) attempted to depict how language learners deep-process word forms and word meanings with multiple-choice glosses next to reading texts.

Rott and William (2003) conducted a qualitative study to explore the effects of multiple-choice glosses and periodic text reconstruction on vocabulary learning. They had 14 fifth-semester L1 English learners of German read a text under two conditions: reading with multiple-choice glosses and reading with no glosses. To measure word gain, two immediate vocabulary tests, including a modified Vocabulary Knowledge Scale based on Wesche and Paribakht (1996) and a word recognition test, were administered after learners read the passage. Besides, to elicit L2 readers' processing behavior, a think-aloud protocol, was conducted. The results indicated that learners with glosses and learners without glosses differed in their reading behavior and scores for vocabulary tests, suggesting the following points. The authors first contended that multiple-choice glosses triggers' a search for concrete meaning and form-meaning mapping. Besides, access to gloss triggered learner-text interaction, leading to better comprehension. Furthermore, they claimed that the multiple-choice glosses guide learners to infer word meanings from context and consolidate the memory of the new words. Finally, they added that the multiple-choice gloss presented an extrinsic need for learners to assign meanings to the target words, which in turn led readers to keep on processing the target words by searching for meanings in the test and evaluating their hypothesis on word meanings.

To explore the word processing strategies triggered by multiple-choice gloss and single-translation gloss, Rott (2005) subsequently conducted a qualitative study via a think-aloud procedure. In the study, Rott had 10 native speakers of English learning German read a passage under two conditions: text with multiple-choice gloss and text with single-translation gloss. After the reading process, learners were given a reading comprehension test, an immediate vocabulary test for measurement of word gain and a four-week post-delayed test for word retention. The results showed that learners with multiple-choice gloss and single translation gloss had similar performance in their vocabulary gain; but in word
retention, learners with multiple-choice gloss performed much better than learners with single gloss translation. As for the gloss effects on reading comprehension, there was no significant difference. Through the think-aloud protocol, Rott made the following observations. Unlike learners with single translation gloss, learners with multiple-choice gloss were more likely to perceive their need to assign a concrete meaning to the target words, thus paying more attention to the target words. Moreover, learners with multiple-choice gloss actively searched for the meaning of the target words and reevaluated their hypothesis on word meaning during consecutive encounters. Last, the data suggested that multiple-choice gloss lead to more robust and complete connections between word form and word meaning, since learners with multiple-choice glosses employed both meta-cognitive and semantic-elaborative resources, while learners with single translation gloss only depended on meta-cognitive resource. That is, learners with multiple-choice gloss evaluated the word meaning by using their background knowledge, context and hypothesis-testing strategies, while learners with single translation gloss just briefly glanced at the gloss and integrated their meaning.

The Present Study

A search for vocabulary studies conducted in Taiwan led us to research into how gloss types, proficiency levels and vocabulary learning interact. Both language practitioner and researchers agree that vocabulary skills play a crucial role of language learners’ proficiency; however, the research interests vary among language learners proficiency levels. For beginners in elementary schools, incorporations of multimedia presentations and games in vocabulary instructions are considered essential (Hou, 2006; Lin, 2006). Animations and video clips helped young learners acquire word meanings and playing games challenged children to learn more. For teenagers in high school and colleges, a dominant theme is vocabulary learning strategy though findings contradicted. Instructions on vocabulary learning strategies were taught (Chang, 2006; Lu, 2002; Jiang, 2001), surveyed (Hu, 2007; Lin C., 2007; Lin M., 2007; Wang, 2004) and compared (Cheng, 2006; Lian, 2006). The consensus was that high school and college students alike found learning strategies helpful for their vocabulary acquisition.

The focus of the present study is on the two gloss types, meaning-inferred and meaning-given, and their relationships with incidental vocabulary learning. The first research question is thus formed because of mixed findings presented earlier. The language used to present meanings of target words is participants’ mother tongue, L1 gloss. The major concern is their proficiency level, that is, gloss in English (L2) may not help but cause much difficulty in comprehending the text as well as in deciphering the words. Because of this linguistic concern, the proficiency levels of our participants were the focus in our second research question, which has not been discussed in previous studies reviewed.

Method

Participants

Participants in the study were male students from four classes in a boys’ senior high school in central Taiwan. Two classes were first-year students, whose average age was seventeen; the other two
classes were third-year students, with an average age of nineteen. All participants had received three
years of formal English education in junior high schools. Upon graduation from junior high schools,
their English proficiency level was considered between high-beginning and low-intermediate, which
the first-year students in the present study belonged to. After having received two more years of
English lessons, the third-year students were expected to reach a level between intermediate and
high-intermediate. In the high school where the study took place, the first-year students attended five
English classes each week while the third-year students had seven English classes each week.

Instrument

The list of twenty target words was selected from two reading passages in CLASSROOM Smart
Vocabulary for Senior High 7000. The book featured the word usage in the 7,000 list in reading
passages under different topics. The two selected reading passages were Traditional Education and
Single Mother. The main idea in the first passage of 207 words was the education during Confucius
time in the sixth century B.C., and that of the second passage of 208 words was life of a single mother.
Each passage contributed ten target words in the present study.

The instrument in the study was the multiple-choice vocabulary test of the twenty target words
(Appendix A). It was repeatedly used in the pre-test, the immediate post-test, and the delayed post-test.
The scores of each test were then used to determine the participants’ vocabulary gain and vocabulary
retention.

To ensure that the participants in the study have no or little knowledge about the target words, a
pilot vocabulary test was conducted. A class of 45 third-year students was selected and none
participated in the present study later. They were asked to write down L1 translation of thirty-two
words adopted from the two reading passages, with the twenty target words embedded. The results of
the translation test, in Table 1 below, showed that the participants in the pilot study had no or little
knowledge about the twenty target words chosen for the present study.

In each of the two passages, there were sixteen words glossed, including ten target words and six
non-target words. The presence of the six non-target words was to distract the participants from
intentional focus on the target words. Each passage was glossed in two ways. Meaning-given gloss
gave single Chinese translation whereas multiple-choice meaning-inferred gloss provided three
alternatives in Chinese (Appendix B).

One class from the first-year classes and one from the third-year classes were assigned to
multiple-choice meaning-inferred group (MI) and the other two classes, including one from each year,
were assigned to meaning-given group (MG). The participants in the MI group had to finish the
multiple-choice gloss by making the choices of word meanings from three alternatives in Chinese. The
three alternatives in the meaning-inferred gloss had the same grammatical category and had similar
semantic property. All three alternatives in Chinese make sense in the context.
Table 1  Results of the Pilot Vocabulary Translation Test

<table>
<thead>
<tr>
<th>Vocabulary of Passage One*</th>
<th>Number of correct translations</th>
<th>Vocabulary of Passage Two</th>
<th>Number of correct translations</th>
</tr>
</thead>
<tbody>
<tr>
<td>contemporary</td>
<td>4</td>
<td>dual</td>
<td>2</td>
</tr>
<tr>
<td>ethical</td>
<td>20</td>
<td>core</td>
<td>8</td>
</tr>
<tr>
<td>criterion</td>
<td>1</td>
<td>preside</td>
<td>0</td>
</tr>
<tr>
<td>emphatic</td>
<td>5</td>
<td>filter</td>
<td>0</td>
</tr>
<tr>
<td>presume</td>
<td>3</td>
<td>preliminary</td>
<td>0</td>
</tr>
<tr>
<td>incentive</td>
<td>0</td>
<td>proposal</td>
<td>9</td>
</tr>
<tr>
<td>overcome</td>
<td>38</td>
<td>smoothly</td>
<td>36</td>
</tr>
<tr>
<td>faculty</td>
<td>0</td>
<td>diagram</td>
<td>3</td>
</tr>
<tr>
<td>relish</td>
<td>0</td>
<td>resolve</td>
<td>3</td>
</tr>
<tr>
<td>ponder</td>
<td>5</td>
<td>friction</td>
<td>3</td>
</tr>
<tr>
<td>integrate</td>
<td>1</td>
<td>dissolve</td>
<td>4</td>
</tr>
<tr>
<td>generalize</td>
<td>3</td>
<td>condense</td>
<td>2</td>
</tr>
<tr>
<td>stimuli</td>
<td>4</td>
<td>radius</td>
<td>0</td>
</tr>
<tr>
<td>priority</td>
<td>22</td>
<td>density</td>
<td>10</td>
</tr>
<tr>
<td>deficiency</td>
<td>0</td>
<td>patch</td>
<td>0</td>
</tr>
<tr>
<td>render</td>
<td>0</td>
<td>smack</td>
<td>0</td>
</tr>
</tbody>
</table>

* The vocabulary is listed according to the order of the appearance in the two selected passages. The target words in the study were bold-faced.

Procedures

In the first phase, the pre-test made up of twenty target words was unexpectedly administered to the participants for twenty minutes to measure their prior knowledge about the target words.

In the second phase, all participants underwent two reading tasks, each of which required them to first finish reading a passage and to answer four comprehension questions in thirty minutes, and later to take an unexpected vocabulary test of ten items as an immediate post-test in ten minutes. Before taking the vocabulary test, the participants in the MI group were offered the correct answers of the target words. The two reading tasks were completed in two class periods on two different days.

In the third phase, a post-test of the twenty target words was unexpectedly administered two weeks after the second reading tasks. The test items were the same as those in the pre-test and the immediate post-test, but they were presented in a different order.

Data Collection and Analysis

The data were collected in the pre-test, the immediate post-test and the delayed post-test to determine the differences between meaning-inferred group and meaning-given group, between higher proficient level and lower proficient level, and the interaction between gloss types and proficiency.
levels. The independent variables are gloss types (meaning-inferred and meaning-given) and proficiency levels (high and low). The dependent variables are vocabulary gain and vocabulary retention, where vocabulary gain is obtained by a comparison made between the scores of the pre-test and those of the immediate post-test, and vocabulary retention is measured by a comparison made between the scores of the pre-test and those of the delayed post-test. The collected data were run on the Statistical Package for Social Science (SPSS) for the analyses of two-way ANOVA (Analysis of Variance) to answer both research questions of whether gloss types and proficiency levels affect incidental vocabulary learning.

**Results and Discussions**

**Results**

All participants’ mean scores in the pre-test, the immediate post-test, and the delayed post-test are presented in Table 2 below, together with the comparisons between the pre-test and the immediate post-test and between the pre-test and the delayed post-test.

**Table 2 Descriptive Statistics of Three Vocabulary Tests**

<table>
<thead>
<tr>
<th>Glosses</th>
<th>Levels</th>
<th>N</th>
<th>Pre M</th>
<th>SD</th>
<th>IM M</th>
<th>SD</th>
<th>DE M</th>
<th>SD</th>
<th>Pre-IM t</th>
<th>p</th>
<th>Pre-DE t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>hi</td>
<td>47</td>
<td></td>
<td>3.68</td>
<td>2.41</td>
<td>12.43</td>
<td>4.03</td>
<td>10.57</td>
<td>4.79</td>
<td>14.682</td>
<td>0.000**</td>
<td>10.175</td>
<td>0.000**</td>
</tr>
<tr>
<td>MI</td>
<td>lo</td>
<td>43</td>
<td>1.05</td>
<td>1.63</td>
<td>9.33</td>
<td>3.36</td>
<td>5.67</td>
<td>3.25</td>
<td>14.601</td>
<td>0.000**</td>
<td>7.963</td>
<td>0.000**</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td></td>
<td>2.42</td>
<td>2.45</td>
<td>10.94</td>
<td>4.02</td>
<td>8.23</td>
<td>4.79</td>
<td>20.740</td>
<td>0.000**</td>
<td>12.548</td>
<td>0.000**</td>
</tr>
<tr>
<td>hi</td>
<td>44</td>
<td></td>
<td>3.66</td>
<td>3.18</td>
<td>8.43</td>
<td>4.22</td>
<td>6.09</td>
<td>3.14</td>
<td>9.159</td>
<td>0.000**</td>
<td>4.993</td>
<td>0.000**</td>
</tr>
<tr>
<td>MG</td>
<td>lo</td>
<td>41</td>
<td>0.95</td>
<td>1.45</td>
<td>6.76</td>
<td>2.52</td>
<td>4.51</td>
<td>3.19</td>
<td>12.417</td>
<td>0.000**</td>
<td>6.694</td>
<td>0.000**</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td></td>
<td>2.35</td>
<td>2.84</td>
<td>7.62</td>
<td>3.58</td>
<td>5.33</td>
<td>3.24</td>
<td>14.888</td>
<td>0.000**</td>
<td>8.203</td>
<td>0.000**</td>
</tr>
<tr>
<td>HI</td>
<td>91</td>
<td></td>
<td>3.67</td>
<td>2.79</td>
<td>10.49</td>
<td>4.56</td>
<td>8.41</td>
<td>4.64</td>
<td>15.254</td>
<td>0.000**</td>
<td>9.850</td>
<td>0.000**</td>
</tr>
<tr>
<td>TOTAL</td>
<td>LO</td>
<td>84</td>
<td>1.00</td>
<td>1.54</td>
<td>8.07</td>
<td>3.23</td>
<td>5.11</td>
<td>3.25</td>
<td>18.071</td>
<td>0.000**</td>
<td>10.349</td>
<td>0.000**</td>
</tr>
<tr>
<td>Total</td>
<td>175</td>
<td></td>
<td>2.39</td>
<td>2.64</td>
<td>9.33</td>
<td>4.15</td>
<td>6.82</td>
<td>4.35</td>
<td>23.275</td>
<td>0.000**</td>
<td>14.106</td>
<td>0.000**</td>
</tr>
</tbody>
</table>

*Note:* In the column of Glosses, MI refers to meaning-inferred and MG meaning-given; and, in the column of Levels, hi refers to third-year students and lo first-year students. In the top row, Pre refers to Pre-test, IM immediate post-test, DE delayed post-test.

**p < .01**

**Baseline knowledge:** To confirm whether the participants had fair baseline knowledge of the target words in the pre-test, a two-way ANOVA was conducted, whose results are shown in Table 3.
Table 3  Tests of Between Subjects Effects in Pretest

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloss types</td>
<td>0.149</td>
<td>1</td>
<td>0.149</td>
<td>0.028</td>
<td>0.866</td>
</tr>
<tr>
<td>Proficiency levels</td>
<td>311.394</td>
<td>1</td>
<td>311.394</td>
<td>59.303</td>
<td>0.000**</td>
</tr>
<tr>
<td>Gloss types * Proficiency levels</td>
<td>0.059</td>
<td>1</td>
<td>0.059</td>
<td>0.011</td>
<td>0.916</td>
</tr>
<tr>
<td>Error</td>
<td>897.909</td>
<td>171</td>
<td>5.251</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlated Total</td>
<td>1209.577</td>
<td>174</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** p < .01

The interaction effect between gloss types and proficiency levels was not significant (F=0.011, p=0.916 n.s.); the main effect of gloss types didn’t reach a significant level (F=0.028, p=0.866 n.s.) while the main effect of proficiency levels reached significant level (F=59.303, p<0.000**), with the HI (M=3.67 in Table 2) outperformed the LO (M=1.00 in Table 2) in the pre-test. A series of t-tests further confirmed the comparisons in Table 4 below.

Table 4  Group Comparisons of Pretest

<table>
<thead>
<tr>
<th>Types</th>
<th>Group (M/SD)</th>
<th>Group (M/SD)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloss types</td>
<td>MI-hi (3.68/2.41)</td>
<td>MG-hi (3.66/3.18)</td>
<td>0.037</td>
<td>0.971</td>
</tr>
<tr>
<td></td>
<td>MI-lo (1.05/1.63)</td>
<td>MG-lo (0.95/1.45)</td>
<td>0.283</td>
<td>0.778</td>
</tr>
<tr>
<td>Proficiency types</td>
<td>MI-hi (3.68/2.41)</td>
<td>MI-lo (1.05/1.63)</td>
<td>6.123</td>
<td>0.000**</td>
</tr>
<tr>
<td></td>
<td>MG-hi (3.66/3.18)</td>
<td>MG-lo (0.95/1.45)</td>
<td>5.103</td>
<td>0.000**</td>
</tr>
</tbody>
</table>

Note: No. for each group are MI-hi=47, MI-lo=43, MG-hi=44, and MG-lo=41.
** p < .01

The comparisons included MI-hi and MG-hi (t=0.037, p=0.971 n.s.) and MI-lo and MG-lo (t=0.283, p=0.778 n.s.); and, MI-hi and MI-lo (t=6.123, p<0.000**) and MG-hi and MG-lo (t=5.103, p<0.000**). The participants grouped by gloss types had fair baseline knowledge of the twenty target words whereas the participants grouped by proficiency levels showed significant differences, the two high groups outperforming the low groups.

Proficiency differences: In the analyses of the two post-tests, the differences between the two proficiency groups, including HI and LO, MI-hi and MI-lo, and MG-hi and MG-lo, were found significant. The results of the immediate post-test are shown below, including those of two-way ANOVA in Table 5 and those of group comparison in Table 6.
Table 5  Tests of Between Subjects Effects in Immediate-Posttest

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloss types</td>
<td>470.001</td>
<td>1</td>
<td>470.001</td>
<td>35.891</td>
<td>0.000**</td>
</tr>
<tr>
<td>Proficiency levels</td>
<td>248.849</td>
<td>1</td>
<td>248.849</td>
<td>19.003</td>
<td>0.000**</td>
</tr>
<tr>
<td>Gloss types * Proficiency levels</td>
<td>22.132</td>
<td>1</td>
<td>22.132</td>
<td>1.690</td>
<td>0.195</td>
</tr>
<tr>
<td>Error</td>
<td>2239.288</td>
<td>171</td>
<td>13.095</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlated Total</td>
<td>2996.777</td>
<td>174</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** p < .01

Table 6  Group Comparisons of Immediate-Posttest

<table>
<thead>
<tr>
<th>Types</th>
<th>Group (M/SD)</th>
<th>Group (M/SD)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloss types</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MI-hi (12.43/4.03)</td>
<td>MG-hi (8.43/4.22)</td>
<td>4.619</td>
<td>0.000**</td>
<td></td>
</tr>
<tr>
<td>MI-lo (9.33/3.36)</td>
<td>MG-lo (6.76/2.52)</td>
<td>3.953</td>
<td>0.000**</td>
<td></td>
</tr>
<tr>
<td>Proficiency types</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HI (10.49/4.56)</td>
<td>LO (8.07/3.23)</td>
<td>3.953</td>
<td>0.000**</td>
<td></td>
</tr>
<tr>
<td>MI-hi (12.43/4.03)</td>
<td>MI-lo (9.33/3.36)</td>
<td>3.944</td>
<td>0.000**</td>
<td></td>
</tr>
<tr>
<td>MG-hi (8.43/4.22)</td>
<td>MG-lo (6.76/2.52)</td>
<td>2.204</td>
<td>0.030</td>
<td></td>
</tr>
</tbody>
</table>

*Note: No. for each group are MI-hi=47, MI-lo=43, MG-hi=44, MG-lo=41, HI=91 and LO=84.*

** p < .01

In the immediate post-test, the interaction effect was not significant (F=1.690, p=0.195 n.s.); the main effect of proficiency levels reached a significant level (F=19.003, p<0.000**), with the HI (M=10.49) outperforming the LO (M=8.07). Same tests were conducted for the delayed post-test; and, the results of two-way ANOVA were presented in Table 7 and those of group comparisons in Table 8.

Table 7  Tests of Between Subjects Effects in Delayed-Posttest

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloss types</td>
<td>347.789</td>
<td>1</td>
<td>347.789</td>
<td>25.537</td>
<td>0.000**</td>
</tr>
<tr>
<td>Proficiency levels</td>
<td>457.986</td>
<td>1</td>
<td>457.986</td>
<td>33.629</td>
<td>0.000**</td>
</tr>
<tr>
<td>Gloss types * Proficiency levels</td>
<td>120.363</td>
<td>1</td>
<td>120.363</td>
<td>8.838</td>
<td>0.003**</td>
</tr>
<tr>
<td>Error</td>
<td>2328.811</td>
<td>171</td>
<td>13.619</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlated Total</td>
<td>3289.509</td>
<td>174</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** p < .01
Table 8  Group Comparisons of Delayed-Posttest

<table>
<thead>
<tr>
<th>Types</th>
<th>Group (M/SD)</th>
<th>Group (M/SD)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloss types</td>
<td>MI-hi (10.57/4.79)</td>
<td>MG-hi (6.09/3.14)</td>
<td>5.243</td>
<td>0.000**</td>
</tr>
<tr>
<td></td>
<td>MI-lo (5.67/3.25)</td>
<td>MG-lo (4.51/3.19)</td>
<td>1.654</td>
<td>0.102</td>
</tr>
<tr>
<td>Proficiency types</td>
<td>HI (8.41/4.64)</td>
<td>LO (5.11/3.25)</td>
<td>5.407</td>
<td>0.000**</td>
</tr>
<tr>
<td></td>
<td>MI-hi (10.57/4.79)</td>
<td>MI-lo (5.67/3.25)</td>
<td>5.626</td>
<td>0.000**</td>
</tr>
<tr>
<td></td>
<td>MG-hi (6.09/3.14)</td>
<td>MG-lo (4.51/3.19)</td>
<td>2.300</td>
<td>0.024</td>
</tr>
</tbody>
</table>

Note: No. for each group are MI-hi=47, MI-lo=43, MG-hi=44, MG-lo=41, HI-91 and LO=84.
** p < .01

In the delayed post-test of participants, the interaction effect was significant (F=8.838, p=0.003**); the simple main effect of proficiency levels reached a significant level at .01 (F=33.629, p<0.000**), with the HI (M=8.41) outperformed the LO (M=5.11).

The further t-tests were conducted to compare the differences between MI-hi and MI-lo and between MG-hi and MG-lo in both post-tests, totaling four pairs. The results of the MI-hi and MI-lo in both post-tests reached a significant level at .01 (t=3.944** in Table 6, t=5.626** in Table 8) while those of the MG-hi and MG-lo did not (t=2.204 in Table 6, t=2.300 in Table 8).

Vocabulary learning: All participants shown in the TOTAL row in Table 2 attained higher scores in the immediate post-test and the delayed post-test than they did in the pre-test. The increases in the immediate post-test and in the delayed post-test showed some vocabulary gain and vocabulary retention. The pair of t-tests both reached a significant level at .01: the pre-test and the immediate post-test for vocabulary gain (t=23.275, p<0.000** in Table 2) and the pre-test and the delayed post-test for vocabulary retention (t=14.106, p<0.000** in Table 2).

Gain and retention: The definition of vocabulary gain is the difference between the score of the pre-test and that of the immediate post-test; the difference between the score of the pre-test and that of the delayed post-test defines vocabulary retention. Each possible pair of vocabulary gain and vocabulary retention in the column of Pre-IM and of Pre-DE in Table 2, nine pairs apiece, showed its significant difference at the level of .01, a sign of effects from each gloss type given to the participants when reading passages. The descriptive statistics of vocabulary gain and vocabulary retention are presented in Table 9 below.

The tendency of the higher immediate post-test than the delayed post-test is reflected in gain and retention shown in Table 9. The results of testing the differences between groups, that is, gloss types and proficiency levels, by employing two-way ANOVA are presented in Table 10 below.
Table 9  Descriptive Statistics of Gain and Retention

<table>
<thead>
<tr>
<th>Glosses</th>
<th>Levels</th>
<th>N</th>
<th>Gain (Pre-IM)</th>
<th>Retention (Pre-DE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>MI</td>
<td>hi</td>
<td>47</td>
<td>8.74</td>
<td>4.08</td>
</tr>
<tr>
<td></td>
<td>lo</td>
<td>43</td>
<td>8.28</td>
<td>3.72</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>90</td>
<td>8.52</td>
<td>3.90</td>
</tr>
<tr>
<td>MG</td>
<td>hi</td>
<td>44</td>
<td>4.77</td>
<td>3.46</td>
</tr>
<tr>
<td></td>
<td>lo</td>
<td>41</td>
<td>5.80</td>
<td>2.99</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>85</td>
<td>5.27</td>
<td>3.26</td>
</tr>
<tr>
<td>TOTAL</td>
<td>HI</td>
<td>91</td>
<td>6.82</td>
<td>4.27</td>
</tr>
<tr>
<td></td>
<td>LO</td>
<td>84</td>
<td>7.07</td>
<td>3.59</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>175</td>
<td>6.94</td>
<td>3.95</td>
</tr>
</tbody>
</table>

Note: Pre denotes Pre-test, IM immediate post-test, and DE delayed post-test.
**p < .01

Table 10  Tests of Between Subjects Effects of Gain and Retention

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloss types</td>
<td>453.386</td>
<td>1</td>
<td>453.386</td>
<td>34.927</td>
<td>0.000**</td>
</tr>
<tr>
<td>Proficiency levels</td>
<td>3.502</td>
<td>1</td>
<td>3.502</td>
<td>0.270</td>
<td>0.604</td>
</tr>
<tr>
<td>Gloss types * Proficiency levels</td>
<td>24.477</td>
<td>1</td>
<td>24.477</td>
<td>1.886</td>
<td>0.171</td>
</tr>
<tr>
<td>Error</td>
<td>2219.754</td>
<td>171</td>
<td>12.981</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlated Total</td>
<td>2709.42</td>
<td>174</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In vocabulary gain, the interaction effect was not significant (F=1.886, p=0.171 n.s.). While the main effect of proficiency levels was not significant (F=0.270, p=0.604 n.s.), that of gloss types reached a significant level (F=34.927, p<0.000**), with the MI group (M=8.52) outperforming the MG group (M=5.27). In vocabulary retention, the interaction effect reached a significant level (F=7.328, p=0.007**). The simple main effect of gloss types showed a significant difference (F=20.673, p<0.000**), with the MI group (M=5.68) outperforming the MG group (M=2.98).

Discussions

The research questions are answered in this section. The effects of glosses in reading texts are first addressed; then, the comparisons between meaning-inferred gloss and meaning-given gloss are
presented; and, the factor of learners’ proficiency level is finally discussed.

**Benefits of Glosses on Incidental Vocabulary Learning**

The results that glosses, either multiple-choice meaning-inferred or single meaning-given, are beneficial to incidental vocabulary learning are in line with the findings of previous research (Hulstijn et al., 1996; Jacobs et al., 1994; Mondria, 2003; Nagata, 1999; Paribakht & Wesche, 1997; Rott, 2005; Rott and William, 2003; Watanabe, 1997; Yoshii, 2006). There are several factors that can account for the effectiveness of gloss on learners’ incidental vocabulary learning. The use of gloss arouses learners’ noticing to the target words, which is a crucial process in vocabulary-learning (Schmidt, 1992). With its salience due to being bold-faced, gloss successfully draws learners’ attention, creating an ideal vocabulary-learning condition of “consciousness-raising” and “input-enhancement” (Rutherford & Sharwood Smith, 1985; Sharwood Smith, 1993). Besides its salience of textual input that enhances learners’ attention to target words, gloss also helps learners to connect the word form to its meaning immediately, consolidating the form-meaning association, which is a vital component of knowing a word (Rott & William, 2003). Last, with a view to comprehending the reading material, learners are more likely to read back and forth between the target words and the gloss, triggering more lexical processing. Such lexical processing of the target words is beneficial to vocabulary learning (Jacobs et al., 1994).

**Greater Effects of Meaning-inferred Gloss than Those of Meaning-given Gloss**

The present study reveals greater effects of meaning-inferred gloss than those of meaning-given gloss in vocabulary gain and retention. The superiority of meaning-inferred gloss to meaning-given gloss in incidental vocabulary learning corresponds to the findings of previous studies (Hulstijn, 1992; Nagata, 1999; Rott & William, 2003; Rott, 2005).

The findings of the present study corroborate the positive effects of meaning-inferred gloss that Hulstijn proposed and described as a “compromise between meaning-inferred method and meaning-given gloss” (1992). Moreover, the present study showed a higher vocabulary gain and retention from the multiple-choice meaning-inferred gloss than from the single meaning-given gloss on the immediate post-test and the delayed post-test. As in Nagata’s study (1999), where immediate feedback of the correct meanings was given, the present study verified the importance and necessity of teachers’ immediate correct feedback given to the students in the meaning-inferred group. The necessity of providing correct feedback in the present study echoes with the proposal by Hulstijn (1992) in order to avoid the incorrect inferences made by learners alone. Also, the findings of the positive effects of meaning-inferred gloss in the present study confirm the statement in Rott (2005) that meaning-inferred gloss is beneficial in strengthening the form-meaning connection because of learners’ more mental processing of target items.

As is expected, the finding of the significantly better effects of meaning-inferred gloss in the present study contradicts Watanabe’s (1997) results of non-significant difference between meaning-given gloss and meaning-inferred gloss. This inconsistency is expected; by offering students the correct feedback of multiple-choice gloss after reading, the present study manages to address the
problem of Watanabe’s study, in which students in the meaning-inferred group were not informed of the correct alternative of word meaning. Next, contrary to the finding in Mondria (2003) that meaning-inferred method is more time-consuming and thus less efficient than meaning-given method, the present study demonstrates the positive effects of meaning-inferred method by employing multiple-choice meaning-inferred gloss rather than wild guessing of word meanings. Such positive effects of meaning-inferred gloss support Hulstijn’s (1992) claim that multiple-choice meaning-inferred gloss serves well as a compromise between meaning-given gloss and wild guessing of word meanings. In Hulstijn’s words, the multiple-choice meaning-inferred gloss retains the advantages of the inferring method as it helps learners reduce the risk of making incorrect inference because of their lacking problem-solving skills and finding contextual clues. The multiple-choice meaning-inferred gloss compensates for limited contextual information and reduces chances of wrong inferences; thus, it is appropriate for learners with less-developed problem-solving skills.

To explore the factors that account for the greater effects of meaning-inferred gloss than meaning-given gloss, the fundamental difference between meaning-inferred gloss and meaning-given gloss should be explained. The most striking difference between meaning-inferred gloss and meaning-given gloss is the presence of decision-making among learners. We now turn to the discussion of what is involved in the decision-making process based on mental effort hypothesis and involvement load construct to account for the greater effects meaning-inferred gloss generates than meaning-given gloss.

According to research in human memory, the chance that new lexicon be stored in long-term memory is determined by the depth of processing in the encoding process (Craik & Lockhart, 1972; Craik & Tulving, 1975; Jacoby, Craik, & Begg, 1979). A learner retains a word meaning if he or she is engaged in deep processing of the particular word, which includes elaboration of word form, word meaning, their context and learners’ previous knowledge (Ellis, 1994; Hulstijn & Laufer, 2001). When learners in the meaning-inferred group are asked to infer word meanings, they are to exert more mental efforts than when they are given word meanings. They need to assign a proper meaning to a word by elaborating the context and employing their previous knowledge of the context words to make a choice of the word meaning. Because of more mental efforts in decoding and elaborating form and meaning, the learners in the meaning-inferred group later retrieve and recall the word meaning better than those with less mental processing of words in the meaning-given group.

In addition to in-depth processing and more mental efforts, the involvement load hypothesis (Hulstijn & Laufer, 2001) also accounts for the greater effects of meaning-inferred gloss. According to the hypothesis, the cognitive search and evaluation activities are essential components in lexical acquisition and retention. When learners in the meaning-inferred group are given multiple-choice glosses, they are involved in a problem-solving task. The problem-solving task of the multiple-choice gloss presents an extrinsic need and enhances learners’ motivation to assign a concrete meaning to a particular word; the need to assign a meaning in turn leads learners to allocate attention to processing the word by searching for meaning in the context and evaluating their hypothesis on the semantic information of the word. Thus, compared to meaning-given gloss, which requires less mental effort and involvement of learners, the use of multiple-choice meaning-inferred gloss triggers a deeper processing of words, requires more involvement from learners and thus enhances the subsequent word acquisition and retention.
Proficiency Levels and Gloss Types

In the present study, the higher proficiency participants scored higher in all three vocabulary tests than the lower proficiency participants, whose differences were found significant in three two-way ANOVA analyses. The fact that the proficiency levels play a role in learner’s performances in the present study corresponds to the previous studies. As Mondria stated (2003), the precondition for successful learning from meaning-inferred method to take place is that learners should infer the meaning of the words correctly, as incorrect meanings will also be retained. The correct inference of words depends on rich contextual clue of the text, learners’ knowledge of the context words and learners’ skill at inferring, all of which are related to learners’ proficiency level. That is, if learners are not proficient enough, they may have difficulty accessing the contextual clues because of limited knowledge of the context words, which will in turn lead to their poor inference of the unknown words and affects their vocabulary learning. Furthermore, given the fact that incorrect inference may be retained (Grace, 1998; Mondria, 2003), it is reasonable to argue that proficiency level affects word retention, based upon its importance of deciding whether learners can make correct inference of the unknown words. As mentioned above, the lower proficiency learners, because of their insufficient knowledge of the context words and poor skill at inferring, are more inclined to make incorrect inference of word meanings. The incorrect inference of word meanings might be redressed in the immediate post-tests because of the teachers’ immediate feedback of the correct meanings, but it still interfered with the learners in their delayed post-test and led to their inferior performance in word retention. Contrarily, learners of higher proficiency level, because of more vocabulary knowledge of the context words and greater accessibility to the rich contextual clue, are more likely to make correct associations of the word meanings by more readily triggering appropriate schemata and, hence, the likelihood of committing the correct meaning to memory (Grace, 1998).

While the higher proficiency participants in the three vocabulary tests outperformed the lower proficiency participants, their results in vocabulary gain and retention appeared opposite. In the single meaning-given group, the differences between high and low proficiency participants were reversed both in vocabulary gain and vocabulary retention. In addition, the lower proficiency participants in the meaning-inferred gloss outperformed the higher proficiency participants in the meaning-given gloss in both assessments. That is, the lower proficiency participants in both the meaning-inferred and meaning-given glosses gained more and retained more than the higher proficiency participants in the meaning-given gloss. Furthermore, in the comparisons between gloss types in gain and in retention, the only pair that showed no significant difference was between the two lower groups in retention although the meaning-inferred group outscored the meaning-given group. Such discrepancy is considered a possible cause for the significant interaction effect and explained immediately below.

The contradictory results found in the present study may be attributed to the sampling and the immediate feedback to the meaning-inferred participants. The participants in the present study were confined to one school in central Taiwan, first-year and third-year senior high school male students. They were categorized into two groups of high and low according to the years of their English learning, although the differences between the two proficiency groups were found significant before the treatment began. The homogeneity found in the participants may not generate enough differences. Secondly, the present study offered immediate feedback to those in the multiple-choice
meaning-inferred group after the participants finished their reading task and comprehension questions and before they took the unexpected vocabulary tests. The immediate feedback redressed wrong inferences and reinforced the learning of the target words. The participants of the two proficiency groups in the multiple-choice meaning-inferred group displayed similar performance in the subsequent immediate post-tests, their vocabulary gain.

Conclusions

The present study investigated the effects of meaning-inferred gloss and meaning-given gloss on learners’ incidental vocabulary learning and explored whether learners’ proficiency level affects the efficacy of meaning-inferred gloss and meaning-given gloss. Its conclusions are as follows.

Learners can learn vocabulary incidentally from either meaning-inferred gloss or meaning-given gloss when they are engaged in reading mainly for comprehension of the text. The bold-faced gloss can trigger learners’ noticing of the new words and lead them to pay additional attention to the new words, which in turn facilitates their vocabulary learning. Of the two gloss types, meaning-inferred gloss is more effective than meaning-given gloss in eliciting vocabulary gain and retention because of more mental processing of words and more involvement load triggered by the decision-making process in inferring word meaning.

Learner’s proficiency level determines their performances in lexical assessments when engaged in comprehending texts enhanced with glosses; however, their proficiency level is non-significant in vocabulary gain and retention. The result that matches the expectation lies in the vocabulary retention of the multiple-choice meaning-inferred group. Other than that, the proficiency level either is found non-significant or demonstrates opposite results in the present study.

Finally, when learners are reading gloss-enhanced materials, it is gloss types, not proficiency levels, that determine how much vocabulary they gain and retain incidentally from the reading tasks.

Pedagogical Implication

The study aims to investigate whether Taiwanese senior high students can benefit from meaning-inferred gloss and meaning-given gloss. It is expected that the findings in the study can shed light on vocabulary learning and teaching.

The study shows that reading materials, enhanced with meaning-given gloss, can be assigned to students for independent reading. Although it is undeniable that extensive reading can lead to the incremental process of vocabulary learning, there is still concern that learners’ text comprehension may not always lead to the kind of word processing, which is an indispensable element in vocabulary learning. The presence of gloss, however, can solve the above problem.

Glosses are beneficial in several aspects. As learners are engaged in reading, their attention to new words is drawn by the gloss and their knowledge of the unknown words is enriched by the rich context in the reading material. Besides, the presence of gloss can ease students’ burden of dictionary consultation, minimize the interruption of reading process and prevent students from making wrong
inference or assigning a meaning not appropriate for the unknown words in the particular context. Thus, gloss can ensure students’ exact understanding of the text as well as the meaning of the unknown words.

Despite the advantages of glosses, some teachers are worried that students are deprived of the opportunities to develop their inferential skills when the meaning is given directly in the gloss. Such being the case, teachers can occasionally implement meaning-inferred gloss to elicit their mental processing of the words in class, so that correct feedback can be presented immediately after learners finish the multiple-choice meaning-inferred gloss. In this way, the influence of wrong inference can be minimized; at the same time, learners can exert more mental efforts on the new words, from which their vocabulary learning can be consolidated.

No matter what kind of text enhancement teachers employ, one thing to keep in mind is that students should not abandon their inferring ability to learn words incidentally while they are engaged in reading. The study suggests that word processing via inferring the meaning facilitate students’ vocabulary acquisition more than that via mere given meaning directly and explicitly. In other words, giving students word definition directly may deprive them of the opportunities to have deep processing of the words and lead to their ignorance or inattentive browse of the target words. In view of such risk, teachers should always encourage students to infer the word meaning from context before consulting the meaning of the new words in the glosses or dictionary.

Although the current study supports the effects of incidental vocabulary learning, effective vocabulary learning does not just occur in one learning condition (Horst, Cobb, & Meara, 1998; Nation, 2001; Oxford & Scarcella, 1994; Paribakht & Wesche, 1997; Prince, 1996; Tran, 2006). In addition to having students pick up the words incidentally from reading, teachers should still keep in mind that vocabulary learning is an incremental process, in which several encounters of the new words are crucial for vocabulary to take place. Thus, teachers should encourage students to have more exposure to vocabulary and enhance their mental processing of the words by reading extensively and inferring the word meaning from context. To build up learners’ confidence in reading, teachers should also devote some time in class to instructions of the necessary skills, which will help students to handle unknown words from context (Fraser, 1999; Goerse, Beck, & McKeown, 1999; Swanborn & de Glopper, 1999).

The importance of intentional learning should not be ignored. Students should be encouraged to verify the meaning of the unknown words and invest efforts in memorizations of words encountered in reading.

**Future Research**

The results indicate that both meaning-inferred gloss and meaning-given gloss facilitate incidental vocabulary learning, with meaning-inferred gloss outperforming meaning-given gloss. Other aspects of the vocabulary learning can be employed to verify the findings, such as a productive task, various locations of the glosses, and a questionnaire or interview for participants.

The study only measures learners’ receptive knowledge of the target words, so if future study can incorporate both the measurement of learners’ receptive knowledge and their productive knowledge, there will be more significant findings. Also, the present study put gloss subsequent after the target
words with a view to minimize the interruption of reading process. However, it is also suggested that marginal gloss, by having learners read back and forth between the target words in the context and the gloss, can consolidate the form-meaning connection better (Rott and William, 2003). Thus, a future study can explore the effects of meaning-inferred gloss and meaning-given gloss in the margin, at the foot of the page, or at the end of the text, to see whether where gloss occurs has impacts on learners' vocabulary learning. Finally, because the present study investigated the retention of the target words only two weeks after the immediate post-test, a future study can investigate the longer delayed effects to find out if the positive effects on retention that meaning-inferred gloss generates may be absent because of time attrition. It is also suggested that future study employ interview or questionnaire to investigate learners' inferring process in doing multiple-choice gloss and their responses to the use of meaning-inferred gloss in reading.
References


Gloss Types on Vocabulary Learning


作者簡介

林至誠，國立台灣師範大學英語學系，副教授
Chin-cheng Lin is an associate professor of Department of English, National Taiwan Normal University.
E-mail: cclin@ntnu.edu.tw

黃惠敏，國立彰化高級中學，教師
Hui-min Huang is an English teacher at National Chang-hua Senior High School.

收稿日期：96.10.09
修正日期：97.03.27
97.06.20
接受日期：97.06.21
Appendix A  Vocabulary Test

Instructions: Choose the most appropriate word for each blank below.
(The correct answers are marked in bold-faced.)

1. A lot of children in Africa suffered from a ______ of food.
   (A) turbulence    (B) convention    (C) sufficiency    (D) deficiency

2. The responsible manager made good preparations before he ______ at the annual meeting.
   (A) embarked    (B) dazzled    (C) presided    (D) swapped

3. Even a small ______ of land can make a wonderful place for children to play.
   (A) literacy    (B) blockbuster    (C) patch    (D) transaction

4. Success in making money is not always a good ______ of real success in life.
   (A) utensil    (B) premiere    (C) illusion    (D) criteria

5. Because of time limit, the guest speaker ______ the lecture from three hours to two hours.
   (A) formulated    (B) condensed    (C) nominated    (D) dissolved

6. The child had no ______ to study harder because his parents cannot afford him to go to college.
   (A) segment    (B) incentive    (C) counterpart    (D) inhabitant

7. You can’t ______ that he is telling the truth before you have any evidence.
   (A) evacuate    (B) disfigure    (C) presume    (D) defy

8. The chairman ______ all the ideas proposed at the meeting and made a new plan for the project.
   (A) integrated    (B) emulated    (C) anticipated    (D) adored

9. Most students won’t ______ having to stay after school for extra work.
   (A) complement    (B) relish    (C) interfere    (D) lament

10. The ______ woman makes a good leader and leads the team to go through the difficulties.
    (A) implicit    (B) resolute    (C) municipal    (D) pathetic

11. Most cities ______ water through chemicals and rocks to make it pure.
    (A) oblige    (B) radiate    (C) narrate    (D) filter

12. It is so kind of you to forgive him and ______ good for evil.
    (A) poach    (B) plunge    (C) render    (D) shatter
13. The boy studies harder under the ______ of praise from his parents.
   (A) stimulus  (B) tactic  (C) vapor  (D) miser

14. Political ______ between the two neighboring countries made the area trapped in wars.
   (A) ornament  (B) inquiry  (C) friction  (D) juvenile

15. Having a good ______ for learning languages, he speaks several foreign languages well.
   (A) faculty  (B) hazard  (C) elite  (D) destiny

16. Because there are five lakes within a ______ of fifty miles in the area, farmers can easily get water for irrigation.
   (A) descendant  (B) radius  (C) concession  (D) blunder

17. In my class, students are usually encouraged to ______ rules from a collection of examples.
   (A) assassinate  (B) emigrate  (C) designate  (D) generalize

18. A ______ examination on your English proficiency is required before the job interview.
   (A) preliminary  (B) distorted  (C) masculine  (D) luxurious

19. Nowadays, a lot of women play ______ roles as career woman and mother.
   (A) martial  (B) notorious  (C) liable  (D) dual

20. Out of anger and disappointment, he ______ his son's face.
   (A) smacked  (B) mingled  (C) restrained  (D) quivered
Appendix B

Reading Passage Examples

Traditional Education (Meaning-given Gloss)

Compared with contemporary (adj. 當代的) education, the education of centuries ago put more emphasis on students’ ethical (adj. 道德的) development than on academic performance.

One of the greatest educators, Confucius, had a special philosophy about teaching. He would set a particular criterion (n. 標準) for each student, since he was emphatic (adj. 強調的) that every student was presumed (v. 假設) to be an individual with specific traits. Instead of teaching in an imperative manner, he would create incentive (n. 誘因) for learning through everyday experiences. Confucius used what was happening around the students to overcome (v. 克服) their differences and to stimulate them to think independently. Different experiences would be used to foster their faculty (n. 能力) for solving problems. His pupils could also relish (v. 喜愛) learning by pondering (v. 考慮) the philosophy of life and integrating (v. 整合) the knowledge they had gained. Students generalized (v. 归納) their learning and built a correct outlook on life with the stimuli (n. 刺激) provided by their teachers. However, academic learning was not the only thing. Using what they had learned and being orderly were the first priorities (n. 優先的事物) of learning in the old days.

In addition, the pupils in the old days might not have been able to pay the tuition due to a deficiency (n. 缺乏) of money. To repay their teachers’ efforts, students rendered (v. 回報) great respect to them and achieved their goals in life.

Traditional Education (Meaning-inferred Gloss)

Compared with contemporary (adj. (A) 當代的(B) 當代的(C) 教條的) education, the education of centuries ago put more emphasis on students’ ethical (adj. (A) 道德的(B) 藝術的(C) 哲學的) development than on academic performance.

One of the greatest educators, Confucius, had a special philosophy about teaching. He would set a particular criterion (n. (A) 目標(B) 標準(C) 步驟) for each student, since he was emphatic (adj. (A) 確信的(B) 擔憂的(C) 強調的) that every student was presumed (v. (A) 假設(B) 注定(C) 對待) to be an individual with specific traits. Instead of teaching in an imperative manner, he would create incentive (n. (A) 目標(B) 誘因(C) 奇蹟) for learning through everyday experiences. Confucius used what was happening around the students to overcome (v. (A) 接受(B) 克服(C) 忽略) their differences and to stimulate them to think independently. Different experiences would be used to foster their faculty (n. (A) 才能(B) 潛力(C) 自信) for solving problems. His pupils could also relish (v. (A) 提供(B) 利用(C) 喜愛) learning by pondering (v. (A) 利用 (B) 考慮(C) 評估) the philosophy of life and integrating (v. (A)
吸收(B)排除(C)整合) the knowledge they had gained. Students generalized (v. (A)歸納(B)促進(C)引導) their learning and built a correct outlook on life with the stimuli (n. (A)懲罰(B)獎勵(C)刺激) provided by their teachers. However, academic learning was not the only thing. Using what they had learned and being orderly were the first priorities (n. (A)優點(B)優先的事物(C)缺點) of learning in the old days.

In addition, the pupils in the old days might not have been able to pay the tuition due to a deficiency (n. (A)缺乏(B)挑戰(C)富足) of money. To repay their teachers’ efforts, students rendered (v. (A)虧欠(B)保留(C)回報) great respect to them and achieved their goals in life.
字義推測與直接翻譯對非刻意字彙學習之比較研究

林至誠 黃惠敏
國立台師大大學英語系 國立彰化高級中學

摘要

本文探討「多選推測字義提示」與「單一翻譯字義提示」是否對詞彙學習有所差異，同時也探討語言程度是否會影響此兩類字義提示之詞彙學習。研究對象為台灣中部某高中學生共 175 名，由該校兩班高三（程度高組）、兩班高一（程度低組）組成，其中高三及高一各一班為「推測」組，另一班則為「翻譯」組。本研究先從兩篇閱讀文章中，每篇挑出 10 個目標詞彙共 20 個，以測量詞彙學習；在「推測」組的文章裡，每個目標詞彙後會有三個中文選項供學生選擇，而在「翻譯」組的文章中，目標詞彙後僅出現該詞彙之單一中文翻譯。所有學生都重複接受同一詞彙測驗三次，即前測、立即後測、延宕後測，每次題目及選項的順序不同；之後，再以雙因子變異數分析資料。結果顯示這兩種字義提示對學生之非刻意詞彙學習都有幫助，而「多選推測字義提示」強於「單一翻譯字義提示」；至於語言程度的高低對詞彙學習及習得的成效則不顯著。

關鍵字：字義提示，非刻意字彙學習，翻譯字義提示，推測字義提示，語言程度