CHAPTER 5

DISCUSSION

This chapter presents the discussion on the results of the three research questions. The current results will be discussed in the following sections:

5.1 Vocabulary Acquisition and Retention

5.2 The Relationship between Look up Behavior and Levels of Vocabulary Acquisition and Retention

5.3 The Students' Attitudes towards the Provision of Lexical Information in the CALL Reading Package

5.1 Vocabulary Acquisition and Retention

In this study, the extent of students' vocabulary acquisition and retention after using the CALL reading package was investigated in terms of incidental word learning when word meanings and related lexical information were provided in the form of look up options during the reading comprehension process. In order to measure vocabulary acquisition, a vocabulary test was used immediately after the reading treatment and two weeks later to measure vocabulary retention.

Regarding vocabulary acquisition, the findings show that the percentages of words gained immediately after the reading treatment ranged from 49% to 71%. On average, 63% of all the words tested were remembered immediately after the reading treatment (See Table 4.1, p.33). Moreover, this study further expanded investigation in the area of vocabulary retention two weeks after the reading treatment. The range of vocabulary retention was from 18% to 23%. On average, the percentage of vocabulary retention two weeks after the reading treatment was 20% (See Table 4.2, p.34). It is notable that vocabulary knowledge retention two weeks after the reading treatment was lower than when assessed immediately after the treatment. An overall trend of vocabulary loss over a period of two weeks was evident (See Table 4.3, p.35).

In order to compare the results of this study with previous studies, it is important to note the findings of those that did and did not provide dictionaries, glosses and multimedia annotations. There were previous studies examining the extent of word knowledge gained after the reading treatment by using context to determine the meanings of unknown words. Shu et al. (1995) found the average percentages gained in knowledge of unknown words were 8% for Chinese students and 10% for American students when they learned vocabulary from context. Hulstijn et al. (1996) also reported that 5% of unknown words inferred from contexts during the reading task were remembered immediately after reading. When compared with the findings of Shu et al. (1995) and Hulstijn et al. (1996), clearly, the percentages of word knowledge gained in the present study were considerably higher.

There were previous studies investigating the effect of dictionaries, glosses, computerized dictionary and multimedia word annotations on vocabulary acquisition and retention. Hulstijn et al. (1996) found that 3% of words looked up in a paper dictionary were provided correctly on recognition tests immediately after reading. Knight (1994) found that after looking up unknown words in an online dictionary, learners remembered 20% of tested words immediately after reading and retained 14% of tested words two weeks later. Comparing the present findings to the findings found in these two previous studies, it is obvious that the amount of vocabulary acquisition in the present study was greater. Furthermore, the amount of vocabulary retention found in the present study was higher (20%), especially when compared to the study by Knight (14%).

In terms of the marginal glosses, Hulstijn et al. (1996) pointed out that 18% of words with L1 translation provided in the marginal glosses were recalled immediately after reading. The percentage of vocabulary acquisition (63%) found in the present study when compared with the Hulstijn et al.'s findings (18%) was much higher.

In the area of a computerized dictionary, Laufer and Hill (2000) discovered that after looking up word meanings, Israeli students who frequently selected the L1 translation option (meanings in Hebrew) remembered 33.3% of unfamiliar words whereas Hong Kong students who primarily selected the L1 translation option (meanings in Chinese) remembered 42% of unfamiliar words tested immediately after

reading. The students in the present study outperformed the subjects in the study by Laufer and Hill (2000).

As for multimedia annotations, Chun and Plass (1996) reported that students overall acquired 77% of unfamiliar words immediately following reading of the text, and retained 77.1% after two weeks for all three types of annotations. That is, words with textual annotation (75.1% in the immediate and 75% in the delayed tests), words with pictures + textual annotation (76.2% and 81%), and words with videos + textual annotation (81.4% and 77.2%). It can be seen that the students in the study by Chun and Plass (1996) outperformed the students in the present study in both vocabulary acquisition and retention. The study by Al-Seghayer (2001) also showed that 87% for words with video and text (English definition) annotation, 67% for words with picture and text, and 53% for words with text alone were recalled immediately after reading.

It is worth noting that the percentage range of vocabulary knowledge of the present study was lower than that discovered by Chun and Plass (1996) and Al-Seghayer (2001). This can be explained by the fact that these previous studies provided students with words in various modalities such as printed text, pictures, and video clips whereas the present study provided students with only lexical information in separate look up options. The previous studies discovered that words with text definition coupled with still pictures, and words with text definition coupled with video clips were remembered better than words with text definition only. The dual coding theory is a reasonable explanation. Chun and Plass (1996) pointed out that visual traces were remembered better than verbal modes. Therefore, words that were annotated with both verbal and visual modes of information were remembered better than words annotated only with the verbal mode, namely definition only. However, it can be said that the comparison of the present study's findings to the above previous studies makes a strong case for providing word meaning. Providing word meanings during the reading comprehension process can better enhance vocabulary acquisition than inferring word meanings from the context through reading.

In addition, difference between the results in this study and those in the previous studies could be explained in terms of the use of different media types that fostered vocabulary acquisition while reading. It might be that since media types used such as dictionaries, marginal glosses, and multimedia annotations were different,

various extents of vocabulary acquisition and retention occurred. Thus, it might be said that although the difference in the use of media types might partly influence the differences in the extent of vocabulary acquisition and retention, each media type had a positive effect on incidental vocabulary learning during the reading tasks in both short-term and long-term retention.

Furthermore, it is interesting to see that a trend of word loss in long-term memory was found in both the present study and the previous studies. On the contrary, Chun and Plass (1996) found a different result—the scores for the delayed tests two weeks later were slightly higher than the scores for the immediate tests. They mentioned that a possible reason was that the story that learners read in the experiment might be discussed in the classroom. That is, the students' further exposure to the text and the words might result in better retention. In the present study, the students seemed to forget most acquired word meanings after two weeks. One possible reason why percentages of vocabulary acquisition and retention were significantly different might be that students did not commit further effort to memorize the word and its meaning when they looked it up. They concentrated more on answering reading comprehension questions. This seems to suggest that the additional practice opportunities are desirable between training and testing to support long-term retention of vocabulary (Johnson, 1997).

It should be acknowledged that the percentages of vocabulary knowledge gained two weeks after the reading treatment when compared with those gained immediately after the reading treatment were considerably lower. However, the percentage of the students' vocabulary retention (20%) found in the present study was sizable when compared with the previous studies (Knight, 1994; Shu et al., 1995; Chun & Plass, 1996; and Hulstijn et al., 1996). Thus, it might be said that in the current study, the encounter with unfamiliar words with provision of lexical information in the reading text seemed to have some reasonable effect on the students' long-term vocabulary knowledge. That is, when the students faced unfamiliar words in the reading text and looked up their lexical information while reading, they seemed to be able to retain that lexical information they looked up in long-term memory.

It is important to note that in the present study, three possible factors might have contributed to vocabulary acquisition and retention. The first factor was the provision of lexical information for word learning in the CALL reading package although the effect of provision of lexical information on long-term vocabulary retention was less impressive than on immediate vocabulary acquisition after the reading treatment. When students encountered unknown words in a reading text, they occasionally ignored those words or failed to guess word meanings from context (Hulstijn et al., 1996). In this case, the provision of lexical information of unknown words was helpful. In this study, the provision of lexical information could encourage students to look up word meanings because it was easily accessible. That is, the provision of lexical information for word learning was at hand. The students just clicked on any highlighted word and chose lexical information anytime they wished. In addition, the CALL reading package provided the students with various types of lexical information, so they could select the type of lexical information that they considered most suitable for comprehending the reading texts and which felt most comfortable and helpful for them to understand and remember word meanings (Laufer and Hill, 2000).

The second factor that affected acquisition and retention of word meanings in this study was the reinforcement comprehension exercises. In vocabulary acquisition, Schmitt and McCarthy (1997) suggest that one way to engage learners in deeper processing is through a task in which learners are engaged with the particular input until its meaning is clearly understood. Each reading text in the CALL reading package was followed by a series of reading comprehension exercises, which tended to involve the understanding of the meanings of unfamiliar words. It might be said that vocabulary knowledge gained seems to be partially attributable to the effect of doing reinforcement comprehension exercises.

The third factor that influenced vocabulary acquisition and retention was input enhancement. As Chapelle (1998) pointed out, CALL materials, which aroused learners to notice target language input by highlighting it, positively influenced learners' acquisition. Furthermore, conditions for noticing that lead to retention of what is noticed can be easily done in CALL reading materials (Hegelheimer and Chapelle, 2000). CALL reading materials might provide students with conditions for

noticing by highlighting unknown lexical items which learners should be expected to notice in order to draw their attention to input. Accordingly, in this study unfamiliar words were made salient by being highlighted in red color. Students might have perceived an importance of those unfamiliar words and might have paid more attention to those words. This might affect the increasing amount of vocabulary acquisition and retention. This finding was confirmed by the study by De Ridder (2000). She indicated that the highlighted words attracted the readers' attention, and the amount of vocabulary incidentally learned by readers was affected by the highlighted words. The current finding also confirms the finding of Laufer and Hill (2000) who claim that input enhancement is partly attributable to the better results compared with those found by Knight (1994) and Hulstijn et al. (1996) who did not make unfamiliar words salient.

In brief, the descriptive statistics revealed that the intermediate EFL Thai students acquired 63% of the tested words immediately after the reading treatment when word meanings were provided during the reading comprehension process. However, a great number of acquired words decreased after two weeks. The students retained 20% of the tested words two weeks after the reading treatment. It can be said that the provision of lexical information for word learning may facilitate vocabulary acquisition and retention during the reading comprehension process.

5.2 The Relationship between Look up Behavior and Levels of Vocabulary Acquisition and Retention

The result concerning the second research question involving the relationship between look up behavior of the students and levels of vocabulary acquisition and retention will be discussed in three aspects: 1) the relationship between the number of words looked up and the vocabulary acquisition and retention scores, 2) The relationship between the frequency of looking ups and the vocabulary acquisition and retention scores, and 3) look up types and levels of vocabulary acquisition and retention.

First, the current study found that there was a weak but positive correlation between the number of words looked up and the vocabulary acquisition and retention scores ($r = .397$, $p < 0.01$ for acquisition, and $r = .262$, $p < 0.05$ for retention; see Table 4.4, p.37). Based on the view that if more words are looked up, then more correct answers will be given on vocabulary tests (Chun & Plass, 1996), these current results mean that students who looked up more words tended to acquire and retain word meanings better than those who looked up fewer words. These findings were consistent with the result of Knight (1994) who also found a positive correlation between the number of words looked up and scores on the vocabulary and recall measures for the low ability group. As for a large number of word looked up, it might be possible that the students might have inadequate vocabulary knowledge when they had to read for comprehension and when they might think the unfamiliar words were relevant in the context of their reading goal, so they looked up those unfamiliar words. In the same way, Hulstijn (1993) found that foreign language readers looked up meaning of unfamiliar words when their goal was to answer comprehension questions, and those words were relevant in terms of reaching their reading goal. Thus, though the number of words looked up did not correlate strongly with scores on immediate and delayed vocabulary tests, it might be said that the relationship between the number of words looked up and scores on immediate and delayed vocabulary tests was noticeable. That is, students who had insufficient vocabulary knowledge and tended to look up more word meanings of unfamiliar words in a CALL dictionary while reading for comprehension were likely to learn more words in short-term and long-term retention.

Second, the weak but positive relationship between the frequency of looking ups and vocabulary acquisition and retention scores was also found in the current study ($r = .414$, $p < 0.01$ for acquisition; $r = .280$, $p < 0.01$ for retention; see Table 4.6, p.39). These current results were consistent with the results of Laufer and Hill (2000) discovering the significant but low correlation between the number of selections and scores on immediate vocabulary test in Israeli group. The results of the present study can be reasonably explained by the fact that the CALL reading package provided students with an opportunity to reread the text and click on unfamiliar words any time they wished. On average, each word was looked up 3.7 times (See Table

4.5, p.38). They might look up word meanings in order that they could answer comprehension questions correctly. The results could be explained in terms of students' attention. The more frequently students looked up unfamiliar words, the greater they gave their attention to the unfamiliar words. Research by Laufer and Hill (2000) suggests that learners who attended to the words several times remembered them better than words they attended to only one time. That is, looking up a word more than once assisted learning of a word. Therefore, even though the frequency of looking ups did not correlate well with scores on immediate and delayed vocabulary tests, there was a noticeable positive relationship. It can be said that the students who are more attentive to vocabulary feel unfamiliar with and looked it up more than once, tend to remember more words when they perform both immediate and delayed vocabulary tests.

Third, with regard to types of lexical information looked up by the students, it was initially expected that each type of lexical information could assist students in reading, and that students would be willing to look up various types of lexical information. On the contrary, the students selected the meaning in Thai option more than other options although multiple lexical information options were available. A small number of students in this study accessed meaning in English, synonym/antonym, and contextual example of word use options (8%, 5% and 1% respectively). Lomicka (1998) and Laufer and Hill (2000) who observed learners' look up behavior also found a similar look up preference with participants in their studies. Participants in Lomicka's study read the text with access to full glosses providing French definition, images, references, questions, pronunciation, and English meanings and consulted L1 translation (meaning in English) more frequently than L2 definitions (French) for text comprehension (Lomicka, 1998). Likewise, Israeli students showed a considerable preference for L1 translation, namely Hebrew meanings (Laufer and Hill, 2000). However, the current results did not confirm the observation made by Chun & Plass (1996) who reported that learners looked up multiple annotations when different types of annotations for vocabulary were available. According to the findings of the current study, it is worth noting that the meaning in Thai is students' primary source of information during a reading process. That is, intermediate EFL Thai students were interested in L1 translation while

reading for comprehension. They might think the meaning in Thai aided reading comprehension. It could be said that to facilitate comprehension in an English reading text, students prefer the meanings in Thai to English definitions. There seems to be one possible explanation why all subjects predominantly looked up L1 translation rather than other lexical information of words. Although Thai students have been trained to use monolingual dictionaries in high school, they might prefer English-Thai dictionaries for reading English texts. At the university level, it may be said that only English majors are trained and intensively encouraged to use monolingual dictionaries. The subjects in this study are non-English majors, so it is less likely that they are trained to use monolingual dictionaries in an English class in the university. In addition, it is possible that for them an English definition of an English word is much more difficult to understand than a meaning in Thai. Moreover, the current study found that students tended to ignore related lexical information options: synonym/antonym, and contextual example of word use. A very small number of the students selected synonym/antonym, and contextual example of word use options (5% and 1% respectively). This might be because students were informed at the beginning of the experiment that the purpose of the reading was to comprehend a reading text as a whole, so they might not consider it necessary to look up the related lexical information of unfamiliar words while reading for comprehension.

It is interesting to note that the records of look up behavior in log files showed almost half of the students (42.4%), classified as L1+ group, selected L1 translation (meaning in Thai) with the pronunciation of the words, which is the related lexical information of the words the students selected the most. It should be acknowledged that the pronunciation did not appear to directly aid reading comprehension (Lomicka, 1998), but 42.4% of the students selected the meaning in Thai option together with the pronunciation option. It is apparent that they realized that it was useful to hear the pronunciation of unfamiliar words. According to the questionnaire responses, the students considered the pronunciation of words as a means for vocabulary acquisition and retention (See Table 4.15, p.50). They gave reasons for selecting the word pronunciation option with statement such as, *"I want to know how the words are pronounced." "I want to practice pronouncing the words." and "Hearing word pronunciation helps me remember word meanings."* It is reasonable to think that

students selected to listen to the pronunciation of English words as an aid to vocabulary learning. This study's finding supported Laufer and Hill's (2000) speculation in the importance of the provision of auditory information for vocabulary acquisition. They speculated that a combination of written form of a word and its audio information might enhance short-term retention of vocabulary because manipulating the written form of a word and its pronunciation at the same time, as L1+ group did in this study, was one way of building referential connections of the written form and the meaning of the word. These findings indicate that intermediate EFL Thai students like to hear the pronunciation for vocabulary learning while reading.

Another result concerning look up behavior of students also deserves mentioning—the comparison between levels of vocabulary acquisition and retention of L1 and L1+ types. No significant difference of vocabulary acquisition and retention between the L1 group and the L1+ group was found in this study (See Tables 4.10 and 4.11, pp.44-45). The results could be explained in terms of students' look up behavior. Students in L1 and L1+ types showed the similar look up preference while reading, namely L1 translation only and L1 translation together with some related lexical information. They might use mainly Thai meanings of unfamiliar words to aid both reading and vocabulary comprehension. Therefore, their vocabulary knowledge after the reading treatment might be at a similar level. Furthermore, the loss of vocabulary knowledge in long-term memory was revealed. That is, the scores on the delayed vocabulary test were significantly lower than scores on immediate vocabulary tests for both L1 and L1+ students (See Tables 4.8 and 4.9, pp.42-43). It would be reasonable to think that L1 translation seems to result in shallow processing. L1 translation might provide students with vocabulary knowledge needed for comprehending the text content, so it was stored in short-term memory, but it might not be kept in long-term memory. Besides, according to the available data, it may be implied that looking up word meaning in L1 translation together with auditory information, namely a pronunciation of a word, is not more effective than looking up L1 translation exclusively. This could be attributed to the fact that hearing word pronunciation was more effective in learning vocabulary pronunciation than in

helping the students to retain vocabulary knowledge in short-term and long-term memory.

In summary, in terms of the relationship between look up behavior of the students and levels of vocabulary acquisition and retention, the current study discovered that the students who tended to look up more word meanings of unfamiliar words during the reading process were likely to acquire and retain more word meanings after the reading treatment. Also, the students who looked up lexical information more frequently during the reading process tended to memorize more word meanings. In addition, intermediate EFL Thai students preferred looking up the meaning in Thai for text comprehension and hearing the pronunciation for vocabulary learning while reading. However, looking up L1 translation only and looking up L1 translation with the pronunciation and other related lexical information during a reading process fostered the identical level of short-term and long-term vocabulary retention.

5.3 The Students' Attitudes towards the Provision of Lexical Information in the CALL Reading Package

From the attitude measures, the present study found that the students' attitudes were positive towards the provision of various types of lexical information in the CALL reading package after using it. The questionnaire results were discussed as follows:

As for items 1-5, it is obvious that the students perceived that vocabulary knowledge is an important factor in reading comprehension (See Table 4.12, p. 47). The current results confirmed a survey made by Krajangsirisin (2001), who found that First Year students at Prince of Songkla University, Hat Yai campus thought vocabulary was an important element in learning English. One possible reason why they showed favorable attitudes towards the provision of lexical information might be that they were aware that they did not possess adequate vocabulary knowledge and encountered difficulties while reading.

With respect to the questionnaire results in Table 4.13 (p.48), it is notable that the students showed favorable attitudes towards the provision of lexical information in two main areas: to assist reading comprehension process, and to enhance vocabulary acquisition and retention. First, the students realized that the provision of lexical information positively motivated them to continue reading and help them understand the content of the reading texts more easily. It could be said that since word meanings and related lexical information of the unknown words were provided during the reading task and the access to word meanings and other lexical information of the unknown words was faster than referring to a paper dictionary, the students were satisfied with the provision of various types of lexical information during the reading comprehension process. Secondly, the students believed that the provision of lexical information was a way of enhancing vocabulary acquisition and retention. The students might see that they were able to provide correct answers on the immediate vocabulary tests and the delayed vocabulary tests because of lexical information provided in multiple look up options during the reading process. Hence, it can be assumed that the students perceived the provision of lexical information as being useful and applicable to their reading comprehension process and vocabulary acquisition and retention.

Based on the responses to items 2.1-2.3, it is interesting to note that the students expressed that learning vocabulary by using the multiple lexical information options provided was likely to make them worried about the reading time (See Table 4.14, p. 49). The students saw that consulting multiple lexical information options wasted their time and made them spend more time reading. It is likely that they thought it was time-consuming in consulting the entire look up options provided. Accordingly, they mainly looked up only L1 translation and the pronunciation. Although the students were aware of the effect of the use of multiple lexical information options on reading time, it seems that the students' concern do not lead to a negative attitude towards learning vocabulary by using multiple lexical information options provided. It seems reasonable to think that this might be because normally, the students consulted a dictionary to get word meanings when they encountered unknown words in a reading text.

It is also notable that the students believed that the provision of lexical information helped them learn and retain vocabulary. However, according to the questionnaire results in items 3.1-3.5, they thought the meaning in Thai and the word pronunciation rather than the meaning in English, the contextual example of word use, and synonym/antonym helped them acquire and retain vocabulary (See Table 4.15, p. 50). This result was consistent with their look up behavior as recorded in computer log files showing that the students selected more the meaning in Thai and word pronunciation options than the other three options. As they mentioned, the reason for selecting the meaning in Thai option was that the meaning in Thai was easy for reading and understanding, and the reason for selecting the pronunciation was that it helped them retain word meanings. It may be said that the students selected the type of lexical information they felt most comfortable with and considered it helpful for reading and vocabulary learning.

The students' general attitudes to the CALL reading package was positive (See Table 4.16, p. 51). They assumed that they would study this CALL package if it was available in the future. One possible reason was that since the CALL reading package is a self-study material, the students might feel more independent when using the package. They could find word meanings and other lexical information easily and constantly without asking others to help them and referring to other sources. From the results in items 4.1-4.3, it can be concluded that the students were satisfied with the CALL reading package after using it.

Furthermore, when the students were asked to write comments on the CALL reading package, 67% of the questionnaire respondents commented positively on it and recommended further improvement of the package design (See Table 4.17, p. 52). Clearly, because of the provision of lexical information, the students found the package motivated them to read. It is likely that since the students perceived that generally, the CALL reading package was motivating and appealing, they showed a favorable attitude to the package. Based on responses, it is interesting that positive attitudes and comments were made regarding the provision of lexical information for word learning provided in the form of look up options. The students commented on the package's potential to be a useful self-study tool, which was useful for improving reading comprehension, vocabulary knowledge and general English.

In sum, since the students in the current study were satisfied learning vocabulary through the CALL reading package and believed that the provision of lexical information for word learning fostered their vocabulary acquisition and retention, the current findings suggest that the provision of lexical information in the CALL reading material can have a positive short-term and long-term effect on vocabulary growth.