



*Malaysian Journal Of ELT Research*

**ISSN: 1511-8002**

*Vol. 7 (1), 2011*

**Comparing Listening and Vocabulary Enhancement Activities  
for Vocabulary Acquisition and Retention**

**ANDREA LITTLE**

*Tokyo University of Pharmacy and Life Sciences*

*Japan*

&

**KAORU KOBAYASHI**

*Tokyo University of Agriculture*

*Japan*

Abstract

The present study, based on Min's study (2008), seeks to compare the effectiveness of reading plus focused-listening activities (RL) and reading plus vocabulary-enhancement activities (RV) in vocabulary acquisition and retention among college-level EFL students. Sixty academic vocabulary items were chosen from four texts in a content-based textbook to be learned by 30 Japanese sophomores with intermediate-level English proficiency. The participants were divided into two groups each receiving one of the treatments over 6 weeks while reading the four texts. The RL group listened and answered questions about

thematically-related materials utilizing the 60 target words and the RV group practiced a variety of vocabulary exercises targeting the words. The participants' progress was evaluated by pre- and post- tests conducted immediately before and after the treatment, and by a delayed-post test given after 12 weeks. These tests utilised a modified version of Paribakht and Wesche's (1997) Vocabulary Knowledge Scale. The results of statistical analyses show that although the RV treatment was superior to the RL treatment in vocabulary acquisition, the RL treatment was found to be more effective in retention. The researchers conclude that both treatments can enhance vocabulary learning among college-level EFL students and provide suggestions for incorporating listening in vocabulary learning.

**KEYWORDS: Vocabulary acquisition, vocabulary retention, intentional learning, incidental learning, listening activity**

## **Introduction**

Reading instructors are often asked by their L2 students for advice about the best way to learn vocabulary. Building vocabulary knowledge is an essential part of second language acquisition, and instructors not only need to provide ways that integrate intentional/explicit learning of vocabulary and incidental/implicit vocabulary learning (Nation, 2001), but also explore ways that are effective, efficient, and fit learners' conceptions of what works best for them. To better support these needs instructors may need to provide explicit vocabulary instruction as well as find opportunities for learners to be exposed to vocabulary through contextualized-input, such as extensive reading or listening.

Two observations from our EFL classes have prompted us to explore the effectiveness of listening for vocabulary acquisition and retention. First, during listening tasks not only do some L2 learners appear to pick up new vocabulary items, but they are also able to recall and use these items in later classes, suggesting that listening can result in incidental learning and may lead to both vocabulary acquisition and retention. Second, when our L2 learners are required to select a self-study project, many choose listening to podcasts in English, rather than reading, as a way of enhancing their English skills. Self-report feedback from these learners indicates they find listening effective for vocabulary learning from context. This suggests that listening has high saliency and efficacy with some learners as a way to build lexical knowledge.

A recent study by Min (2008) compared an intentional vocabulary learning treatment with an incidental treatment to see which was more effective for gaining and retaining lexical knowledge in an instructed language context. Laufer and Hulstijn (2001) define incidental learning as ‘learning without an intent to learn, or learning of one thing, for example vocabulary, when the student’s primary objective is to do something else’ (p. 10). Min found reading plus vocabulary enhancement activities (RV) were far superior to reading plus narrow reading (NR) for EFL vocabulary acquisition and retention. Since increasingly our students are not interested in extensive reading but are interested in listening, we wondered how narrow listening would compare with vocabulary enhancement activities. In our study, we will compare reading plus the instructional

treatments of focused listening (RL) and vocabulary enhancement activities (RV) based on Min's framework. This paper will first summarize Min's study before examining the relevant literature and presenting the study.

### ***Hui-Tzu Min's study***

In a study in Taiwan using 50 male secondary school English as a Foreign Language (EFL) learners, Min (2008) compared the effectiveness of reading plus focused vocabulary exercises (RV) and reading plus repeated reading of thematically-related materials (NR) to see which treatment was more effective for vocabulary acquisition. In conducting the study, Min's purpose was to contribute more empirical evidence to the growing body of research (Laufer, 2003; Rott, 1999; Waring & Takaki, 2003) demonstrating the superiority of reading in an enhanced condition (i.e., reading plus vocabulary enhancement exercises) over reading-only for lexical growth. Min's study found that in instructed language contexts, reading plus tasks for explicit learning of vocabulary led to significantly greater gains in acquisition and retention, for both receptive and productive vocabulary knowledge, than reading plus narrow reading.

In Min's study, both treatment groups received 10 hours of formal instruction (2 hrs/week for 5 weeks). During class time the groups read each of the four main texts on two themes and participated in various reading-related activities, such as discussion and

answering questions. The main texts were authentic articles on themes considered motivating to the participants, and the articles' linguistic difficulty was carefully controlled so that the new words comprised less than 3% of the total words. The 50 target items, all unfamiliar to the participants prior to the study and 'cognitively challenging', were distributed across the four texts and appeared in boldface to ensure noticing. For each text, both groups completed reading comprehension questions for homework, and these were checked in class the following week. From this point on, the activities for each group differed.

The RV group did several vocabulary exercises that used each target word 3-4 times and exploited both receptive and productive knowledge of the words. Using Paribakht and Wesche's (1997) typology, the exercises included recognition exercises, such as matching target words with definitions, and production exercises, such as writing the L1 equivalents for target words, open cloze exercises, and reordering words to form sentences. The answers were checked with the instructor before beginning the next main text and repeating the same instructional cycle for the remaining 4 weeks. In contrast, after the NR group checked the homework, the students were further exposed to the target vocabulary by reading 2-3 thematically-related texts in which each target word appeared 2-3 times. These texts had been compiled and composed for this purpose. To simulate a natural setup, the students were not required to do any reading-related activities or answer comprehension questions on the supplemental texts. After reading them, the group moved on to the next main text, repeating the same instructional cycle.

To measure the participants' acquisition and retention of the 50 target items, Min administered a modified version of Paribakht and Wesche's (1997) Vocabulary Knowledge Scale (VKS) as a pre-test before the instructional treatments, a post-test immediately after the treatments, and a delayed test three months later. Both groups had similar pre-test scores, but subsequent test results showed vocabulary gains varied according to instructional treatment and time of assessment. Although both treatments resulted in acquisition and retention, the RV group gained ( $M = 36.24$ ) and retained ( $M = 17.52$ ) significantly more lexical knowledge than the NR group (acquisition:  $M = 24.64$ ; retention:  $M = 13.04$ ). The delayed test, or retention test, revealed significant word knowledge decay, with most receptive and productive knowledge becoming partial word knowledge; however, the RV group showed more decay than the NR group. Although a follow-up survey showed both groups felt their instructional treatment had been helpful, Min concludes that in instructed settings reading plus vocabulary-enhancement activities are far more effective and efficient than reading plus narrow reading.

## **Literature review**

### ***Limitations of learning vocabulary incidentally through reading***

Although extensive reading is widely acknowledged as having numerous benefits for improving language proficiency, some SLA research challenges the effectiveness and efficiency of extensive reading for incidental acquisition of L2 vocabulary in instructed contexts. For example, studies of L2 readers found very small gains in vocabulary acquisition from reading both short and long texts (Horst, Cobb, & Meara, 1998; Zahar, Cobb, & Spada, 2001). Other researchers, such as Laufer (2003), question some of the core assumptions about vocabulary acquisition from extensive reading, including learners' ability to notice unknown words, their ability to infer word meaning correctly from context, and the number of exposures necessary for successful acquisition. Research by Laufer and Yano (2001) found learners do not always recognize when words are new and tend to over-estimate their understanding of words. If learners do recognize a word is unknown, and attempt to guess the meaning from context, they need to know 95-98% of the words in the text to do so accurately (Hirsh & Nation, 1992; Laufer, 1997). In addition, for successful guessing, the text must provide clear clues (Saragi, Nation, & Meister, 1978). However, learners will not always bother with guessing (Pigada & Schmitt, 2006). Regarding the number of exposures needed to acquire and retain new vocabulary items, there is little agreement. Estimates range from 6 exposures (Rott, 1999) to 10 or more (Pigada & Schmidt, 2006; Webb, 2007), with Waring and Takaki (2003) reporting more than 20 encounters may be required. How many encounters are necessary may also depend upon the learner's proficiency level (Zahar et al., 2001). Finally, according to Hill and Laufer (2003), to increase vocabulary size by 2000 words, second language learners would need to read more than 8 million words of text. All this indicates

incidental acquisition from extensive reading is a time-consuming, labour-intensive process.

### ***Learning vocabulary incidentally through listening***

Although many studies have examined incidental vocabulary learning from reading, apart from studies with L1 and L2 children investigating vocabulary acquisition from listening to stories (Elley, 1989, 1991; Schouten-van Parreren, 1989), few studies have examined L2 vocabulary acquisition through listening. Brown, Waring and Donkaewbua (2008) examined the rate at which Japanese EFL students learned vocabulary from reading, reading-while-listening, and listening-only. They found the reading-while-listening mode produced the greatest gains (4.38 of 28 words), and the listening-only mode produced the smallest gains (0.56 of 28). After 3 months, a meaning-translation test showed that at most students retained only one word, whereas a prompted multiple-choice test showed higher learning and retention rates. Brown et al. surmise the poor scores for the listening-only group might indicate learners listen at a lower headword level than they can read.

Drawing on research on the importance of phonological loops and working memory for acquiring both novel and FL vocabulary (Papagno, Valentine, & Baddeley, 1991), Vidal (2003) studied the effect of lecture comprehension on vocabulary acquisition. In Vidal's study, Spanish EFL students listened to three 14-15 minute academic lectures on



syllabus-related topics. Pre-, post-, and delayed tests of 36 vocabulary items over a 4-week period indicated aural contexts have positive implications as listening to lectures resulted in vocabulary acquisition ( $M = 30.41$ ) and some retention ( $M = 16.14$ ). She found a significant interaction effect between vocabulary acquisition and EFL proficiency, with more proficient learners gaining, and losing, more lexical knowledge than weaker learners. The study also found occurrence frequency and gain were positively correlated. Citing Toya (1992), who found explicit word elaborations have a significant effect on vocabulary gain, Vidal concludes that although proficiency level is important for gain, for retention information must be processed more deeply to enable transfer to and storage in long-term memory.

Little (2007) examined whether listening and generative tasks could enhance incidental L2 vocabulary acquisition and retention. The generative model assumes when learners actively generate or elaborate on target items read in a text, better retention occurs as new and known information is integrated (Wittrock, 1974, cited in Joe, 1998). Little found listening to and retelling twelve 3-5 minute stories helped high proficiency Japanese EFL learners acquire 300 target words in two weeks and aided in retention over four weeks. Little constructed and recorded stories for this purpose because research shows it takes less time to learn associated words in a story line (Nation, 2000), and experiments by Craik and Tulving (1975) found building semantic links enhances memory performance because words are encoded more elaborately. Post-test and delayed-test results showed stories aided acquisition ( $M = 184$ ) and retention ( $M = 176.5$ ), with the most proficient

students gaining and retaining the most. Little concluded encountering target words in a listening context and providing opportunities for recall enhance acquisition and retention, suggesting the task's qualitative nature rather than intention to learn determines retention.

Smidt and Hegelheimer (2004) investigated how authentic online academic lectures in a self-paced autonomous CALL activity can enhance incidental vocabulary acquisition, lecture comprehension and learner strategy use. In the study, 24 adult ESL learners listened to one 15-minute lecture, answered 10 multiple-choice comprehension questions, and had access to an online dictionary. Pre-, post-, and delayed partial dictation tests of the 20 most difficult vocabulary items indicated the CALL activity enhanced incidental vocabulary learning from listening as the mean gain from pre- to post-test was 3.2 words and the decay from post- to delayed post-test was not statistically significant.

### ***Learning vocabulary intentionally through reading and enhancement activities***

Given the limitations of acquiring L2 vocabulary from reading alone, augmenting reading with word-focused activities is necessary to enhance acquisition. Paribakht and Wesche (1997) compared reading under two conditions: reading only (RO) and reading plus contextualized vocabulary exercises (RP). Using the VKS, they found both conditions made highly significant gains, but the RP group had greater gains given the amount of time spent on the treatments. They concluded reading plus focused vocabulary instruction

was more efficient for learning target vocabulary when time is limited than reading for meaning alone. Laufer's (2003) study comparing reading alone, reading with word-focused tasks, and word-focused activities only found word-focused activities are essential for acquisition. Min's study (2008), adds to these findings, showing the superiority of reading combined with explicit/intentional vocabulary learning activities.

Various other studies have compared reading and different types of activities. Adding word-focused activities after reading, such as completing a gapped text based on the reading (Hulstijn & Laufer, 2001) or writing sentences with the target words (Laufer, 2001), leads to greater acquisition than simply reading alone. Moreover, the type of task used in post-reading activities appears to be important. In a study comparing a message-oriented task, a form-oriented comprehension task and a form-oriented production task, the form-oriented tasks were significantly better for acquisition and retention (Hill & Laufer, 2003). Finally, in a study examining task-induced involvement, Kim (2008) compared reading plus three different types of tasks: comprehension exercises including graphic organizers, comprehension questions and gap-fills and a composition task. Using the VKS to test acquisition and retention over two weeks, Kim found initial gains were greatest for tasks with a higher involvement load (gap-fills and composition), but that for retention reading plus composition was higher. This adds to Hulstijn and Laufer's (2001) claim that more effective tasks for acquiring new words have a deeper level of processing.

### **Purpose of the study**

The present study partially replicates Min's study (2008) to enrich our understanding of the types of activities that can promote incidental vocabulary acquisition. This study, however, compares the effectiveness of reading plus listening activities and reading plus vocabulary enhancement activities. We asked the following questions.

### ***Research questions***

1. Do intermediate EFL university learners acquire target vocabulary items through reading plus thematically-related lectures and vocabulary focused activities as measured by a post-test?
2. If yes, are the target items retained 12 weeks later?
3. Over a 12-week period, which instructional treatment is more effective for vocabulary acquisition and retention?
4. What is the qualitative change in vocabulary knowledge within each group?
5. What is the qualitative change in vocabulary knowledge between the groups?

### **Method**

### ***Setting and participants***

The participants in this study were 30 second year EFL learners at a Japanese university. There were 21 females and 9 males. All participants had completed 6 years of formal education in English at the secondary level and 1.5 years at the tertiary level. Their TOEFL scores at the time they entered university ranged between 370 and 460. The participants had two 70-minute compulsory EFL classes per week, a listening and speaking class and a reading class. The study was conducted in reading class during the first 6 weeks of the fall semester, 2009. The participants were evenly divided between the two highest intact sections of the reading class, and one of the researchers taught both sections. Although the students (44 students in total) were told they were all participating in the study, only the data from 30 of the students were actually used. The researchers obtained signed consent from each student before beginning the study, and then administered the pre-test. Before scoring the pre-test, the students were randomly assigned to the two treatment groups to prevent potential learner involvement from exerting any influence on the study (Hulstijn & Laufer, 2001), a possible limitation in Min's study, where students volunteered for their groups.

The 30 participants were selected on the basis of their first semester final exam reading scores, with participants limited to students whose scores fell between 95% and 73% in order to eliminate the very highest and lowest students. To confirm that the English

proficiency of each group was basically equivalent before the instructional treatments, an independent samples *t*-test was performed to compare the participants' final reading exam scores. The score average for the reading plus listening group (RL) was 83.15 (*SD* = 7.8) and the score average for the reading plus vocabulary-enhancement group (RV) was 84 (*SD* = 6.4). This difference was not significant,  $t(28) = -.205$ ,  $p > .05$ ,  $r = 0.04$ .

### ***Study design***

The researchers selected 60 target vocabulary items from the four readings to be covered on the second semester mid-term test (see Appendix A). The readings were from the content-based instruction (CBI) textbook used in reading class. In attempting to ensure the words would be unfamiliar, the researchers chose only items that had not appeared in any of the book's previous readings or vocabulary exercises. The vocabulary items were not pilot-tested. On the first day of the semester, the participants took the pre-test and were then told they would be participating in a study involving either listening or vocabulary exercises. They were also told treatment assignments would be random. However, they were not told the study was investigating vocabulary acquisition and retention nor were the post-test or delayed post-test mentioned. The participants took the unannounced post-test six weeks later, immediately after the instructional treatments, and the unannounced delayed post-test was administered 12 weeks after the post-test.

### ***Instructional treatments***

Each section had an RL group and an RV group. The first week of the study, the instructor had the students highlight in marker the first 15 target items in the first reading in their textbooks. The words were highlighted to ensure students noticed them as they read, an essential condition for converting input to intake (Gass, 1988; Schmidt, 1994).

The instructor also pronounced the words and had the students practice. This was to ensure students in the RL group would recognize the words when they encountered them in the listening tasks. Without a stable pronunciation, new words cannot be held in the phonological loop and thus cannot enter long-term memory easily (Nation & Newton, 2008; also Baddeley, Gathercole, & Papagno, 1998). Following this, both groups read the first reading in class and completed a worksheet with open-ended comprehension questions (see Appendix B) that were checked the following week with the instructor.

In addition to the in-class readings, for homework RL students were assigned to listen to a thematically-related lecture and answer comprehension questions. They were instructed to listen as many times as necessary and to write answers in full sentences. To save class time when checking homework, each student was given an answer sheet with both the questions and answers written out. The instructor appointed a group leader, and the students took turns reading the questions and answers aloud. The students were asked

to correct any mistakes. They were then given the transcript with the target words enhanced in boldface (see Appendix C), which they read aloud with a partner. They were also instructed to listen to the recording once more for homework while reading the transcript.

The rationale for having students answer comprehension questions was to focus their listening, encourage listening several times and increase the likelihood of noticing the target vocabulary. If learners listen multiple times, there is a greater chance of acquiring the form and learning the meaning (Toya, 2004, 1992; also Robbins & Ehri, 1994). Moreover, writing out the answers would provide opportunities for generative processing and to recall the target items. Also, it was felt that setting a task would more closely mirror what the learners did when they selected listening for self-study. At those times learners either transcribed or summarized what they heard after listening several times.

In the reading plus vocabulary (RV) treatment, the learners also read in-class readings; however, the homework assignment was vocabulary-enhancing exercises which used the targeted vocabulary items (see Appendix D). These exercises were based on the receptive and productive types Min's study used, with each target word appearing three to four times. To check the exercises, the following week the instructor appointed a group leader, who had students take turns reading the questions and answers aloud and corrected all incorrect responses.



The same instructional procedure for the RL and RV treatments was repeated three more times for the remaining sets of words and readings. The only difference was two weeks were allotted instead of one to complete readings 2 and 4 as they were significantly longer than readings 1 and 3.

### ***Materials***

#### *Reading text*

The reading text used in the classes where the study was conducted was *Exploring Content 2: Reading for Academic Success* by Lorraine Smith (2004), a CBI textbook designed for college-level ESL learners. The textbook readings are unmodified excerpts from introductory college textbooks in several content areas. The researchers intentionally timed the study to coincide with Chapter 5, “The Birth of Science,” and Chapter 6, “Science and a New World View,” as the participants were life science majors, and the researchers believed the science-related focus would be more interesting, and perhaps motivating, for them.

Each chapter had two readings, a shorter introductory reading and a longer main reading. The readings in Chapter 5 were 724 and 951 words, respectively; and in Chapter 6, they were significantly longer at 951 and 2195 words, respectively. Using Cobb's (2009) Vocabulary Profiler, 84.95% of the words in Chapter 5 were at the 1000 – 2000 level, 4.42% were from the Academic Word List (AWL), and 10.62% were off list words. For the Chapter 6 readings, 81.90% of the words were at the 1000-2000 level, 4.38% were from the AWL, and 13.92% were off list words. In short, these readings were challenging.

#### *Thematically-related lectures*

One of the researchers wrote four thematically-related lectures to accompany each reading used in the study. The lectures were about concepts (e.g., the telescope) and individuals (e.g., Nicholas Copernicus and Thomas Harriot) associated with the Scientific Revolution, the theme of all four textbook readings. These topics were chosen because it was felt that the learners might have an easier time hearing the target words if the lecture content overlapped somewhat with the readings. It was also hoped these topics would be interesting and motivating to the students as all were science majors. The lectures were recorded by two different native speakers as research indicates acoustic variability has a positive affect on L2 vocabulary learning (Barcroft & Sommers, 2005).

The lectures averaged 486 words each, and the recordings averaged 4 minutes 24 seconds in length. According to Cobb's (2009) Vocabulary Profiler, 82.69% of the words were from the 1000-2000 word level, 3.59% were from AWL, and 13.72% were off list words. Each target item was used at least once in the thematically-related lectures.

### ***Test instrument***

To measure the participants' initial word knowledge of the target items and subsequent acquisition and retention, this study used Min's (2008) modified version of Paribakht and Wesche's (1997) Vocabulary Knowledge Scale (VKS) (see Appendix E). Like the original VKS, Min's modified scale relies on self-reports to measure receptive and productive vocabulary knowledge. The VKS's advantages, according to Min (2008), are high test-retest reliability (Wesche & Paribakht, 1996) and more accurate reflection of student word knowledge: the VKS relies on self-reports, which provide no clues, rather than multiple-choice questions, which provide clues. In other words, it reduces the possibility that students can guess the correct meaning of the target words.

Min (2008) also noted two limitations in the VKS, which she sought to rectify. First, it reduces vocabulary knowledge to a single scale where several scales are required (see also Read, 2000). And, second, it assumes a clear progression between the five categories, with receptive knowledge preceding productive knowledge. In modifying the VKS, Min

(2008) took the position that her modified scale tests receptive and productive word knowledge independently and made no assumptions that one type of knowledge preceded the other. She also reduced Paribakht and Wesche's five categories to four to establish a clear unknown/known word dichotomy. On Min's scale, Categories I (words unknown) and II (partial knowledge) are the unknown word category, and Categories III (receptive word knowledge) and IV (productive word knowledge) are the known word category.

### ***Scoring***

The test was administered three times (prior to, immediately after and 12 weeks after the vocabulary treatments finished) and was rated by the two researchers. Following Min, points were only given for the known word category. Thus, the test's maximum score was 120 points, with 60 points possible each for receptive and productive knowledge.

For unknown word knowledge, no points were given for checking either Category 1 ('I don't remember having seen this word before'.) or Category 2 ('I have seen this word before, but don't know what it means'.). Regarding known word knowledge, Category 3 tested receptive knowledge ('I know this word. It means \_\_\_\_\_'.), and one point was given for a correct synonym or Japanese translation for any sense of the target words. Category 4 tested productive knowledge, and one point was given if the target word was used correctly both grammatically and semantically, providing a correct synonym had

been given in Category 3. However, since a learner's L1 heavily influences the acquisition order of grammatical morphemes, articles, third-person singular *-s*, and plural *-s* are acquired later by Japanese EFL learners than predicted by the natural order hypothesis (Luk & Shirai, 2009). Therefore, we ignored these three mistakes when the target item was a noun or a verb, as long as the sentence was semantically correct. In line with Min, grammar errors in other parts of the sentences were ignored.

## **Results**

### ***Effectiveness of each instructional treatment***

The first research question asked whether the participants in each group acquired and retained the target vocabulary items. The descriptive statistics of the pre-, post- and delayed post-test scores are shown in Table 1. The post-test scores were considered scores of vocabulary acquisition, whereas those of the delayed post-test, taken 12 weeks after completing the instructional treatments, were treated as vocabulary retention scores. The mean scores for each group for the pre-test, acquisition test and retention test were obtained by first adding the scores for the 60 target words for each participant and then dividing the total by the number of participants.

Table 1: Descriptive Statistics of Pre-, Acquisition and Retention Test Scores for RL and RV groups

*Little, A & Kaoru Kobayashi (2011). Malaysian Journal of ELT Research, Vol. 7(1), p. 1-63. [www.melta.org.my](http://www.melta.org.my)*

Group	Pre-test		Acquisition Test		Retention Test	
	Mean	SD	Mean	SD	Mean	SD
RL (n=15)	3.93	2.71	33.93	17.73	25.4	13.62
RV (n=15)	2.87	2.48	52.47	21.38	30.07	10.69

*Note.* The full score of the tests is 120.

Figure 1: Mean scores for pre-, acquisition and retention tests

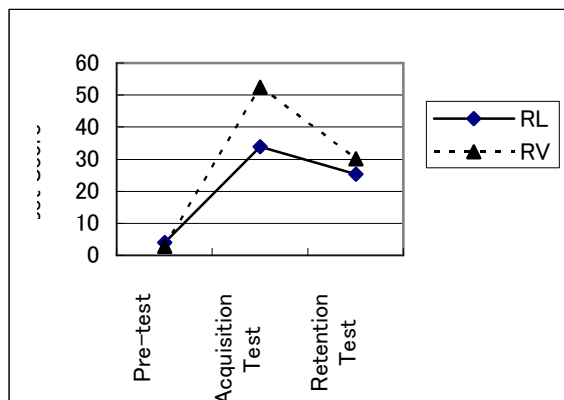


Figure 1 graphically shows the mean scores for the pre-, acquisition and retention tests. As indicated in Figure 1, although the students in both groups scored quite low on the pre-test, their scores increased on the acquisition test and the retention test.

**Comparative effectiveness between instructional treatments**

Two-way mixed-design ANOVA was used to see the difference in the effectiveness of each treatment more clearly. The analysis was done by using SPSS 17.0. Mauchly's test showed that the assumption of sphericity had been violated for the main effect of test,  $\chi^2(2) = 14.5$ ,  $p < .01$ . Therefore, degrees of freedom were corrected using Greenhouse-Geisser ( $\epsilon = .71$ ).

Table 2: ANOVA for scores for pre-, acquisition and retention tests (RL and RV groups)

Source	SS	<i>df</i>	<i>F</i>	<i>r</i>	<i>p</i>
Between-subjects					
Intercept	18418.148	1	179.338	0.930	0.000
Group	408.237	1	3.975	0.350	0.056
Error	2875.615	28			
Within-subjects					
Test	24153.689	1.413	103.079	0.850	0.000
Test x Group	1523.289	1.413	6.501	0.380	0.008
Error	6561.022	39.562			

Table 2 shows a significant interaction effect between the tests and the student groups,  $F(1.413, 39.56) = 6.501, p < .01, r = .38$ . This indicates the RL and RV groups scored differently on the three tests (pre-, acquisition and retention tests). The results show vocabulary acquisition and retention varied between the two groups due to the different instructional treatments they received.

Simple effects analysis was then conducted to scrutinize differences between every pair of levels in each independent variable. The analysis was conducted by using SPSS 17.0, and the results are presented in Tables 3 and 4.

Table 3: Pairwise comparisons of mean scores for tests between two groups

Test	(I) Group	(J) Group	(I) – (J)	Std. Error	Sig.
Pre-test	RL	RV	1.067	0.948	0.270
Acquisition Test	RL	RV	-18.533	7.172	0.015
Retention Test	RL	RV	-4.667	4.470	0.305

*Note.* Std. Error = Standard error. Sig. = Significance.

Table 3 presents differences of the mean scores for the respective tests obtained by the RL and RV groups. The mean scores for the pre-test and the retention test were not  
*Little, A & Kaoru Kobayashi (2011). Malaysian Journal of ELT Research, Vol. 7(1), p. 1-63. [www.melta.org.my](http://www.melta.org.my)*



significantly different between the RL and RV groups ( $p = .270$  and  $p = .305$ , respectively). With regard to the mean scores for the acquisition test, however, the RV group significantly outperformed the RL group ( $p < .05$ ).

Table 4: Pairwise comparisons of mean scores among tests obtained by two groups

Group	(I) Test	(J) Test	(I) – (J)	Std. Error	Sig.
RL	Pre-test	Acquisition Test	-30.000	5.047	0.000
	Acquisition Test	Retention Test	8.533	3.537	0.068
	Pre-test	Retention Test	-21.467	2.980	0.000
RV	Pre-test	Acquisition Test	-49.600	5.047	0.000
	Acquisition Test	Retention Test	22.400	3.537	0.000
	Pre-test	Retention Test	-27.200	2.980	0.000

*Note.* Std. Error = Standard error. Sig. = Significance.

Table 4 shows the mean score differences between each pair of tests (pre-, acquisition and retention tests) scored by the RL and RV groups respectively. In the RV group, all the differences were significant ( $p < .01$ ). This indicates the mean score for the acquisition test significantly improved compared to that of the pre-test. However, the

score for the retention test deteriorated compared to the acquisition test, though it was better than the pre-test. On the other hand, the students in the RL group scored differently on the three tests. Similar to the RV group, the differences between the pre- and acquisition tests and between pre- and retention tests were significant ( $p < .01$ ). In other words, the scores for the acquisition and retention tests were significantly higher than the score for the pre-test. However, there was no statistically significant difference between the acquisition and retention tests ( $p = .068$ ). This indicates the RL group students retained vocabulary items better after 12 weeks than the RV group students. The results indicate that the RV treatment was more effective for the subjects' acquisition of the target vocabulary but less effective for vocabulary retention than the RL treatment.

### ***Qualitative change in vocabulary knowledge within groups***

The third research question asked whether there was any qualitative change in vocabulary knowledge within each group. The results for the first and second research questions show that the shift in the size of vocabulary knowledge for both groups reflects the overall positive effects of the treatments given to each group. The third and fourth research questions looked for qualitative changes in unknown, partially known, receptive and productive knowledge of the 60 target vocabulary within and between the RL and RV groups. These types of knowledge are not reflected in the test scores used to answer

the first two research questions. As in Min’s study, neither unknown nor partially known words received any points. Therefore, the participants’ responses were used as a unit of analysis. All 15 participants in each group rated their knowledge of each of the 60 target words giving 1800 responses in each test.

Table 5 shows the change in the participants’ lexical knowledge within each group. Similar to Min’s study, the subjects in both groups showed shifts from unknown (‘unknown’ and ‘partially known’) to known (‘receptive’ and ‘productive’) categories.

Table 5: Breakdown of responses over types of vocabulary knowledge for both groups

Vocabulary knowledge						
Group	Test	Unknown	Partially		Productive	Total
			known	Receptive		
RL	Pre-test	61%	34%	4%	1%	100%
	Acquisition test	28%	39%	11%	22%	100%
	Retention test	30%	44%	10%	16%	100%
RV	Pre-test	78%	19%	2%	1%	100%
	Acquisition test	25%	25%	12%	38%	100%

Retention test	29%	39%	14%	18%	100%
----------------	-----	-----	-----	-----	------

---

*Note.* Total number of responses = 900

### *RL group*

As shown in Table 5, between pre- and acquisition tests, an overall tendency in word gain was observed. Unknown words fell from 61% to 28% resulting in a decrease of 33% in unknown words from the pre-test to the acquisition test. Partially known words increased from 34% on the pre-test to 39% resulting in a gain of 5%. As in Min's study, the increase in the percentage of partially known words was interpreted as a sign of word gain since the percentage of receptive and productive word knowledge also increased. Receptive word knowledge increased from 4% on the pre-test to 11% on the acquisition test indicating that the group's receptive word knowledge expanded by 7%. Productive knowledge also increased to 21% from 1% on the pre-test to 22% on the acquisition test.

An overall word loss trend was observed on the retention test for the RL group. Unknown words increased by 2% from 28% to 30%. Partially known words rose by 5% from 39% to 44%. Here, the shift can be interpreted as a sign of both word gain and word loss, since the percentage of unknown words increased and, at the same time, the percentages of receptive and productive word knowledge decreased. The increase of

*Little, A & Kaoru Kobayashi (2011). Malaysian Journal of ELT Research, Vol. 7(1), p. 1-63. [www.melta.org.my](http://www.melta.org.my)*

partially known words may have been caused by the increase of unknown words, in which case it is a sign of word gain. At the same time, the increase may be due to the decrease in the amount of receptive and productive word knowledge, in which case it indicates word loss. Receptive word knowledge decreased by 1% from 11% to 10%; likewise, productive word knowledge, decreased by 6% from 22% to 16%.

However, a comparison between the pre- and retention test scores demonstrated a general tendency of gain in the target words. Unknown words dropped from 61% to 30% resulting in a reduction of 31%. An expansion of 10%, from 34% to 44%, was observed in partially known words, which, in this case, is more likely to mean word gain. The percentage of both receptive and productive word knowledge increased. Receptive word knowledge increased from 4% to 10%, showing a gain of 6%, and productive word knowledge increased from 1% to 16%, showing a gain of 15%.

### *RV group*

A tendency similar to that of the RL group was observed in every comparison between the tests for the RV group. A comparison of the percentage of unknown words between the pre- and acquisition tests indicated a tendency in word gain. Unknown words decreased from 78% to 25%, a reduction of 53%. The decrease in the percentage of unknown words was offset by the increase in the percentages of the partially known

words as well as receptive and productive word knowledge. Partially known words increased by 6% from 19% to 25%; receptive word knowledge, increased by 10%, from 2% to 12%; and productive word knowledge, increased by 37%, from 1% to 38%.

As was observed for the RL group, a comparison between the acquisition and retention tests showed an overall word loss trend. Unknown words increased from 25% to 29%, a 4% rise. Partially known words increased from 25% to 39%, leading to a gain of 14%, indicating both word gain and loss. Although receptive word knowledge increased by 2% from 12% to 14%, productive word knowledge decreased from 38% to 18% resulting in a loss of 20%.

A comparison of pre- and retention tests showed a pattern of overall word gain similar to that for the RL group. There was a decrease of 49%, from 78% to 29%, in unknown words. A gain of 20%, from 19% to 39%, was observed in partially known words, a likely a sign of word gain. With regard to receptive and productive word knowledge, both showed an increase. Receptive word knowledge rose from 2% to 14% resulting in a gain of 12%, and productive word knowledge also increased from 1% to 18%, a surge of 17%.

### *Trends in both groups*

On the acquisition test, both groups showed a decrease in the percentage of unknown words, and an increase in the percentage of partially known words, receptive and productive word knowledge, indicating word gain. Although a regression in receptive and productive word knowledge was observed on the retention test for both groups, the comparison between the pre- and retention tests shows that these types of word knowledge were larger on the retention test than on the pre-test. For the RL group, the sum of the percentage of receptive or productive word knowledge was 5% on the pre-test, but this increased to 26% on the retention test. On the other hand, for the RV group, the sum was 3% on the pre-test but this increased to 32% on the retention test. This shows both treatments were effective for acquisition and retention of the target words.

### ***Qualitative change in vocabulary knowledge between groups***

Although the shift in word knowledge showed a similar pattern between the RL and RV groups, there were differences in the size of shift that occurred. To answer the last research question, this section looks at the size of differences to compare the effectiveness of the treatments. The researchers of the present study refrained from interpreting the responses for partially known words as a sign of either word gain or word loss for the reason mentioned in the previous section. This section focuses on receptive and productive word knowledge.

Figure 1 describes the effectiveness of the RV treatment over the RL treatment by showing higher means for the RV group in both acquisition and retention tests. Figures 2 and 3, graphic presentations of Table 5, further show the qualitative differences in the factors that caused these differences.

Figure 2: Response patterns of the RL group

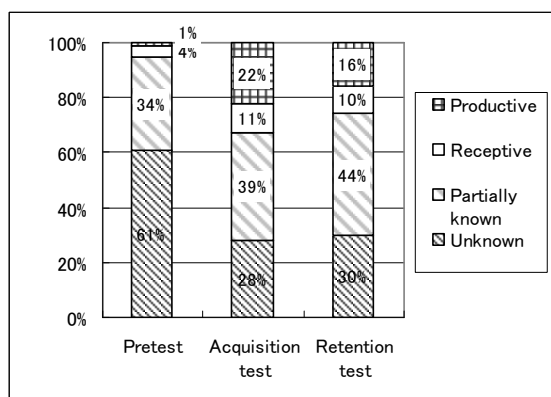
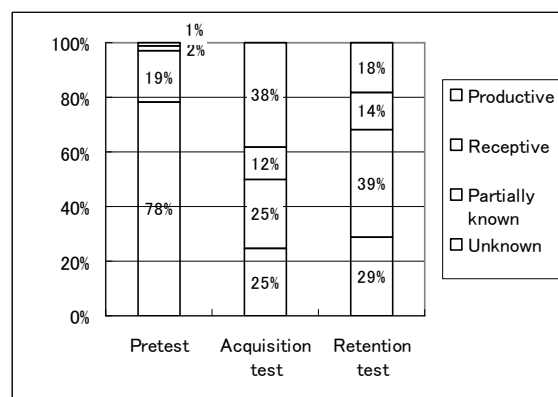


Figure 3. Response patterns of the RV group



*Acquisition of vocabulary*

The pre-test bar in both figures shows that only a few students had either receptive or productive word knowledge before the treatments. However, the acquisition test bar shows the difference in the treatments. The distribution of types of word knowledge differs between the two groups. The mode for the RV group’s responses was productive word knowledge, which was larger than the sum of the responses for receptive or productive word knowledge for the RL group. This indicates the RV treatment was more



effective for acquiring the target vocabulary: the treatment not only helped students to learn the meaning but also to use the target items correctly in sentences.

### *Retention of vocabulary*

Not much difference was observed in the distribution of the students' responses between the groups for the retention test. Although the sum of the responses for receptive and productive word knowledge was larger for the RV group, more than half of the students in both groups either showed no or only partial knowledge of the target vocabulary. The breakdown of the figures reveals that for both groups, not much difference occurred in the responses for receptive knowledge between the acquisition and retention tests. A difference can be seen between the RV group's responses for productive word knowledge for the acquisition and retention tests. As much as 38% of the RV group's responses fell into the productive word knowledge for the acquisition test, but this decayed to 18% on the retention test. On the other hand, although some deterioration occurred with the RL group as well, the difference was not as large. This indicates the greater effectiveness of the RL treatment for retaining words than the RV treatment.

### *Learners' perceptions of the effectiveness of the treatments*

Six weeks after the post-test was administered, the researchers distributed an open-ended survey for feedback on the instructional treatments. The purpose was to see whether the participants were satisfied with their particular treatment and how long it had taken them to complete the assignments. The researchers also sought some sense of the learners' perceptions of the effectiveness of the treatments as well as the positive and negative aspects of each instructional treatment. The responses of all 15 participants in each group are given below.

There were four questions on the survey that asked about the participant's satisfaction with the treatment. Figure 4 and 5 show the responses in each group.

Figure 4: Satisfaction: RL treatment

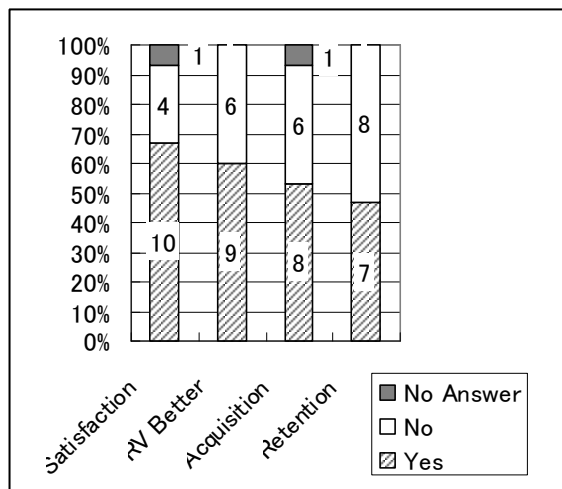
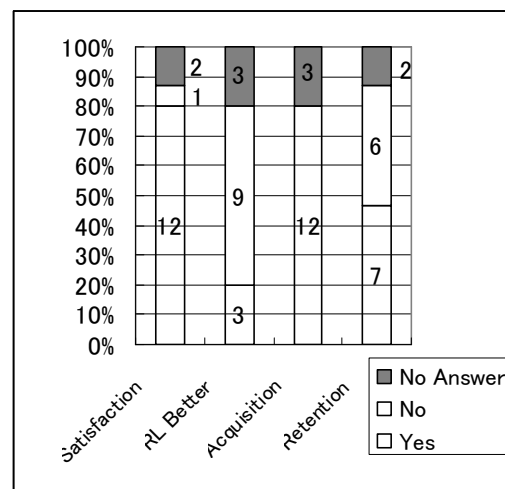


Figure 5: Satisfaction: RV treatment



A comparison of these figures reveals satisfaction was higher for participants in the RV treatment. About half of the students in the RL group felt the treatment had resulted in vocabulary acquisition and the picture was similar for responses about retention. All but three participants in the RV group acknowledged the effectiveness of the treatment for acquisition of vocabulary; however, the positive response decreased to 7 regarding the treatment's effectiveness for vocabulary retention. The participants' perceptions conform to the groups' performance on the acquisition and retention tests.

Regarding time, the RL participants spent an average of 98.7 minutes per assignment and listened to each lecture an average of six times, whereas the average amount of time the RV group spent on each set of vocabulary exercises was 46 minutes.

For the RL group, the number of positive and negative comments was roughly equal, with students indicating the good points of the RL treatment were that it improved their listening ability, enabled them to learn the pronunciation of the words, and allowed them to guess from context. The bad point for many students was the lecture level was too high (i.e., too fast, too much unknown vocabulary and too difficult to guess from context).

For the RV group, positive comments outnumbered negative comments by 60%. Learners appreciated the variety of exercises and found them useful for acquiring different types of word knowledge as well as for review and midterm exam preparation. The main

criticisms were the exercises did not provide any opportunity to guess meanings from context or learn pronunciation. A few students also felt they quickly forgot the words.

Finally, interestingly, six of the 30 respondents felt it would have been more effective if both instructional treatments had been made available to all students. This indicates, perhaps, that some students see the value of both intentional and incidental approaches.

## **Discussion**

The intention of the study was to add to our understanding of the types of activities that can lead to vocabulary knowledge. Although both treatments facilitated the acquisition and retention of the target vocabulary, reading plus listening (RL) was not as effective as reading plus vocabulary enhancement activities (RV) for acquisition given the amount of time spent. This confirms earlier findings that reading plus intentional vocabulary learning activities are superior to reading plus activities that promote incidental vocabulary learning (Laufer, 2003; Min, 2008; Paribakht & Wesche, 1997). Nonetheless, the study does indicate learners can acquire vocabulary from incidental listening, corroborating earlier research (Elley, 1989, 1991; Little, 2007; Schouten-van Parreren, 1989; Smidt & Hegelheimer, 2004; Vidal, 2003). The results also indicate RL was better than RV for retention. There are several possible explanations for these results.

### ***Acquisition and retention from listening to lectures***

First, it cannot be assumed learners listen at the same level as they read. In fact, from the students' feedback regarding the difficulty of the lectures, it appears they could not recognize many target words. A 95% coverage rate is recommended for extensive reading, but for extensive listening, coverage should be about 99% (Nation, 2001). The lectures' average coverage was 82.6%. Brown et al. (2008) noted the same thing in the listening-only mode in their study. In addition, the low coverage rate may also explain why learners commented they had difficulty guessing the meaning from context.

Second, Toya (2004) comments that for foreign language (FL) learners, language processing begins with a bottom-up process and that is then followed by a top-down process; in other words, acquisition of form precedes that of meaning. Learners must be able to recognise, or decode, words when they hear them in order to learn them. Given the high number of unknown words, it was difficult for the learners to attend to both form and meaning as was required by these lectures.

Third, although the learners listened to the lectures multiple times, even if they noticed the target words, they were encountering them in the same context and not in different contexts. This is not as enriching as meeting the words in several different contexts (Pigada & Schmidt, 2006).

In terms of retention, listening to lectures was beneficial. This may be because the lectures presented the target vocabulary as part of a narrative which allowed the words to be encoded more elaborately through building semantic links ( Craik & Tulving, 1975), or it could be attributed to the essential role the phonological loop and long-term memory play in acquiring FL vocabulary (Papagno et al., 1991). Given the difficulty of the lectures and the amount of effort the learners had to make in processing and comprehending them, this may also have contributed to greater retention, in line with the depth of processing and involvement load hypotheses (Hulstijn & Laufer, 2001; Laufer & Hulstijn, 2001). And, finally, it must be noted that apart from vocabulary acquisition and retention, listening to lectures provided far richer opportunities for acquisition of other aspects of language, including listening skills, than the RV activities afforded.

### ***Acquisition and retention from vocabulary enhancement activities***

The superior gains in acquisition made by the RV group may reflect both the types of exercises they were given, the amount of processing needed, and the number of opportunities for retrieval. First, reflecting the learners' comments on the effectiveness of L2-L1 matching exercises, studies have shown that L1 translations, and L2-L1 words pairs, are more effective for making initial form-meaning connections and lead to better

receptive and productive learning of words (Laufer & Shmueli, 1997; Lotto & de Groot, 1998; Ramachandran & Rahim, 2004; Webb, 2009).

Second, according to Hulstijn and Laufer (2001), certain tasks require greater depth of processing than others, and this leads to enhanced vocabulary acquisition and retention. Learner comments on two exercise types indicated deeper processing may have been required. For gap-fills the learners not only had to identify the correct word but also had to make the correct form. Learners also commented on the challenge presented by the reordering exercise.

Finally, a study by Folse (2006) found multiple encounters or retrievals of target words in vocabulary exercises enhance acquisition. Learners encountered each target item three to four times in the exercises in addition to encountering the items in the reading text.

## **Conclusion and implications**

Explicit learning of vocabulary appears to be more effective and efficient than incidental learning, if we compare the overall gains and the average amount of time the learners spent on each instructional treatment (RL = 98.7 minutes; RV = 46 minutes). Yet listening to lectures was still worthwhile. 'Word knowledge involves a range of skills and word learning is facilitated by approaches that provide varied experiences' (Zimmerman, Little, A & Kaoru Kobayashi (2011). *Malaysian Journal of ELT Research*, Vol. 7(1), p. 1-63. [www.melta.org.my](http://www.melta.org.my)

1997, p. 123, cited in Pigada & Schmidt, 2006). We should encourage our students to pick up word knowledge through various means, including incidentally through listening. However, to increase the potential effectiveness of this approach, the researchers recommend the following. First, it is necessary to construct or use lectures with a 99% coverage rate, and these should be recorded at a slow pace. Second, along with more extended pronunciation practice, providing learners with an L2-L1 wordlist in advance may help them make initial form-meaning connections. Third, giving the students the option of listening to lectures as they read may also lead to more efficient and effective acquisition, as Brown et al. (2008) found.

### **Acknowledgements**

We would like to thank Takanori Sato for his invaluable assistance on the statistical analyses used in this paper.

### **References**

- Baddeley, A., Gathercole, S. & Papagno, C. (1998). The phonological loop as a language learning device. *Psychological Review*, 105(1), 158-173.
- Barcroft, J. & Sommers, M. S. (2005). Effects of acoustic variability on second language vocabulary learning. *Studies in Second Language Acquisition*, 27(3),
- Little, A & Kaoru Kobayashi (2011). *Malaysian Journal of ELT Research*, Vol. 7(1), p. 1-63. [www.melta.org.my](http://www.melta.org.my)



- 387-414.
- Brown, R., Waring, R. & Donkaewbua, S. (2008). Incidental vocabulary acquisition from reading, reading-while-listening, and listening to stories. *Reading in a Foreign Language, 20*(2), 136-163.
- Cobb, T. Vocabulary Profiler, on Compleat Lexical Tutor, accessed August 2009 at <http://www.lextutor.ca/vp/eng/>
- Craik, F. & Tulving, E. (1975). Depth of processing and the retention of words in episodic memory. *Journal of Experimental Psychology, 104*(3), 268 – 294.
- Elley, W. (1989). Vocabulary acquisition from listening to stories. *Reading Research Quarterly, 24*(2), 174-187.
- Elley, W. (1991). Acquiring literacy in a second language: The effect of book-based programs. *Language Learning, 41*(3), 375-411.
- Folse, K. (2006) The effect of type of written exercise on L2 vocabulary retention. *TESOL Quarterly, 40*(2), 273-293.
- Gass, S. (1988). Integrating research areas: A framework for second language studies. *Applied Linguistics, 9*(2), 233-252.
- Hill, M. & Laufer, B. (2003). Type of task, time-on-task and electronic dictionaries in incidental vocabulary acquisition. *IRAL, 41*, 87-106.
- Hirsh, D. & Nation, P. (1992). What vocabulary size is needed to read unsimplified texts for pleasure? *Reading in a Foreign Language, 8*(2), 689-696.
- Horst, M., Cobb, T. & Meara, P. (1998). Beyond a Clockwork Orange: Acquiring second language vocabulary through reading. *Reading in a Foreign Language, 11*(2), 207-227.
- Hulstijn, J. H. & Laufer, B. (2001). Some empirical evidence for involvement load hypothesis in vocabulary acquisition. *Language Learning, 51*(3), 539-558.

- Joe, A. (1998). What effects do text-based tasks promoting generation have on incidental vocabulary acquisition. *Applied Linguistics*, 19(3), 357-377.
- Kim, Y. J. (2008). The role of task-induced involvement and learner proficiency in L2 vocabulary acquisition. *Language Learning*, 58(2), 285-325.
- Laufer, B. (1997). The lexical plight in second language reading: Words you don't know, words you think you know and words you can't guess. In J. Coady & T. Huckin (Eds.), *Second language vocabulary acquisition: A rationale for pedagogy* (20-34). Cambridge: Cambridge University Press.
- Laufer, B. (2001). Reading, word-focused activities and incidental vocabulary acquisition in a second language. *Prospect*, 16(3), 44-54.
- Laufer, B. (2003). Vocabulary acquisition in a second language: Do learners really acquire most vocabulary by reading? Some empirical evidence. *The Canadian Modern Language Review*, 59(4), 567-587.
- Laufer, B. & Hulstijn, J. H. (2001). Incidental vocabulary acquisition in a second language: The construct of task-induced involvement. *Applied Linguistics*, 22(1), 1-26.
- Laufer, B. & Yano, Y. (2001). Understanding unfamiliar words in a text: Do L2 learners understand how much they don't understand? *Reading in a Foreign Language*, 13(2), 549-566.
- Laufer, B. & Shmueli, K. (1997). Memorizing new words: Does teaching have anything to do with it? *RELC Journal*, 28(1), 89-108.
- Little, A. (2007). Can retelling stories help learners retain and acquire vocabulary? Unpublished research for MSc in TESP. Language Studies Unit, Aston University, Birmingham, UK.

- Lotto, L. & de Groot, A. M. B. (1998). Effects of learning method and word type on acquiring vocabulary in an unfamiliar language. *Language Learning*, 48(1), 31-69.
- Luk, Z. P. & Shirai, Y. (2009). Is the acquisition order of grammatical morphemes impervious to L1 knowledge? Evidence from the acquisition of plural *-s*, articles, and possessive *-s*. *Language Learning*, 59(4), 721-754.
- Min, H. (2008). EFL vocabulary acquisition and retention: Reading plus vocabulary enhancement activities and narrow reading. *Language Learning*, 58(1), 73-115.
- Nation, P. (2000). Learning vocabulary in lexical sets: Dangers and guidelines. *TESOL Journal*, 9(2), 6-10.
- Nation, I. S. P. (2001). *Learning vocabulary in another language*. Cambridge: Cambridge University Press.
- Nation, I. S. P. & Newton, J. (2008). *Teaching ESL/EFL listening and speaking*. New York: Routledge.
- Papagno, C., Valentine, T. & Baddeley, A. (1991). Phonological short-term memory and foreign language learning. *Journal of memory and Language*, 30, 331-47.
- Paribakht, T. S., & Wesche, M. (1997). Vocabulary enhancement activities and reading for meaning in second language vocabulary development. In J. Coady & T. Huckin (Eds.), *Second language vocabulary acquisition: A rationale for pedagogy* (174-200). Cambridge: Cambridge University Press.
- Pigada, M. & Schmitt, N. (2006). Vocabulary acquisition from extensive reading: A case study. *Reading in a Foreign Language*, 18(1), 1-28.
- Ramachandran, S. D., & Rahim, H. A. (2004). Meaning recall and retention: The impact of the translation method on elementary level learners' vocabulary learning. *RELC Journal*, 35(2), 161-178.
- Read, J. (2000). *Assessing vocabulary*. Cambridge: Cambridge University Press.

- Robbins, C. & Ehri, L. C. (1994). Reading storybooks to kindergartners helps them learn new vocabulary words. *Journal of Educational Psychology*, 86(1), 54-64.
- Rott, S. (1999). The effect of exposure frequency on intermediate language learners' incidental vocabulary acquisition and retention through reading. *Studies in Second Language Acquisition*, 21(4), 589-619.
- Saragi, T., Nation, I. S. P., & Meister, G. F. (1978). Vocabulary learning and reading. *System*, 6(2), 72-128.
- Schouten-van Parreren, C. (1989). Vocabulary through reading: Which conditions should be met when presenting words in texts? *AILA Review*, 6, 75-85.
- Schmidt, R. (1994). Deconstructing consciousness in search of useful definitions for applied linguistics. *AILA Review*, 11, 11-26.
- Smidt, E. & Hegelheimer, V. (2004). Effects of online academic lectures on ESL listening comprehension, incidental vocabulary acquisition, and strategy use. *Computer Assisted Language Learning*, 17(15), 517-566.
- Smith, L. C. (2004). *Exploring content 2: Reading for academic success*. White Plains NY: Pearson Education.
- Toya, M. (1992). Form of explanation in modification of listening input in L2 vocabulary learning. Unpublished MA in ESL thesis. Department of ESL, University of Hawaii, Honolulu.
- Toya, M. (2004). Issues in L2 passive acquisition of vocabulary through listening: From the perspectives of form, meaning and input. *Ryudai Review of Euro-American Studies*, 48, 41-59.
- Vidal, K. (2003). Academic listening: A source of vocabulary acquisition? *Applied Linguistics*, 24(1), 56-89.
- Waring, R. & Takaki, M. (2003). At what rate do learners learn and retain new vocabulary from reading a graded reader? *Reading in a Foreign Language*, 15(2), 130-163.

- Webb, S. (2007). The effects of repetition on word knowledge. *Applied Linguistics*, 28(1), 46-65.
- Webb, S. (2009). The effects of receptive and productive learning of word pairs on vocabulary knowledge. *RELC Journal*, 40(3), 360-376.
- Wesche, M. & Paribakht, T. S. (1996). Assessing second language vocabulary knowledge: Depth versus breadth. *The Canadian Modern Language Review*, 53(1), 13-40.
- Wittrock, M.C. (1974). Learning as a generative process. *Educational Psychologists*, 11, 87-95.
- Zahar, R., Cobb, T., & Spada, N. (2001). Acquiring vocabulary through reading: Effects of frequency and contextual richness. *The Canadian Modern Language Review*, 57(4), 740-752.
- Zimmerman, C. (1997). Do reading and interactive vocabulary instruction make a difference? An empirical study. *TESOL Quarterly*, 31(1), 121-140.

## **APPENDICES**

### **Appendix A: List of 60 Target Vocabulary Items**

adequate

anatomist

cavities

accession

contradictions	brass	clarity	censor
discarded	building blocks	concave	cite
disorienting	coincided	convex	disrepute
disproved	epicycle	credence	elliptical
elements	elaborate	discolors	erudite
emergence	ethereal	dissemination	heliocentric
incorporated	flourish	enumerate	incur
moorings	immune	formative	inertia
stargazers	inclined	hemisphere	posit
to this end	ingenious	pervade	prosecute
voluminous	logarithm	radii	refute
reside	plane	refraction	ridicule
heavenly objects	virtue	spherical	smuggled
common sense	acceleration	wholeheartedly	unequivocally

## **Appendix B: An Example of a Main Text Reading and the Accompanying Reading Comprehension Exercises**

### **The Seventeenth-Century Scientific Revolution**

The two essential characteristics of the new science were that it was materialistic and mathematical. Its materialism was contained in the realization that the universe is composed of matter in motion. That meant that the stars and planets were not made of some perfect ethereal (abstract) substance but of the same matter that was found on earth. They were thus subject to the same rules of motion as were earthly objects. The mathematics of the new science was contained in the realization that calculation had to replace common sense as the basis for understanding the universe. Mathematics itself was transformed with the invention of logarithms, analytic geometry, and calculus. More importantly, scientific experimentation took the form of measuring repeatable phenomena. When Galileo attempted to develop a theory of acceleration, he rolled a brass ball down an inclined plane and recorded the time and distance of its descent 100 times before he was satisfied with his results.

### **HEAVENLY REVOLUTIONS**

There was much to be said for Aristotle's understanding of the world, for his cosmology. For one thing, it was harmonious. It incorporated a view of the physical world that coincided with a view of the spiritual and moral one. The heavens were

unchangeable, and therefore they were better than the earth. The sun, moon, and planets were all faultless spheres, unblemished and immune from decay. Their motion was circular because the circle was the perfect form of motion. The earth was at the center of the universe because it was the heaviest planet and because it was at the center of the Great Chain of Being, between the underworld of spirits and the upper world of gods. The second advantage to the Aristotelian world view was that it was easily incorporated into Christianity. Aristotle's description of the heavens as being composed of a closed system of crystalline rings that held the sun, moon, and planets in their circular orbits around the earth left room for God and the angels to reside just beyond the last ring.

## **THE EUROPEAN CONTRIBUTION**

The new science was also a European movement. The spirit of scientific inquiry flourished everywhere. The main contributors to astronomy were a Pole, a Dane, a German, and an Italian. The founder of medical chemistry was a Swiss; the best anatomist was Belgian. England contributed most of all—the founders of modern chemistry, biology, and physics. By and large, the scientists operated outside the traditional seats of learning at the universities. Although most were university trained and not a few taught the traditional Aristotelian subjects, theirs was not an academic movement. Rather, it was a public one made possible by the printing press. Once published, findings became building blocks for scientists throughout the Continent and from one generation to the next. Many discoveries were made in the search for practical solutions to ordinary problems, and what was learned fueled advances in technology and



the natural sciences. The new science gave seventeenth-century Europeans a sense that they might finally master the forces of nature.

## **HEAVENLY REVOLUTIONS**

There was much to be said for Aristotle's understanding of the world, for his cosmology. For one thing, it was harmonious. It incorporated a view of the physical world that coincided with a view of the spiritual and moral one. The heavens were unchangeable, and therefore they were better than the earth. The sun, moon, and planets were all faultless spheres, unblemished and immune from decay. Their motion was circular because the circle was the perfect form of motion. The earth was at the center of the universe because it was the heaviest planet and because it was at the center of the Great Chain of being, between the underworld of spirits and the upper world of gods. The second advantage to the Aristotelian world view was that it was easily incorporated into Christianity. Aristotle's description of the heavens as being composed of a closed system of crystalline rings that held the sun, moon, and planets in their circular orbits around the earth left room for God and the angels to reside just beyond the last ring.

## **PROBLEMS WITH ARISTOTLE'S UNIVERSE**

There were, of course, problems with Aristotle's explanation of the universe as it was preserved in the work of Ptolemy, the greatest of the Greek astronomers. For one thing, if the sun revolved in a perfect circle around the earth, then why were the seasons

not perfectly equal? If the planets all revolved around the earth in circles, then why did they look nearer or farther, brighter or darker at different times of year? To solve those problems, a lot of ingenious hypotheses were advanced. Perhaps the sun revolved around the earth in an eccentric circle, that is, a circle not centered on the earth. That would account for the differing lengths of seasons. Perhaps the planets revolved in circles that rested on a circle around the earth. Then, when the planet revolved within the larger circle, it would seem nearer and brighter, and when it revolved outside it, it would seem farther away and darker. That was the theory of epicycles. Yet to account for the observable movement of all the known planets, there had to be 55 epicycles. As ingeniously complex as they were, the modifications of Aristotle's views made by the theories of eccentric circles and epicycles had one great virtue: they accurately predicted the movements of the planets. Although they were completely hypothetical, they answered the most troubling questions about the Aristotelian system.

## **NICOLAUS COPERNICUS**

In the 1490s, Nicolaus Copernicus (1473-1543) came to the Polish University of Krakow, which had one of the leading mathematical faculties in Europe. There they taught the latest astronomical theories and vigorously debated the existence of eccentric circles and epicycles. Copernicus came to Krakow for a liberal arts education before pursuing a degree in Church law. He became fascinated by astronomy and puzzled by the debate over planetary motion. Copernicus believed, like Aristotle, that the simplest explanations were the best. If the sun was at the center of the universe and the earth

*Little, A & Kaoru Kobayashi (2011). Malaysian Journal of ELT Research, Vol. 7(1), p. 1-63. [www.melta.org.my](http://www.melta.org.my)*

simply another planet in orbit, then many of the most elaborate explanations of planetary motion were unnecessary. “At rest, in the middle of everything is the Sun,” Copernicus wrote in *On the Revolutions of the Heavenly Spheres* (1543). “For in this most beautiful temple who would place this lamp in another or better position than that from which it can light up the whole thing at the same time?” Because Copernicus accepted most of the rest of the traditional Aristotelian explanation, especially the belief that the planets moved in circles, his sun-centered universe was only slightly better at predicting the position of the planets than the traditional earth-centered one, but Copernicus’s idea stimulated other astronomers to make new calculations.

Source: Smith, 2004, pp. 134-136

Chapter 5: Main Look through the reading and write the headings on the lines below.

**The Seventeenth-Century Scientific Revolution**

---

---

---

**1 Complete the outline below**

Two essential characteristics of the new science

A. \_\_\_\_\_: The universe is composed of \_\_\_\_\_

1. Stars are not made of \_\_\_\_\_, but of the same matter found \_\_\_\_\_
2. Stars are subject to the same \_\_\_\_\_ as earthly objects

B. \_\_\_\_\_: The basis for understanding the universe must be \_\_\_\_\_ not common sense.

1. The invention of \_\_\_\_\_
2. Scientific experiments measured \_\_\_\_\_

(e.g., to develop a theory of \_\_\_\_\_, Galileo rolled a \_\_\_\_\_ down an \_\_\_\_\_ 100 times.)

**2**

1. What details are given to support the claim that ‘scientific inquiry flourished everywhere’?

---

2. True/false For the most part, the scientists taught at universities.

3. The printing press made two things possible:

a. \_\_\_\_\_

b. \_\_\_\_\_

### **3 Complete the outline below**

Two advantages of Aristotle's world view or cosmology

A. \_\_\_\_\_: The view of \_\_\_\_\_ world \_\_\_\_\_

with the view of spiritual/moral world. For example,

1. Heavens are \_\_\_\_\_; therefore, they are better than \_\_\_\_\_

2. The sun, moon, and planets are perfect \_\_\_\_\_, immune from \_\_\_\_\_

3. The circle is the perfect form of \_\_\_\_\_; therefore, the sun, moon, planets' motion is \_\_\_\_\_

4. The Earth is at \_\_\_\_\_ because it is \_\_\_\_\_ planet  
(The Earth is between \_\_\_\_\_ and \_\_\_\_\_)

B. Easily incorporated into \_\_\_\_\_

(God and the angels resided beyond \_\_\_\_\_ of Aristotle's crystalline rings.)

**4 What** were two problems with Aristotle’s explanation that the sun revolved around the earth in a perfect circle? Under the problem, write the “ingenious” hypothesis that solved it.

Problem 1 \_\_\_\_\_

Solution \_\_\_\_\_

Problem 2 \_\_\_\_\_

Solution \_\_\_\_\_

What was the benefit of epicycles?

\_\_\_\_\_

**5** How was Copernicus similar to Aristotle?

By placing the sun at the center of the universe, what became unnecessary?

Why was Copernicus’s explanation of a sun-centered universe only a little better at predicting the positions of planets than that of an earth-centered universe?

## **Appendix C: An Example of a Listening Task Worksheet and Transcript**

### **Listening 2: Art and Science**

**Comprehension Questions: Write your answers in full sentences.**

<b>acceleration</b>	<b>epicycle</b>	<b>incline</b>
<b>anatomist</b>	<b>elaborate</b>	<b>ingenious</b>
<b>brass</b>	<b>ethereal</b>	<b>logarithm</b>
<b>building blocks</b>	<b>flourish</b>	<b>plane</b>
<b>coincided</b>	<b>immune</b>	<b>virtue</b>

1. Which scientist did Raphael and Rembrandt both paint?
2. When did the astronomer Ptolemy (tah-la-mee) live, and what did he expand on and develop?
3. What did the Ptolemaic system form?
4. What did the 17<sup>th</sup> century Scientific Revolution coincide with?
5. What happened to the arts during this time?
6. Who was Dr. Tulp?

7. During the lessons, what kind of rules was followed?
8. What does virtue mean? What was the virtue of these lessons?
9. What does the fresco in Florence show?
10. Describe the fresco in detail using these words: brass, plane, incline.
11. Complete this sentence: “So, no one from this period was \_\_\_\_\_.”  
  
It means even lesser known scientists had their \_\_\_\_\_ painted.
12. Who was John Napier and what did he invent?
13. How is Napier’s discovery described and how did it help astronomers?

### **Art and Science (Transcript)**

Science and scientists have long been the subjects of art. There is no shortage of portraits of Aristotle, for example. Raphael and Rembrandt both painted him. And, countless sculptures of Aristotle survive from ancient Greece. There are also portraits of the astronomer Ptolemy, who lived in the 2<sup>nd</sup> century AD. Ptolemy expanded on Aristotle’s notion of an **ethereal** universe and further developed the idea of **epicycles**. In fact, the Ptolemaic system formed the basic **building blocks** for our understanding of the universe. Unfortunately, however, one 15<sup>th</sup> century portrait of the astronomer Ptolemy confuses him with an ancient Egyptian Pharaoh who had the same name.



Later scientists, too, were the subject of art. The 17<sup>th</sup> century Scientific Revolution **coincided** with a period of great wealth, so not only did scientific enquiry advance during that century but also the arts, including music, literature, and painting, **flourished**. Not surprisingly, many paintings had scientists and their experiments as their subject matter.

In 1632, Rembrandt painted a picture of Dr. Tulp, the great Dutch **anatomist**, conducting an anatomy lesson in Amsterdam. At that time, annual public anatomy lessons were held to educate the public. Typically the lesson was held in winter, performed in a theatre over about 3 days, and followed **elaborate** rules of protocol. For example, there was a rule that a prayer must be said at the beginning of the lesson and then a moment of silence must be observed at the end. Although the bodies of criminals who had been sentenced to death were always used, there was some **virtue**, or good, in this. Since men were made in God's image, it was felt humans could understand God better and move closer to him through the clearer understanding of the human body that was provided through these lessons using criminals. Thus, some good could come from evil.

A contemporary of Dr. Tulp, Galileo Galilei, was the subject of many paintings. One of the most well-known is Justus Susterman's portrait of Galileo, which was painted in 1636. Galileo's experiments, too, were the subjects of paintings. For example, in Florence, Italy, there is a fresco, or painting on a wall, which shows Galileo doing one of his motion experiments to develop his theory of **acceleration**. In the painting, Galileo is rolling a **brass** ball down a **plane**, or flat surface, with an **incline**.

Portraits were painted of less well-known, but equally important scientists as well. So, no one from this period was **immune**. For example, there are several portraits of the Scottish mathematician, John Napier, who invented **logarithms**. He was more interested in religion than in mathematics, which he just considered to be his hobby. Nonetheless, Napier's **ingenious** discovery saved astronomers time when calculating large numbers.

[452 words]

## Appendix D: An Example of Vocabulary Enhancement Exercises

### Chapter 5: Main Reading

I.

A. Look at the list of words from the reading. Match each one with a definition on the right.

- |                     |                                     |
|---------------------|-------------------------------------|
| 1. ___ coincide     | a. a basic part of something        |
| 2. ___ immune       | b. rich in detail                   |
| 3. ___ anatomist    | c. to agree exactly                 |
| 4. ___ acceleration | d. the rate of change of speed with |

5. \_\_\_ inclined
6. \_\_\_ building block
7. \_\_\_ elaborate

B. Now complete the sentences below using the correct form of each word.

1. When talking about grading, students' views do not always ( ) with teachers' view.
2. Everyone agrees with him. He is ( ) from criticism.
3. Darwin's theory of evolution has become the basic ( ) for scientists who study genetics.
4. The pipe is ( ) a little so that water can flow down.
5. As an ( ), he specialized in the structure of mammals' bodies including those of whales.
6. He gave an ( ) explanation of the theory so that everyone could understand.
7. The ( ) in global warming is clear when we see the many changes in the climate.

II.

A. Look at the list of words from the reading. Match each one with a definition on the right.

- |                  |                                                                                                                                                                                                             |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. ___ ethereal  | a. to be in a period of highest productivity, excellence, or influence                                                                                                                                      |
| 2. ___ epicycle  | b. creative                                                                                                                                                                                                 |
| 3. ___ brass     | c. a small circle, the center of which moves on the circumference of a larger circle at whose center is the earth and the circumference of which describes the orbit of one of the planets around the earth |
| 4. ___ logarithm | d. the power to which a base, such as 10, must be raised to produce a given number; "log"                                                                                                                   |
| 5. ___ virtue    | e. not of this world                                                                                                                                                                                        |
| 6. ___ ingenious | f. a particularly good or beneficial quality                                                                                                                                                                |
| 7. ___ flourish  | g. a flat or level surface                                                                                                                                                                                  |
| 8. ___ plane     | h. a yellowish metal that is compound of copper and zinc                                                                                                                                                    |

B. Now complete the sentences below using the vocabulary from the column above.

Be sure to use the correct form of each word.

1. The ( ) of Darwin's theory of evolution is that it enables us to understand why one species can be categorized into different groups.
2. You need to come up with an ( ) idea to succeed.
3. This fairy story is a fantasy: it's dreamy and ( ).
4. This trumpet is made of ( ).
5. A ( ) is two dimensional.
6. In the Ptolemaic system of astronomy, the ( ) explains the variations in speed and direction of the motion of the Moon, Sun, and other planets.
7. Ikebana, the Japanese traditional art of arranging cut flowers, ( ) in the sixteenth century.
8. I could never understand ( ) when I studied them in math.

III. Translate the Japanese words into the English vocabulary from the reading.

- |               |                        |
|---------------|------------------------|
| 1. _____ 加速   | 9. _____ 真ちゆう          |
| 2. _____ 一致する | 10. _____ この世のものとは思えない |
| 3. _____ 傾いた  | 11. _____ 発展した         |
| 4. _____ 対数   | 12. _____ 影響を受けない      |
| 5. _____ 基礎   | 13. _____ 詳しい          |

- |               |              |
|---------------|--------------|
| 6. _____ 解剖学者 | 14. _____ 長所 |
| 7. _____ 周天円  | 15. _____ 平面 |
| 8. _____ 独創的な |              |

IV. Rearrange the order of the words into a complete sentence.

- the 17th / Japanese / flourished / in / many / arts / century  
\_\_\_\_\_
- computer / the university / an / needed / elaborate / system  
\_\_\_\_\_
- shiny / the / brass / is / metal  
\_\_\_\_\_
- from / immune / the disease / getting / mean / vaccination / you are / an / influenza  
/ vaccination / doesn't  
\_\_\_\_\_
- with / some Asian / Western / views / coincide / views

**Appendix E: Modified Vocabulary Knowledge Scale**

CHAPTER 5 INTRODUCTION

For (1) and (2), check if the statement is true for you. For (3), give the meaning of the word/phrase in either English or Japanese. For (4), write a sentence using the word/phrase. まず、それぞれの単語について(1)から(3)までの何れかを選びなさい。(3)を選んだ場合、可能なら(4)にすすみなさい。(3)は2点、(4)は3点のポイントとなります。

1. ADEQUATE

- (1) I don't remember having seen this word before.
- (2) I have seen this word before, but I don't know what it means.
- (3) I know this word. It means \_\_\_\_\_
- (4) I can use this word in a sentence.  
\_\_\_\_\_

2. COMMON SENSE

- (1) I don't remember having seen this word before.
- (2) I have seen this word before, but I don't know what it means.
- (3) I know this word. It means \_\_\_\_\_.
- (4) I can use this word in a sentence.  
\_\_\_\_\_