

HOW LOOK-UP FREQUENCY AFFECTS EFL LEARNING? : AN EMPIRICAL STUDY ON THE USE OF HANDHELD-ELECTRONIC DICTIONARIES

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Abstract

The main purpose of this research is to explore the differences in learners' look-up behavior between handheld-electronic dictionaries (hereafter ED) and printed dictionaries (hereafter PD). We focused, particularly, on the relation between learners' look-up frequency and degree of reading comprehension of the text. A total of 72 undergraduate students participated in the experiment, and were divided into two groups (ED and PD Groups) with approximately the same proficiency. Each group was assigned two tasks; to read the texts by using the designated dictionary (ED or PD) and to answer quizzes related to the texts they had read. The number of looked-up words, the time they needed for the tasks, and the quiz scores in each group were statistically examined. The results showed the ED group looked up more words to comprehend the texts than the PD group did in a shorter period of time. However no significant difference was found in the quiz scores. These findings indicate that increased look-up frequency induced by ED does not necessarily guarantee better reading comprehension of learners'. Some pedagogical suggestions will be also made based on the results.

1 Introduction

Over the past two decades, media technology has diversified the types of learners' dictionaries. While electronic dictionaries, such as those on CD-ROM or the Web, have become popular among EFL learners all over the world (e.g., Aust, Kelley, & Roby, 1993; Hulstijn, 1993; Knight, 1994; Koga, 1995), the advent of ED has brought about some changes in Japanese EFL environment. The ED market, in fact, has grown approximately fourfold in the last five years (Yagi, 2004).

Recently, some empirical studies have been conducted to compare learners' look-up behavior in using ED with that of PD (e.g., Koyama & Takeuchi, 2003; Osaki, Ochiai, Iso, & Aizawa, 2003; Shizuka, 2003). These studies investigated mainly, i) time for word retrieval, ii) the number of target words retained, iii) the accuracy of selecting L1 equivalent, and iv) learners' impressions of the dictionaries. Shizuka insisted that ED could lower the "consultation trigger point" (Aust, Kelley, & Roby, 1993 p.70)¹, thereby offering more frequent and efficient access

¹ Aust, Kelley, and Roby (1993) made a comparison between hyper-references and conventional paper dictionaries in FL learning. They reported, based on the results, readers consulted hyper- references much more

to target words, although Osaki et al. maintained that the use of an ED did not guarantee better EFL learning.

Koyama and Takeuchi (2003) is one of the first attempts to clarify some differences in two types of dictionaries by adopting quantitative and qualitative techniques. In the study, they found that some relations existed between the dictionary's interface design and the learners' impression of each dictionary. They also reported that the number of look-ups in using ED was not necessarily proportional to the retention of looked-up words, and claimed that the relatively rudimentary interface design of PD might lead to higher word retention. A subsequent study conducted by the same authors (Koyama & Takeuchi, 2004) confirmed this prediction, and revealed that the words looked up in the PD tended to be better retained than those in the ED. They maintained that the difference in word retention between the two types of dictionaries was attributed to PD's longer searching-process, which is inherent to its interface design.

2 The study

2.1 Research questions

As was described above, there was very little agreement concerning the relative advantages of ED over PD in EFL learning. The following research questions, therefore, were proposed.

1. How does the look-up frequency of Japanese EFL learners in real learning context² differ between ED and PD conditions?
2. Does higher look-up frequency affect the comprehension of EFL reading materials in real learning context?

2.2 Subjects

The subjects of the present study were 72 undergraduate EFL students at a large-scale university. According to the result of a 45-item cloze test, their English proficiency levels were considered to be high intermediate ($M = 24.7$, $SD = 4.810$). They were also asked about their daily dictionary use beforehand via a questionnaire.

On the basis of the scores of the cloze test, they were divided into two groups (ED and PD Groups) with approximately the same proficiency ($t = -.010$, ns). Their daily dictionary use and gender difference were counterbalanced in both groups as well (See Table 1).

frequently than comparable paper references because hyper-references appear to lower the "consultation trigger point".

² Their experiments (Osaki *et al.*, 2003; Shizuka, 2003) were designed on the basis of "speed test", which conducted in the limited time or more artificial situations.

Group	n			Cloze Test		Daily Dictionary Use	
	Male	Female	Total	M	SD	ED	PD
ED	12	25	37	24.70	5.348	27	10
PD	12	23	35	24.71	4.247	29	6

Table 1: Breakdown of the Subjects

2.3 Materials

2.3.1 Dictionaries

Two types of learners' dictionaries were used in the present study. One was *Taishukan's Genius English-Japanese Dictionary* (3rd edition), which is one of the most popular, conventional printed dictionaries in Japan. The other was CASIO EX-word XD-R9000, a hand-held electronic dictionary, which included an electronic version of the same *Taishukan's Genius English-Japanese Dictionary*. The same number of headwords, definitions, examples, and usages were contained in the PD and the ED.

2.3.2 Texts

To reduce the influence of the texts on learners' reading comprehension, two reading materials (texts A and B) were selected from the pre-1st grade test of STEP.³ As seen in Table 2, the readabilities of both texts were considered to be the same.

	Flesch Reading Ease	Flesch-Kincaid Grade Level	Number of Words
Text A	47.2	11.1	377
Text B	43.1	11.0	422

Table 2: Readabilities of Texts A and B

2.4 Procedure

Subjects in ED Group were given an abridged version of the users' manual and were provided enough time to get used to ED before the experiment. The data collection procedure is summarized in Figure 1 below.

³ STEP represents "The Society for Testing English Proficiency, Inc.". This test has been extensively adopted to examine EFL learners' proficiency in Japan.

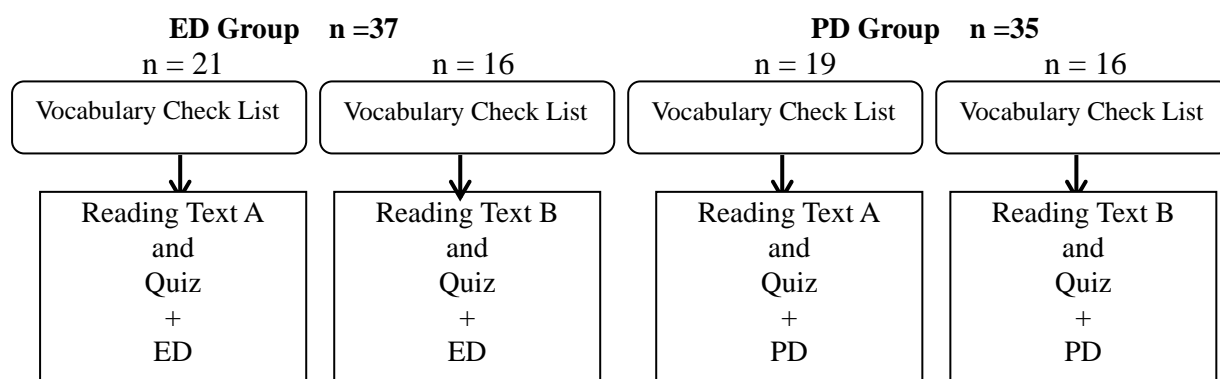


Fig. 1: Procedure of the Study

To investigate the words the subjects had already known, vocabulary lists were distributed, which were composed of all the words in texts C or D excluding the words they should have already learned in a junior high school.⁴ They were asked to circle the words they thought they knew.

As seen in Figure 1, each group was assigned a reading comprehension task by using the designated dictionaries. English proficiency of each group which read the same text (texts C or D) was virtually identical ($F = .966, ns$). The subjects could make free use of either ED or PD while performing the task. They were asked to circle the looked-up words in each text. To measure their comprehension of the texts, they were instructed to take a quiz (Quiz), which consisted of six questions with four multiple-options each. One point was given to the correct answer, so that the full mark was six.

To confirm the reliability of each quiz, a correlation between the scores of the cloze test and the quiz scores were examined. The correlation coefficient shows that, these two sets of scores were significantly related ($r = .291, p \leq .013$), irrespective of the small number of the quiz items, and, thus we could maintain that the comparatively reliable data to measure subjects' comprehension of the texts were obtained. In the experiment, the subjects were given sufficient time so that they could work at their own pace.

3 Results

The descriptive statistics are provided in Table 3. "Time Needed" in the table indicates the time the subjects needed to read the texts and to answer the quiz while consulting a dictionary in each (ED or PD) condition. This was self-measured and reported by the subjects. "Looked-up Words (1)" indicates the total number of words the subjects looked up while reading texts. "Looked-up Words (2)" means the number of the words which the subjects told they knew in the vocabulary check in advance, but were looked up during the task.

⁴ This is based on the word list composed of all the vocabulary which is adopted in the authorized text books of Japanese junior high schools (middle schools). These words were supposed to be learned by our subjects by the time of the experiments, and thus we excluded them from the vocabulary lists used in the present study.

	Group	<i>n</i>	<i>M</i>	<i>SD</i>
Time Needed	ED	37	27'30"	6'37"
	PD	35	32'08"	4'53"
Looked-up Words (1)	ED	37	25.49	13.41"
	PD	35	14.69	7.41
Looked-up Words (2)	ED	37	6.38	5.49
	PD	35	1.14	1.46
Quiz Score	ED	37	3.35	1.16
	PD	35	3.17	1.18

Table 3: Results of Look-up Behavior and Reading Comprehension

As can be seen in Tables 3 and 4, there existed significant differences in “Time Needed”, “Looked-up Words (1)” and “Looked-up Words (2)” between the ED and the PD groups at $p < .001$, which means that the ED group looked up more words to comprehend the texts than the PD group did in a briefer period. Additionally, the results demonstrate that the ED group obviously re-checked more words which they thought they had known than the PD group did.

Nevertheless, computed *t*-values in Table 4 indicate that no significant difference was found in “Quiz Score”. These findings indicate that our subjects obtained almost the same score in the reading comprehension tests (Quiz) under either condition, even though they looked up more words in the ED condition.

	<i>df</i>	<i>t</i>
Time Needed	70	-3.358***
Looked-up Words (1)	70	4.260***
Looked-up Words (2)	70	5.592***
Quiz Score	70	.654

*** $p < .001$

Table 4: Results of Statistical Analysis

4 Discussion

We see from Table 6 that the number of the looked-up words in the ED group was nearly twice that of the PD group. Furthermore, in the case of the re-checked words, the difference between the two groups was considerably wider. In contrast to the number of the looked-up words, the time they needed to perform the task (to read the texts and to answer the quiz in consulting a dictionary) did not differ much in each condition. These findings clearly indicate that the subjects who used ED confirmed more often the definitions of words they thought they had known. Putting it in another way, ED seems to encourage the learners’ look-up behavior more than PD does.

A further important finding in the present study is that no significant difference in the quiz score was found in Table 7. This finding indicates that although the ED group looked up more words than the PD group did, reading comprehension of the texts did not differ. In other words, increased look-up frequency by using ED does not necessarily guarantee better reading comprehension of learners'.

5 Conclusion and Pedagogical Implications

The study reported above provided us with the following conclusions. First, learners' look-up frequency seems to increase in comprehending reading materials when they use ED at hand. Second, ED appears to reduce the time for FL reading. Third, higher look-up frequency induced by using ED does not necessarily produce a beneficial effect on learners' degree of reading comprehension in real learning context.

In light of these findings, EFL learners should be aware of the characteristics of ED, and apply its advantages appropriately to their learning. Since the use of dictionaries in learning EFL is indispensable (e.g.; Wingate, 2004), further research should be aimed at the effective use of ED.

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References

- Aust, R., Kelley, M. J., & Roby, W. (1993). The use of hyper-reference and conventional dictionaries. *Educational Technology Research and Development* 41 (4), 63-73.
- Hulstijn, J.H. (1993). When do foreign-language readers look up the meaning of unfamiliar words? The influence of task and learner variables. *The Modern Language Journal*, 77 (2), 139-147
- Knight, S. (1994). Dictionary use while reading: The effects on comprehension and vocabulary acquisition for students of different verbal abilities. *The Modern Language Journal*, 78 (3), 285-299.
- Koga, Y. (1995). The effectiveness of using an electronic dictionary in second language reading. *Bulletin of the Liberal Arts of Hiroshima University Part 2*, 44, 239-244.
- Koyama, T., & Takeuchi, O. (2003). Printed dictionaries vs. electronic dictionaries: A pilot study on how Japanese EFL learners differ in using dictionaries. *Language Education & Technology* 40, 61-79.

- Koyama, T., & Takeuchi, O. (2004). Comparing electronic and printed dictionaries: How the difference affected EFL learning. *JACET Bulletin*, 38, 33-46.
- Osaki, S., Ochiai, N., Iso, T., & Aizawa, K. (2003). Electronic dictionary vs. paper dictionary: Accessing the appropriate meaning, reading comprehension and retention. *Proceedings of the 3rd ASIALEX Biennial International Conference*, 205-212.
- Shizuka, T. (2003). Efficiency of information retrieval from the electronic and the printed versions of a bilingual dictionary. *Language Education & Technology* 40, 15-33.
- Wingate, U. (2004). Dictionary use -- the need to teach strategies. *Language Learning Journal* 29, 5-11.
- Yagi, S. (2004, June). *Denshijisho shouhin no gijyutsu kaihatsu suii to saishin jyoho* [A shift in the development and the latest information concerning electronic dictionaries] Paper presented at the JACET Kansai Chapter Conference, Kobe, Japan.