# University L2 Leaners' Dictionary Use
# in Multiple-Choice Vocabulary Quiz:
# A Pilot Study

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## 1. Introduction

The modern lexicographers have dedicated themselves to compile good dictionaries focusing on a study of the populations of dictionary users. Bejoint (2010: 227) noted that "The different functions of the dictionary correspond to different choices that need to be made by the lexicographer early in the process of compilation." One of the possible functions of the dictionary picked up by Hartmann (2001) was "the dictionary as an aid to foreign-language (hereafter EFL) learning."

Using dictionaries, in fact, has been considered to be crucial in learning EFL. Several studies claimed that dictionary use contributed to both reading comprehension and vocabulary acquisition for EFL learners (e.g., Fraser, 1999; Luppescu & Day, 1993). Fraser (1999) found that more vocabulary was retained from inferring from context when the inference was followed up by consulting a dictionary. When participants in the study inferred and then consulted, they had a higher retention rate than if they inferred or consulted alone. Luppescu and Day (1993) attempted to confirm the effectiveness of bilingual dictionary use in EFL learning. In the study, a total of 293 Japanese university students were divided into two groups ("dictionary" and "no dictionary" groups), and each group read a short story containing 17 target words. Their retention of the target words was assessed with a multiple-choice test immediately after reading. The results indicated that the "dictionary" group obtained a higher score on the vocabulary test than the "no dictionary" group did. Additionally, the findings indicated that a dictionary might be helpful to disambiguate word meanings when learners could not infer them completely from the context. Luppescu and Day concluded that the use of a

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bilingual dictionary while reading could facilitate EFL learners' vocabulary learning, and seemed to help EFL learners who could not infer word meanings from the context with comprehending texts.

Since the end of the 20th century, as the modern technology continues to advance at a breathless pace, dictionaries have been transformed dramatically; "Modern dictionaries . . . are in this and other respects widely affected by the digital revolution (Mugglestone, 2011: 116)." While digital types of dictionaries such as those on CD-ROM or the Web were widely used around the world, pocket electronic dictionaries (hereafter E-dictionaries) has had the overwhelming support of college and high school students especially in East Asian countries (Koyama, 2015). In the 2000s, a few studies were conducted to focus on a decisive difference in its interface between printed and E-dictionaries (e.g., Koyama & Takeuchi, 2004, 2005, 2007; Bower & McMillan, 2007, Kobayashi, 2008). Studies by Koyama and Takeuchi showed that the use of E-dictionaries in EFL learning seemed to be a double-edged sword. On the one hand, E-dictionaries enhanced learners' lookup frequency, lowering the "consultation trigger point" of EFL learners (Aust *et. al.,* 1993: 70). On the other hand, this lookup frequency did not necessarily contribute to their outcomes.

As Collins (2016: 38) pointed out, however, "With a cursory glance around a current EFL class, the English teacher may be struck by the absence of dictionaries from students' desks, either paper-based or electronic," most college students do not use their E-dictionaries in EFL classes. In fact, in a survey by Koyama and Yamanishi (2016, 2017), many high school students reported using both their E-dictionaries and their smartphones when reading and writing outside the classroom. This tendency is now sthengthened by the rapid increase in smartphone ownership.

Then, how do Japanese college students deal with an unfamiliar word they encounter while reading an English text or answering a quiz in class? Are they able to obtain necessary information about the target words or phrases from their mobile devices? Considering pedagogical implications for learning EFL in using dictionaries, this question could not be ignored.

## 2. The study

### 2.1 Purposes

The purposes of the present study were to investigate students' use of gadgets and apps to obtain necessary information when they encounter unknown words in EFL class, and to explore its relationship with English test scores. The following three research questions were addressed:
(1) What kind of devices and apps do Japanese college students use to look up unknown words when answering multiple-choice vocabulary quiz in their EFL class?
(2) Are there any differences in the number of lookups in terms of dictionary types?

(3) Are there any differences in learning outcomes and English proficiency levels in terms of dictionary types?

## 2.2 Participants and methodology

Participants in the study were 98 undergraduate students (18-19 years old) at two universities located in the Kansai region. Their majors were either education or health and sports. Based on the results of a 45-item pre-class cloze test, their English proficiency level ranged from false-beginners to intermediate ($M = 18.08$, $SD = 4.97$). A questionnaire given in advance revealed that they mainly used E-dictionaries when studying English in their high school days.

The experiment was conducted in an English reading and writing class as part of a compulsory subject. The multiple-choice vocabulary quiz used in the experiment consisted of 15 questions, which was selected from Part 5 of TOEIC® official workbook (See Appendix). It seemed to include several words deemed to be unknown or unfamiliar to the participants. The participants were instructed to answer the 15 questions and were allowed to use their mobile devices such as smartphone apps or E-dictionaries to look up unknown words if necessary. They were also asked to identify the words looked up by circling them on the quiz sheet while performing the task. After the session ended, they reported on the devices, apps and/or dictionaries used. The entire session, including instruction, lasted approximately 40 minutes. No time constraints were imposed; therefore, they could work at their own pace.

## 2.3 Dada analyses

To answer the first research question, we analyzed students' responses to the question as to what mobile devices and dictionary apps they had used while engaging in the English vocabulary quiz. To answer the second research question, the participants were divided into three major dictionary groups, and the number of words circled by the students in each group was counted. Then, a one-way analysis of variance (ANOVA) was conducted to determine if there were significant differences in the number of lookups in terms of dictionary types. To answer the third research question, the three groups' learning outcomes were assessed by the vocabulary quiz and their English proficiency levels assessed by the cloze test. A one-way ANOVA was used to compare these English test scores in terms of dictionary types. Before running each one-way ANOVA, homogeneity of variances for the three groups was confirmed using Levene's test to ensure that our data met the statistical assumption. If significant differences were found by one-way ANOVA, a post-hoc test (Tukey HSD) was run to find out which group's mean was significantly different from each other. These statistical analyses were conducted using SPSS ver. 23.

## 3. Results

### 3.1 Devices and apps

Table 1 shows the types of devices used by the participants. As shown in the table, 75.5% of the participants utilized smartphone dictionary apps and 18.4% used E-dictionaries. There were no tablet users in this study.

This study further examined which dictionary apps were installed and used in these mobile devices. The analysis showed that they used various smartphone dictionary apps, and particularly, Weblio and Google Translate were very popular (Table 2). Weblio is a free bilingual dictionary and encyclopedia offered by Weblio Corporation. It is one of the largest dictionaries available in Japan, including 79 Japanese-English and English-Japanese dictionaries with 5,020,000 English words and 4,510,000 Japanese words. This dictionary enables users to perform a cross search on such multiple dictionaries, providing word definitions, pronunciations, and examples[1]. The second most popular dictionary app among the participants was Google Translate. It is a free translation service developed by Google, offering word-, phrase-, and sentence-translation as well as its pronunciation. Both Weblio and Google Translate offer a website interface and mobile apps for Android and iOS. Our participants accessed these services via their smartphones.

While many students (75.5% of our participants) utilized smartphone dictionary apps, some students (18.4%) seems to prefer E-dictionaries to smartphone dictionary apps (Table 1). As shown in Table 2, *Genius English-Japanese Dictionary* was commonly used by the E-dictionary users. This is one of the best-selling dictionaries among English learners in Japan. The next sections will focus on the top three dictionaries (i.e., Weblio, Google Translate, and E-dictionaries) and report on how these dictionaries were used by the participants.

**Table 1**  *The Number and Percentage of Mobile Devices Used by the Participants*

| Devices | $n$ | % |
| --- | --- | --- |
| Smartphone dictionary apps | 74 | 75.5 |
| E-dictionaries | 18[a] | 18.4 |
| Unspecified | 1 | 1.0 |
| No dictionaries | 5 | 5.1 |
| Total | 98 | 100 |

[a]Among eighteen E-dictionary users, four of them used both E-dictionaries and smartphone dictionary apps.

**Table 2**  *The Number of Dictionary Apps Installed and Used in the Mobile Devices*

| Devices | Dictionary apps | $n$ |
|---|---|---|
| Smartphones | Weblio | 34 |
| | Google Translate | 31 |
| | Google | 5 |
| | LINE | 4 |
| | Yahoo | 3 |
| | ALC Eijirō | 3 |
| | Others[a] | 7 |
| E-dictionaries | *Genius English-Japanese Dictionary* | 15 |
| | Others[b] | 4 |

*Note.* Multiple answers were allowed.

[a]Others include a word navigation app, a translation app and so on.

[b]Others include *English-Japanese Dictionary for the General Reader, O-LEX English-Japanese Dictionary,* a thesaurus, and an unknown dictionary.

## 3.2 Look-up frequency

The participants were divided into the three dictionary groups (Weblio, Google Translate, and E-dictionaries) according to the types of dictionaries they used. Some E-dictionary users also reported using smartphone dictionary apps, but they were included in the E-dictionary group since their English teacher confirmed that their use of smartphone device was minimum, and that E-dictionaries were mainly used by these students. Students who reported using both Weblio and Google Translate were excluded from the data analysis.

This study found that the E-dictionary group looked up more words compared to the other two smartphone groups (Table 3). As shown in Table 4, the one-way ANOVA revealed that there were significant differences in the number of lookups among the three groups ($F(2, 58) = 3.36$, $p = .04$, $\eta^2 = .10$). The post-hoc test (Tukey HSD) showed that the E-dictionary users consulted the dictionaries more frequently than the Google Translate group ($p = .04$, $d = .74$). There was no significant difference in the look-up frequency between the E-dictionaries and Weblio groups ($p = .16$, $d = .60$).

**Table 3**  *Means and Standard Deviations of the Number of Lookups by Three Dictionary Groups*

| Group | $n$ | The number of lookups | |
|---|---|---|---|
| | | $M$ | $SD$ |
| Weblio | 27 | 22.00 | 14.37 |
| Google Translate | 16 | 16.13 | 22.49 |
| E-dictionaries | 18 | 32.83 | 22.52 |

**Table 4**  *One-Way Analysis of Variance of the Number of Lookups by Three Dictionary Groups*

| Source | df | SS | MS | F | p | $\eta^2$ |
|---|---|---|---|---|---|---|
| Between groups | 2 | 2497.52 | 1248.76 | 3.36 | .04 | .10 |
| Within groups | 58 | 21574.25 | 371.97 | | | |
| Total | 60 | 24071.77 | | | | |

## 3.3 English test scores

The relationships between learners' dictionary use and their English test scores were examined. More specifically, the three dictionary groups' learning outcomes measured by the word quiz and English proficiency levels assessed by the cloze test were scrutinized. Regarding the learning outcomes, the E-dictionary group gained a little bit higher scores on the word quiz than the other two smartphone groups (Table 5). However, as shown in Table 6, there were no significant differences in the test scores among the three groups ($F$ (2, 58) = .21, $p$ = .81, $\eta^2$ = .01). These results suggest that despite the frequent lookups by the electronic dictionary group (Tables 3 and 4), there were not considerable differences in the task performance among the three dictionary groups.

**Table 5**  *Means and Standard Deviations of the Word Quiz Scores by Three Dictionary Groups*

| Group | n | Word quiz scores | |
|---|---|---|---|
| | | M | SD |
| Weblio | 27 | 6.30 | 2.60 |
| Google Translate | 16 | 6.44 | 1.93 |
| E-dictionaries | 18 | 6.78 | 2.65 |

*Note.* The maximum score is 15.

**Table 6**  *One-Way Analysis of Variance of the Word Quiz Scores by Three Dictionary Groups*

| Source | df | SS | MS | F | p | $\eta^2$ |
|---|---|---|---|---|---|---|
| Between groups | 2 | 2.54 | 1.27 | .21 | .81 | .01 |
| Within groups | 58 | 350.68 | 6.05 | | | |
| Total | 60 | 353.21 | | | | |

As for the English proficiency levels, Google Translate group obtained higher scores on the cloze test than the other two groups (Table 7). However, as shown in Table 8, the one-way ANOVA did not confirm significant differences in the test scores among the three groups ($F$ (2, 58) = 2.17, $p$ = .12, $\eta^2$ = .07). Based on these findings, it seems that there were no relationships between dictionary types and English proficiency levels. However, given the small sample size with $\eta^2$ of .07 indicating a medium effect size (Mizumoto & Takeuchi 2008), there might have been the probability of a type II error (i.e.,

concluding that there were no significant differences when there were differences). Therefore, the results obtained in this study should be interpreted with cautions, and replication studies with a larger sample size should be conducted to verity the relationships between dictionary use and L2 proficiency levels.

**Table 7**  *Means and Standard Deviations of the Cloze Test Scores by Three Dictionary Groups*

| Group | n | Cloze test scores | |
| --- | --- | --- | --- |
| | | M | SD |
| Weblio | 27 | 17.44 | 5.24 |
| Google Translate | 16 | 20.25 | 3.22 |
| E-dictionaries | 18 | 17.11 | 5.50 |

*Note.* The maximum score is 45.

**Table 8**  *One-Way Analysis of Variance of the Cloze Test Scores by Three Dictionary Groups*

| Source | df | SS | MS | F | p | $\eta^2$ |
| --- | --- | --- | --- | --- | --- | --- |
| Between groups | 2 | 103.15 | 51.57 | 2.17 | .12 | .07 |
| Within groups | 58 | 1381.44 | 23.82 | | | |
| Total | 60 | 1484.59 | | | | |

## 4. Discussion

The first research question aimed to discover what devices and dictionary apps are used by Japanese college students in EFL class. This study showed that many students (75.5% of our participants) utilized free smartphone dictionary apps, such as Weblio and Google Translate, when they encountered unknown words. These findings may reflect the high penetration rate of smartphones in the society and the expansion of free access to these dictionary apps. On the other hand, some of the students (18.4% of our participants) chose E-dictionaries even though many of them possessed their own smartphones. This finding is in line with a previous study by Koyama (2016) suggests that some learners had a preference for E-dictionaries over smartphone apps because of the user interface design －such as the presence of a physical keyboard and function keys like usage examples or idioms.

The second research question inquired into the number of lookups in terms of dictionary types. The comparison of the look-up frequency across three dictionary groups (i.e., Weblio, Google Translate, and E-dictionaries) indicated that the E-dictionary group looked up more words than the other two smartphone groups, and the differences between the E-dictionary and Google Translate groups were ascertained statistically by the one-way ANOVA. These results supported the hypothesis (Koyama,

2016) that the number of lookups in using E-dictionaries will be more than that of smartphone dictionary apps because of marked differences in its interface design of both devices (i.e., a data display and a physical keyboard). Although this hypothesis was not supported by Koyama (2016) using a non-parametric statistical test (*Wilcoxon signed-ranks test*) with a small sample size ($n = 15$), the empirical evidence provided by the present study may suggest that there seems to be relationship between dictionary types and look-up frequency and that the interface design of each dictionary device may affect learners' look-up behavior in some way. Further investigations should be carried out to shed light on the influence of interface design on learners' lookup behavior.

The third research question concerned the relationships between dictionary use and English test scores. This study revealed that there were no significant differences in learning outcomes (as measured by the word quiz) or English proficiency levels (assessed by the cloze test) among the three dictionary groups. These findings suggest that although the electronic dictionary group showed higher look-up frequency as discussed above, there were no significant differences in English test scores in terms of dictionary types. In other words, the frequent lookups using E-dictionaries are not likely to ensure high scores on English tests. Based on these findings, we assume that there may be other factors affecting students' English test scores. These factors may include learners' references skills, or strategies for dictionary use. Koyama and Takeuchi (2009) suggested that good language learners employed several strategies such as guessing meaning from the context before actual lookups, associating dictionary information with their background knowledge, and checking usage examples of the target words, to obtain necessary information when they consulted E-dictionaries. Another possible factor influencing the learning outcomes could be students' English proficiency levels. Although the present study did not confirm the significant difference in English proficiency levels among the three dictionary groups, there might have been a risk of type II error considering the small sample size and the medium effect size (Tables 7 and 8). In the future, replication studies with a large sample size should be conducted to verify the relationships among dictionary use, English proficiency, and learning outcomes.

## 5. Conclusion

This study is preliminary in nature, investigating Japanese college students' use of gadgets when they encounter unknown words and exploring its relationship with English test scores. The summary of the findings follows:

(1) Many students (75.5% of our participants) utilized smartphone dictionary apps, such as Weblio and

Google Translate, while some students (18.4%) showed a preference for E-dictionaries to obtain necessary information in EFL class;

(2) E-dictionary users looked up more words than the users of smartphone dictionary apps; and

(3) There were no statistically significant differences in English test scores in terms of dictionary types.

Lastly, potential limitations and future directions of this study are discussed. One limitation is the relatively small number of participants included in each of the three dictionary groups (i.e., Weblio, Google Translate, and E-dictionaries). In this connection, it bears noting that the medium effect size was estimated for the results pertaining to the three groups' English proficiency levels, that were not statistically significant (Table 8). Given the small sample size and the medium effect size, this pilot study suggests no decisive results of the links between dictionary use and English test scores. Replication studies are needed to elucidate the links with a larger sample size. Another limitation is the lack of data concerning look-up behavior. Focusing on the major three dictionaries used by the participants, this pilot study examined only the number of lookups according to the dictionary types. As discussed in the above section, there may be other factors (i.e., learners' reference skills and dictionary strategy use) affecting their English test scores. Further investigations should be carried out into how learners utilize dictionaries, particularly smartphone dictionary apps since the effective use of these gadgets has yet to be explored despite its widespread use among EFL learners. After a wealth of knowledge is accumulated on the use of smartphone dictionary apps, we can finally move to the next phase, dictionary skills and strategy training, to help students spontaneously consult dictionaries, and hopefully, lead them to become autonomous EFL learners in the future.

**Notes**

*This is a revised version of the papers presented at the LET 58th (2018) Annual Conference in Osaka, Japan and the GLoCALL 2018 in Suzhou, China.

1)   See https://help.weblio.jp/ejje/endictionary/e_info/e_i_dictionary/h0115 for more information about Weblio.

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## Appendix

*The multiple-choice vocabulary quiz (excerpt)*

次の問題 15 問を「満点を目指して」解答してください。また、辞書（電子辞書、スマホのアプリ、Google 検索）は自由に使ってもらって構いませんが、調べた単語やイディオムは○で囲んでください。なお、問題文への書き込みは自由です。

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### Part 5 (TEST 1) (pp. 48-50)

① Poleberry Local Marketplace takes pride in carrying only -------- processed dairy products from the region.
(A) nature
(B) natures
(C) natural
(D) naturally

② The restaurant critic for the *Montreal Times* -------- the food at Corban's Kitchen as affordable and authentic.
(A) ordered
(B) admitted
(C) described
(D) purchased

③ According to the city planning director, Adelaide's old civic center must be -------- demolished before construction on a new center can begin.
(A) completely
(B) defectively
(C) plentifully
(D) richly

④ For 30 years, Big Top Prop Company has been the premier -------- of circus equipment for troupes around the world.
(A) providing
(B) provision
(C) provider
(D) provides

⑬ We regret to announce that Mr. Charles Appiah has resigned his position as senior sales manager, -------- next Monday.
(A) effect
(B) effected
(C) effectiveness
(D) effective

⑭ Rather than wearing business attire on Thursdays, staff may choose to wear casual clothing --------.
(A) enough
(B) despite
(C) instead
(D) in case

⑮ Your -------- registration card provides proof of ownership in case this product is lost or damaged.
(A) frequent
(B) indicative
(C) validated
(D) dispersed

□□□□　→　　→　　→　　→　□□□□□□□□終了時刻□□□：□□□□

この問題を解くのに、使った辞書はなんですか？スマホを使った場合は、詳しく記述してください。（例：電子辞書のジーニアス、スマホアプリのじしょ君、Google 翻訳など）

引用文献：□ Educational Testing Service (2016). 「READING TEST PART 5」『TOEIC®テスト公式問題集―新形式問題対応編』 pp. 48-50, 90-92. 国際ビジネスコミュニケーション協会