

# Changes in Electronic Dictionary Usage Patterns in the Age of Free Online Dictionaries: Implications for Vocabulary Acquisition

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## Abstract

Internet and smartphone technology provides the English language learner with access to free and accessible dictionary technology like never before. However, the implications of this dramatic shift have yet to be fully addressed in dictionary usage and comparative effectiveness research. The primary aim of this research is to establish an up-to-date picture of Japanese college students' usage of traditional electronic and Internet-based dictionary applications. A questionnaire was conducted and responses analyzed from 498 undergraduate college students taking compulsory EFL courses. Follow-up interviews were also conducted with five students and their responses were analyzed. The results showed that the vast majority of students were not using traditional paper dictionaries and that not only has the possession rate of electronic dictionaries fallen, but also that a substantial number of electronic dictionary owners were choosing to use other types of Internet-based dictionary applications. The pedagogical implications of these results are discussed within the framework of the "mental effort" (Hulstijn, 1992) and "involvement load" (Laufer & Hulstijn, 2001) hypotheses. The potential outcomes of a "lowered consultation trigger point" (Aust, Kelley, & Roby, 1993) as a result of the ease and convenience of Internet-based dictionaries and applications are also discussed.

**Key Terms:** Electronic dictionaries, Internet dictionaries/applications, Japanese EFL students, vocabulary acquisition, mental effort hypothesis, involvement load hypothesis, consultation trigger point

## 1. Introduction

With the recent development of smartphone and Internet-based dictionary applications, students have a far greater range of options available when they need to reach for a dictionary to help with their English study. English teachers will have noticed the increasing use of such technology by students. The processes involved when consulting a dictionary, including how and to what extent students engage with the wealth of information dictionaries provide such as word spelling, synonyms, antonyms, usage and appropriateness, are no doubt influenced by the varying designs and content of the online dictionary tools that our students choose. Furthermore, while traditional paper dictionaries have been compiled by professional lexicographers, the same cannot definitively be said for the myriad of free online dictionaries and dictionary-like applications that are literally only a few clicks away. The following paper attempts to provide a clearer picture of exactly how Japanese university students' use of different dictionary technology has changed in recent years. More precisely, it aims to create a clearer picture of exactly what type of dictionary technology students are employing both inside and outside the classroom, and also considers the potential pedagogical implications which arise as a result of this technological shift.

### 1.1 Framing the current study within dictionary usage research

The following literature review deals with two primary areas relating to dictionary use, vocabulary learning, and reading comprehension: the comparative advantages of dictionary use versus no-dictionary use, and traditional dictionary use versus electronic dictionary use.

When an unfamiliar word is encountered in a text, the reader generally has three options: ignore it, infer a meaning

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from contextual clues, or use a dictionary to find a suitable definition. It is the third option that is the focus of this paper. There is a substantial body of research into how dictionary usage and type affect incidental vocabulary acquisition and reading comprehension (Bensoussan, Sim, & Weiss, 1984; Nesi & Meara, 1991; Knight, 1994). Recent research has largely focused on establishing whether a comparative advantage of certain types of dictionaries (monolingual, bilingual, paper or electronic) can be found. Similar research has also attempted to establish whether the retention of unknown vocabulary is greater when learners are provided with translations, synonyms or other contextual clues, or when the learner must infer meaning by themselves. In order to appropriately frame the present paper, it is important to consider the major themes identified in the existing dictionary research.

## 1.2 Dictionary vs. no-dictionary

Early research in this field has focused on the influence traditional paper dictionary usage has on students' vocabulary learning and reading comprehension performance. In a study of 293 Japanese EFL university students, Lupescu and Day (1993) found that students using a bilingual dictionary performed significantly better on a post-hoc vocabulary test. The results were not consistent, however, and the meaning of some items of vocabulary proved difficult for dictionary users to establish due to the often complex processes involved when identifying the correct definition from multiple dictionary entries. In an investigation of 105 Spanish language learners, Knight (1994) concluded not only that students who used a dictionary learnt more words, but also that they achieved higher reading comprehension scores. Based on the results of delayed test scores, Knight did however suggest that the students in the no-dictionary group learnt the words better, that is to say, they processed the information more deeply. While the results of the above studies support the use of dictionaries, opposing results have also been found. In a study of reading comprehension performance under three conditions (no-dictionary, monolingual and bilingual dictionary), Bensoussan, Sim, and Weiss (1984) found no significant difference in either test scores or amount of time taken to complete the test. They also concluded that using a dictionary can leave the learner with a sense of frustration and confusion. Nesi and Meara (1991) replicated the Bensoussan, Sim and Weiss (1984) study. Their results confirmed no significant difference in reading comprehension test scores, although the dictionary group took significantly longer to complete the test.

A central theme of dictionary vs. no dictionary research has been establishing the importance of using contextual clues and the deeper processing skills that occur when the meaning of an unknown word must be inferred by the reader. Hulstijn (1992, p. 122) concluded that when a learner infers an unknown word's meaning by themselves, they invest more mental effort and are therefore more likely to remember the word's form and meaning than when the meaning is provided for them. Not all words, however, can be inferred, especially by the novice learner. Indeed, caution is recommended in situations when a sufficiently large and clear context is not available on which to base inferences (Laufer & Bensoussan, 1982). It is possible that the learner may assume their inference to be correct and therefore forgo the opportunity to look up the word in a dictionary. In my view, it is also reasonable to expect the learner to confront situations when additional information about a word's meaning must be sought, either through a dictionary or another source. Laufer and Bensoussan (1982) therefore

argue that the important question is not whether the process of learners inferring word meaning by themselves is more beneficial, but rather which type of contextual clues or procedures are more effective in assisting the learner to infer the *correct* meaning.

### **1.3 Traditional dictionary vs. electronic dictionary**

With the development and commercialization of electronic dictionaries (EDs), further research has been carried out to establish any comparative advantages of EDs over traditional paper dictionaries (PDs). While studies have concluded in favor of using electronic or CD-ROM dictionaries in terms of word meaning and spelling (Inami, Nishikata, Nakayama & Shimizu, 1997; Amirian & Heshmatifar, 2013), the results are far from conclusive. A number of studies have identified that, although students using EDs looked up more words in a shorter period of time than students using PDs (Koyama & Takeuchi, 2004(b), 2007; Shizuka, 2003), no significant difference is achieved in reading comprehension scores (Koyama & Takeuchi, 2004(b), 2007). Contrary findings have, however, been made that indicate no significant improvement in search time for students using an ED (Koyama & Takeuchi, 2003; Koyama & Takeuchi, 2004(a)). Conversely, Koyama and Takeuchi (2004a) did identify a significantly higher rate of retention for PD users which was attributed to the more elaborate search process required in the PD search process. Similarly, Aust, Kelley and Roby (1993) identified lower rates of consultation for students reading with traditional PDs than for students reading electronic texts which, when a word is clicked, offer definitions for unknown words in a window on the opposing page. They did not, however, find any difference in reading comprehension scores. The higher rate of consultation produced by the electronic text hyper-references was attributed to a lower “consultation trigger point” as a result of a more efficient consultation process. The consultation trigger point (Aust, Kelley, & Roby, 1993) is described as the point at which a student decides to consult a dictionary to confirm the meaning of an unknown word or phrase. In other words, the lower the consultation trigger point, the sooner a student will look up an unknown word. While EDs may stimulate higher rates of consultation, this may not necessarily be beneficial for the student. Kobayashi (2007) found that low-level proficiency ED users were inclined to look up unfamiliar words with little attempt to recall or guess word meaning, potentially resulting in less time being spent by the student interacting with the textual content. Tang (1997) suggested that electronic dictionary usage be discouraged if the learner indiscriminately consults the dictionary for unknown words. It could be argued, therefore, that the rapid consultation process which EDs and other technology provide may induce a number of adverse pedagogical outcomes.

### **1.4 Purpose and significance of the study**

The research described above has dealt with electronic tools in the form of hyper-referenced texts, CD-ROM and other electronic dictionary technology. However, in recent years language learners in Japan have witnessed an explosion of free Internet-based dictionary applications that can be accessed both inside and outside the classroom via PCs and smartphones. With a cursory glance around a current EFL class, the English teacher may be struck by the absence from students’ desks of dictionaries, either paper-based or electronic. Although it has previously been reported that 96% of Japanese students

majoring in English at a university in Tokyo owned an ED (Bower & McMillan, 2007), the results of that study are now a decade old and an up-to-date picture of dictionary ownership and usage patterns is therefore required, particularly in light of figures which indicate that domestic yearly sales of portable EDs in Japan have fallen considerably over the last few years from a peak of approximately 2.8 million in 2007 to 1.73 million in 2012 (Japan Business Machine and Information System Industries Association, 2013). For research into the comparative benefits of dictionaries to remain relevant to the EFL student and teacher, it is vital that the dictionaries that students are actually using are the focus of such research.

## **2. Research Method**

### **2.1 Research rationale and questions**

Using a questionnaire and follow-up interviews, the following research questions were examined with the aim of establishing a clearer picture of Japanese EFL college students' usage of, and opinion towards, electronic and Internet-based dictionary applications.

1. What type of Internet-based dictionary applications are currently being used in the Japanese EFL classroom?
2. Are handheld electronic dictionaries still the most frequently used dictionary in the classroom and for self-study?
3. What factors motivate the choice of dictionary type in an environment where students possess an electronic dictionary but other devices and tools are available to them?

### **2.2 Participants and methodology**

Participants in this study included 498 Ritsumeikan Asia Pacific University (APU) Japanese language basis students studying compulsory track general English classes as part of a bachelor's degree in either business administration or Asia Pacific studies. Participants' English proficiency ranged from elementary to upper-intermediate levels. All of the participants were Japanese language basis students; that is to say, they were either native Japanese speakers or overseas students studying on a Japanese language basis. The questionnaire was completed by students studying in reading and vocabulary-focused English B courses, with the exception of those completed by students studying speaking and writing focused elementary English A courses. The questionnaire was completed in Japanese, the students' university entry basis language. Based on the initial results of the questionnaire, follow-up interviews were conducted with five students who had indicated in the questionnaire their willingness to participate in this research. Students were selected based on the following criteria:

- 1) Owning an electronic dictionary (questionnaire item No.2)
- 2) Using a smartphone or PC-based dictionary most frequently during English class time (questionnaire item No.3).
- 3) Using a smartphone or PC-based dictionary most frequently when doing their English homework (questionnaire item No.4).

The five students were asked the following questions:

- 1) Why do you use a smartphone or PC-based dictionary more frequently than your electronic dictionary in class?
- 2) Why do you use a smartphone or PC-based dictionary more frequently than your electronic dictionary when doing your homework?

3) Would you consider buying an electronic dictionary in the future?

While the questionnaire was voluntary, interviewees were given a 1000-yen book voucher. The interviews were conducted by the researcher in Japanese, the interviewees' L1.

### 3. Results

#### 3.1 Questionnaire results.

##### Questionnaire item 1: *What is your English class level?*

A total of 498 responses were collected from elementary, pre-intermediate, intermediate, and upper-intermediate English language students. Complete figures are shown in Table 1.

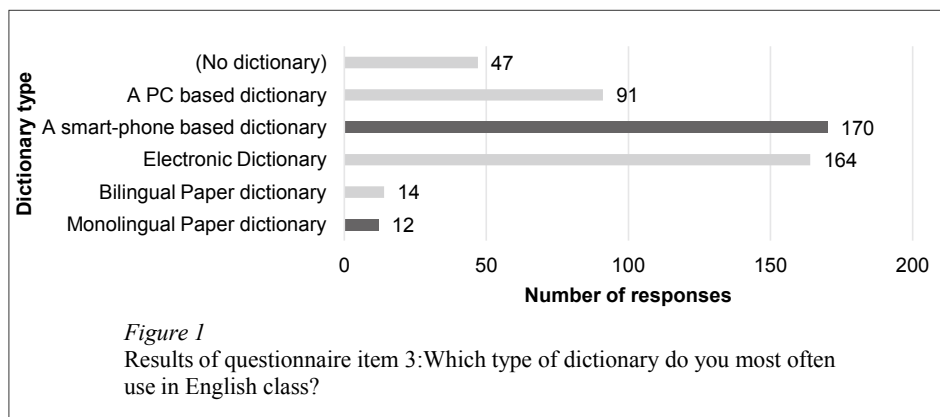
Table 1  
*Breakdown of participant numbers and levels*

Student level	(n)	%
Elementary	12	2.40%
Pre-intermediate	178	35.70%
Intermediate	98	19.70%
Upper intermediate	210	42.20%
<b>Total</b>	<b>498</b>	<b>(100%)</b>

##### Questionnaire item 2: *Do you own a portable electronic English dictionary?*

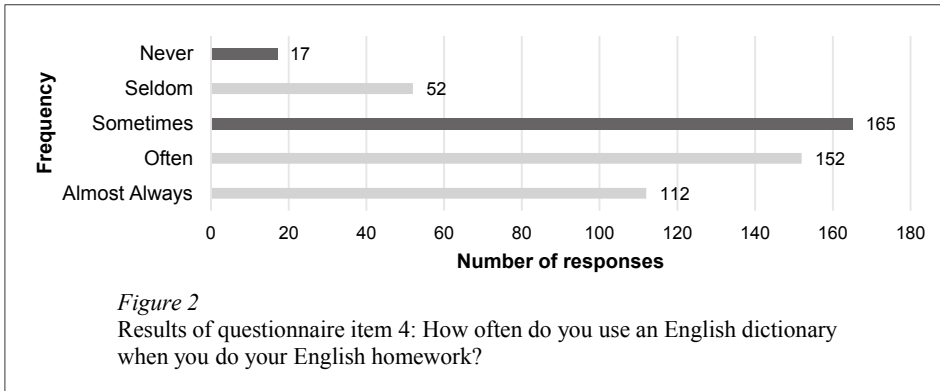
The majority of students (354, 71.1%) stated that they owned a portable electronic dictionary. Conversely, 144 respondents (28.9%) stated that they did not.

##### Questionnaire item 3: *Which type of dictionary do you most often use in English class?*



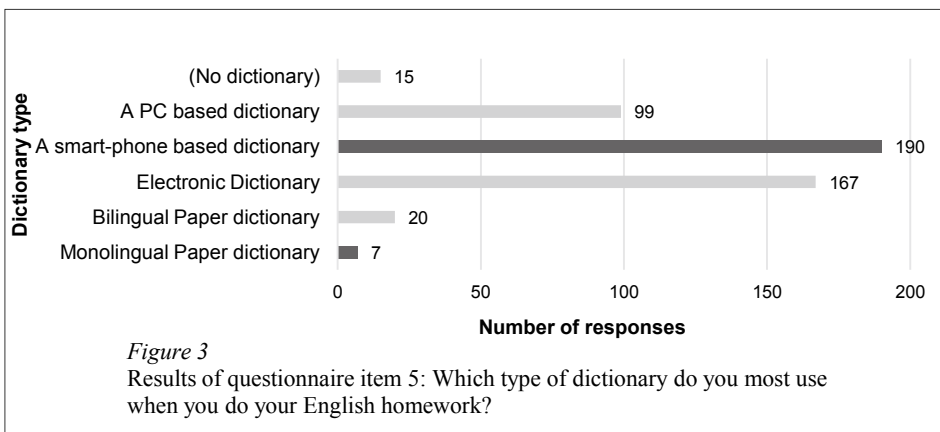
The most frequently used dictionary type was a smartphone-based dictionary (170, 34.1%), followed by an electronic dictionary (164, 32.9%). Bilingual and monolingual PDs were the least frequently used (14, 2.8%; 12, 2.4%). Complete figures are shown in Figure 1 above with the highest and lowest response types highlighted.

**Questionnaire item 4:** *How often do you use an English dictionary when you do your English homework?*



The majority of students (165, 33.1%) responded “sometimes,” followed by “often” (152, 30.5%) and “almost always” (112, 22.5%). Only 17 students (3.4%) responded that they “never” use a dictionary when doing their homework. Complete figures are shown in Figure 2 above with the highest and lowest response types highlighted.

**Questionnaire item 5:** *Which type of dictionary do you use the most when you do your English homework?*



The most frequently used dictionary type was a smartphone-based dictionary (190, 38.2%), followed by an electronic dictionary (167, 33.50%). Bilingual and monolingual PDs were the least frequently used (20, 4%; 7, 1.40%). Complete figures are shown in Figure 3 above with the highest and lowest response types highlighted.

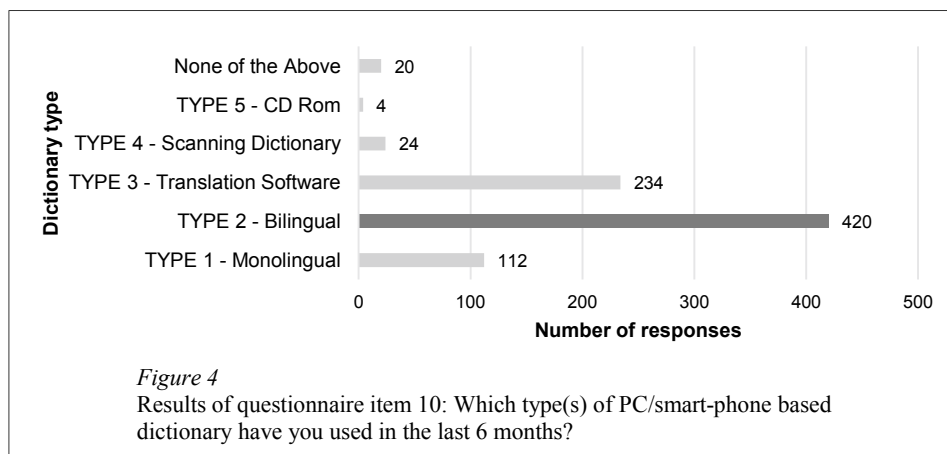
**Questionnaire items 6-9:** *Regarding respective in-class usage frequencies of each type of dictionary.*

Table 2:  
Breakdown of responses to questionnaire items 6-9

	Paper dictionary		Electronic dictionary		Smartphone based dictionary		PC-based dictionary	
Almost always	11	2.20%	43	8.60%	42	8.40%	43	8.60%
Often	24	4.80%	66	13.30%	<u>119</u>	<u>23.90%</u>	<u>150</u>	<u>30.10%</u>
Sometimes	57	11.40%	<u>154</u>	<u>30.90%</u>	<u>158</u>	<u>31.70%</u>	<u>153</u>	<u>30.70%</u>
Seldom	46	9.20%	86	17.30%	83	16.70%	69	13.90%
Never	<u>360</u>	<u>72.30%</u>	<u>149</u>	<u>29.90%</u>	96	19.30%	83	16.70%

The majority of students responded that they “never” use a PD in class (72.3%). 30.9% of students “sometimes” use an electronic dictionary in class, however a similar number stated that they “never” use one in class (29.9%). The majority of students stated that they “sometimes” (31.7%) or “often” (23.9%) use a smartphone-based dictionary. Similarly, the majority of students stated that they “sometimes” (30.7%) or “often” (30.1%) use a PC-based dictionary in class. In other words, the more recent the technology, the more frequently it is used. Complete figures are shown in Table 2, with figures referred to above underlined.

**Questionnaire item 10:** Which types of PC/smartphone-based dictionary have you used in the last 6 months?



This question allowed for multiple responses. The majority of students stated that they had used a bilingual Internet-based dictionary in the last 6 months. The second most frequently used type was Internet-based translation software. Complete figures are shown in Figure 4 above with the highest response type highlighted.

### 3.2 Results of follow up interviews

Following the procedure prescribed in Ellis and Barkhuizen (2005), the interview data was transcribed and analyzed. Themes relating to each interview question were then identified and entered into the transcript margin. The interviewed students were given the pseudonyms of Shigeru, Michiko, Yoshimitsu, Mitsuru and Hayami.

#### 3.3 Interview question 1: *Why do you use a smartphone or PC-based dictionary more frequently than your electronic dictionary in class?*

Three themes were identified, namely the physical burden of carrying a dictionary, ease of access to computers and the Internet in class, and the speed and ease of the Internet search process. Three of the students mentioned the physical burden of carrying about a dictionary as follows: *“I have other things to carry besides my dictionary... It’s a hassle to take it with me”* (Shigeru); *“It’s a hassle to carry to class. It takes up space in my bag”* (Michiko); *“Electronic dictionaries are small, but they do take up space in my bag”* (Hayami). Three students spoke of the access to computers and the Internet, and also how this resulted in a faster and more convenient search as follows: *“I have many opportunities to use computer rooms in English classes... and because my computer is open, it’s faster just to go tap-tap on the keyboard”* (Yoshimitsu). *“During class I mostly work with computers, so it’s convenient just to open up a new tab and find it (the word) there”* (Shigeru). *“In our classes we use computers, and because we are immediately connected to the Internet, I look up words I don’t know, or if I have cellphone coverage I look it up with a smartphone application”* (Mitsuru).

#### 3.4 Interview question 2: *Why do you use a smartphone or PC-based dictionary more frequently than your electronic dictionary when doing your homework?*

Four themes were identified, namely ease of access to computers and the Internet at home, the speed and ease of the Internet search process, functionality, and the nature of homework tasks.

Three students spoke of how they do their homework either with a computer available or directly on a computer as follows: *“We have to write reports and essays for our homework, and write them on a computer, so we’re always connected to the Internet and can look up words”* (Mitsuru); *“I often use a computer to do my homework, and when I have a word I don’t understand I can ‘copy and paste’ it and find its meaning quickly”* (Hayami); *“I do my homework in front of my computer so it is always there open. I can search for an unknown word right away. I’ve become used to it”* (Shigeru). In addition to the ability to copy and paste, the translation function of Internet-based dictionaries was also mentioned as follows, *“With an electronic dictionary you can look up words but you can’t translate full sentences. With the computer you can also translate full sentences, so I use it for both”* (Michiko).



### **3.5 Interview question 3: *Would you consider buying an electronic dictionary in the future?***

Only one of the five students stated that they would buy an electronic dictionary in the future because he felt that *“Although I will probably not use it very much, having an electronic dictionary has almost become common sense”* (Yoshimitsu). A further student stated they might buy one, but only *“if I have to”* (Shigeru). Of the remaining three students, two spoke about the future improvement of translation software and the features of their electronic dictionary, which are included but seldom actually used. *“In the future, the performance of translation applications will greatly improve, so I don’t think I will buy another one”* (Mitsuru); *“There are many features in my electronic dictionary like family health medical dictionaries but, other than English, I never use them. They are a bit of a waste”* (Michiko).

## **4.0 Discussion**

### **4.1 Discussion of the usage questionnaire results**

As described above, Bower and McMillan (2007) reported an electronic dictionary possession rate of 96% among Japanese college students. The results of the current research indicate that this number may have fallen considerably. Furthermore, although the majority of students did state that they owned a portable electronic dictionary (71.1%), possession does not appear to translate into actual usage in the classroom or when doing homework. Indeed in terms of research questions 1 and 2, the most frequently used dictionary type was a smartphone-based dictionary (34.1%). When combined with PC-based dictionaries (18.3%), these two account for over half (52.4%) of the respondents most frequently used in-class dictionary type. A similar result was found regarding students’ dictionary usage while doing English homework (53.4%). Regarding both in-class and homework related dictionary use, bilingual and monolingual PDs clearly appear to be the least favored, or least used, type of dictionary (respectively 2.8% and 2.4% for in-class and 4% and 1.4% for homework). Furthermore, the term “most frequently used” does not necessarily guarantee “frequent use.” Indeed the majority of students (165, 33.1%) responded that they only “sometimes” use a dictionary when doing their homework. Likewise, 29.9% of respondents indicated that they “never” use an ED in the classroom. A further analysis of the questionnaire data revealed that 34.2% of students who indicated that they “never” use an ED in class do actually possess one. Perhaps the most surprising result of the questionnaire was the high proportion of students using translation software as a dictionary. Although not strictly a dictionary in the traditional sense, translation software was included in the questionnaire as an option, based on the observations the researcher and his colleagues had made of students using such applications to look up or translate unknown words. Figure 5 displays the image which was provided in the questionnaire.



Figure 5: Example of translation application/dictionary

Nation (2001) set out the following four steps for looking up unknown words in a dictionary for comprehension:

1. Get information from the context where the word occurred
2. Find the dictionary entry
3. Choose the most suitable sub-entry
4. Relate the meaning to the context and decide if it fits (p. 419).

It can be seen from the image above that step three is impossible owing to the fact that no sub-entries are provided and therefore no comparison can be made between the text and the dictionary entries. There is an obvious risk here that an unsuitable translation, albeit correct in a different context, could be adopted. Not only could this detrimentally influence the student's comprehension of the text, but also lead to their remembering an incorrect meaning. This implication is discussed further below.

#### 4.2 Discussion of the follow-up interview findings

As described above, the physical burden of carrying a dictionary, ease of access to computers and the Internet in class, and the speed and ease of the search process using the Internet were identified as reasons why students were opting to use Internet-based dictionaries over their electronic counterpart. It is interesting to note that Koyama and Takeuchi's (2003) study also identified similar themes. The major difference, however, was that students in the Koyama and Takeuchi study were referring to their preference of *electronic dictionaries* over *traditional paper dictionaries*. That is to say, although an electronic dictionary is much lighter and smaller than a PD, it is now considered a burden to carry for some students. Speed and ease of the search process were mentioned by students in the current study. This theme was also present in Koyama and Takeuchi's 2004(a) study but, as with their 2003 study, the comments referred to EDs vs. traditional PDs. On a continuum of *burdensomeness* traditional PDs, EDs and Internet-based dictionary applications could be displayed thus:

**Traditional paper dictionaries > electronic dictionaries > Internet-based dictionary applications**

Likewise, considering the students' views regarding the convenience and availability of computers and the Internet in their

classes, a continuum for *speed and ease of use* would be identical, albeit flowing in the opposite direction:

**Traditional paper dictionaries < electronic dictionaries < Internet-based dictionary applications**

While tentative, the results of the third interview question, regarding future purchases of EDs, indicate that the shift towards Internet-based dictionary applications may be here to stay. This shift has serious implications for both the dictionary producer and language teacher.

### **5.0 Implications and conclusions**

Based on the current findings, it could be argued that EFL students at Japanese universities have moved away from traditional PDs and are in a transitional phase away from EDs. While EDs and PDs are designed with the learner in mind, the same cannot absolutely be said of the ubiquitous Internet-based translation and dictionary applications available online. Teachers cannot easily monitor what applications students are using, particularly when students work out of the classroom. Herein lies perhaps the most important implication of the current research, which is how students' choice in dictionary application affects their comprehension and retention of English vocabulary. To understand why, the discussion must be framed within the constructs of the "mental effort" hypothesis (Hulstijn 1992), and the "involvement load" (Laufer & Hulstijn, 2001) hypotheses, whose basic contention is that the "*retention of unfamiliar words is, generally, conditional upon the degree of involvement in processing these words*" (p. 545).

Building on the "depth of processing" construct ( Craik & Lockhart, 1972), it has been argued that learners are more likely to remember the meaning and form of a word if conclusions are reached through a process which involves high mental effort (Hulstijn, 1992). Building further on the "depth of processing" construct, Hulstijn and Laufer (2001) attempted to operationalize the concept of *involvement* in L2 vocabulary learning stages. Postulating that involvement consists of three basic components: *need*, *search* and *evaluation*, they established an *involvement index* by which the involvement load can be established for the consultation process the student must go through in order to understand the meaning of an unknown word. It is the third component, evaluation, which offers arguably the greatest potential for involvement load variance within the dictionary options discussed above. Hulstijn and Laufer (2001) describe evaluation as including the comparison

...of a given word with other words, a specific meaning of a word with its other meanings, or comparing the word with other words in order to assess whether a word does or does not fit its context. For example, when a word looked up in a dictionary is a homonym... a decision has to be made about its meaning by comparing all its meanings against the specific context and choosing the one that fits best (p.544).

Considering the ease with which students can look up words with an Internet-based dictionary, including techniques such as copying/pasting and Google translate, it could be argued that the required depth of processing, that is to say the *involvement load*, is lower than with either a paper or electronic dictionary. As described above, some of the dictionary-like tools employed by students do not offer an adequate range of sub-entries or vocabulary metalanguage on which a correct evaluation can be based. Such dictionary-like tools, although speedy and convenient, may be preventing potential cognitive

engagement from taking place. Further studies are required to establish the relationship between Internet-based dictionary usage, invested mental effort, and vocabulary comprehension and retention.

The ease with which students can consult Internet-based dictionary applications also raises implications about a potentially lowered “consultation trigger point” and therefore the number of words being looked up by students. As described above, in their study of in-text hyper-references, Aust, Kelley, and Roby (1993) found that the students reading electronic texts made more than double the amount of definition consultations as PD users, suggesting a lower consultation trigger point. PDs, on the other hand, have been shown to promote a higher trigger point. PD users therefore take more time and effort to guess or remember words before consulting their dictionary (Kobayashi, 2007; Koyama & Takeuchi, 2007). Although length of processing *time* does not necessarily equate to processing *depth* (Eysenck, 1982), using an electronic dictionary does appear to lower the consultation trigger point in learners; that is to say, shorten the amount of time a learner attempts to infer, recall or guess the meaning of an unknown word before using a dictionary. As described above, respondents in the current research described how the speed, convenience and availability of Internet-based dictionary applications have led them to increasingly utilize such applications. It could be argued, then, that Internet-based dictionary applications have lowered the consultation trigger point further still. If it is found that the consultation trigger is so low that students are looking up all unfamiliar words indiscriminately, then, as recommended by Tang (1997), the use of dictionary technology should be discouraged. Or alternatively, instruction on effective dictionary usage could be included in class instruction such as encouraging students to limit their online dictionary consultations in order to encourage students to be more selective when using their dictionary (Prichard, 2008). Exactly how the type of Internet-based dictionary applications employed by students influences the consultation process, and by extension how vocabulary is understood and learned, is beyond the scope of the current research. Further research is required to establish if Internet-based dictionaries are indeed lowering students’ consultation trigger point and therefore adversely influencing the mental effort being employed before and during the consultation process.

The primary aim of this research was to establish an up-to-date picture of Japanese college student’s usage of electronic and Internet-based dictionary applications. It is clear that a technological shift has taken place that will no doubt continue in the coming years. It is also clear the PD vs. ED dialogue, although vital in framing comparative dictionary effectiveness research thus far, has become out of step with the technological realities of the 21<sup>st</sup> century EFL classroom. If they intend to remain relevant to the EFL practitioner and student, further dictionary studies need to ensure that this technological shift is reflected. Teachers must also remain vigilant to the potential adverse implications which Internet-based dictionaries and applications present.

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