

JALT2007

Challenging Assumptions  
Looking In, Looking Out

# The use of pocket electronic and printed dictionaries: A mixed-method study

Chiho Kobayashi  
Tenri University

## Reference data:

Kobayashi, C. (2008). The use of pocket electronic and printed dictionaries: A mixed-method study. In K. Bradford Watts, T. Muller, & M. Swanson (Eds.), *JALT 2007 Conference Proceedings*. Tokyo: JALT.

This paper reports on the results of studies that examined the use of pocket electronic dictionaries (EDs) by Japanese university-level learners of English as compared with printed dictionaries (PDs). The studies also examined students' perceptions of their EDs and PDs, as well as their impact on students' dictionary use. These issues were investigated both quantitatively and qualitatively. Students completed a questionnaire about their impressions of their EDs, and their use of EDs and PDs. A smaller number of students also participated in a follow-up interview, where more details about their dictionary use were elicited. Students perceived that both EDs and PDs had unique advantages. Furthermore, the perceived advantages of their dictionaries appeared to result in some differences between ED and PD users in their dictionary use, such as the frequency of consultation, and the use of the various functions and features of their dictionaries.

本研究は、日本人大学生による、印刷辞書と比較した場合の電子辞書の使用状況について考察した。また、学生の電子辞書および印刷辞書に対する印象、またこれらの辞書がその使用方法に及ぼす影響について考察した。研究方法としては、これらの課題を量的、および質的に探求した。学生は、自分の電子辞書に対する印象、電子辞書および印刷辞書の使用状況についてのアンケートに答えた。また、小数の学生はフォローアップ・インタビューを受け、辞書の使用状況について、さらに詳しい質問に答えた。学生は、電子辞書、印刷辞書のそれぞれが他方がない利点があると認識していた。また、この異なる利点が、学生が電子辞書、および印刷辞書を使用する際に、検索頻度の違いや辞書の様々な機能や特色の利用などの使用方法の違いをもたらしているように思われた。

**D**uring the past decade, the capability of pocket electronic dictionaries (EDs) has increased greatly. As EDs have advanced technologically, their popularity among L2 learners has grown steadily. Reportedly, the sale of EDs exceeded that of printed dictionaries (PDs) in Japan in 2004 (Hashimoto, 2004). It is indisputable that EDs are currently one of the most popular tools for Japanese learners of English, regardless of their learning context.

As EDs have increased in popularity, several studies have been conducted to examine how they are used among L2 learners (Bower & McMillan, 2007; Perry, 2003; Tang, 1997; Taylor & Chan, 1994), as well as what impact they have on L2 learning (Iso & Osaki, 2003; Kobayashi, 2007; Koyama & Takeuchi, 2003, 2004; Osaki, Ochiai, Iso & Aizawa, 2003). However, the relative advantages of EDs versus PDs are still inconclusive. Given that most previous studies were quantitative, there is a particular need for additional research using a qualitative or a mixed method. The goal of the series of studies described in this report is to understand students' use of PDs as compared with PDs comprehensively using a mixed method.

### Literature review

Studies on EDs can be grouped into two major categories: how EDs are used among L2 learners and what their effects on L2 learning are. The latter studies investigated the effects of EDs on dictionary use (Iso & Osaki, 2003; Kobayashi, 2007; Koyama & Takeuchi, 2003, 2004; Osaki et al., 2003), reading comprehension (Iso & Osaki, 2003; Kobayashi, 2007; Osaki et al., 2003), and word retention (Iso & Osaki, 2003; Kobayashi, 2007; Koyama & Takeuchi, 2003, 2004; Osaki et al., 2003).

For example, Koyama and Takeuchi (2003) compared students' searching behavior as they read using either a bilingual ED or PD. Also, they examined the effects of type of dictionary (an ED or a PD) on word retention, using two types of vocabulary tests: recall and recognition. No significant differences were found in either number of words looked up or search time in the ED group of college students,

although the ED group of high school students tended to look up more words. There were no significant differences in the rate of recall or the rate of recognition for both groups. Although the ED and the PD contained the same amount of information, students believed that the ED did not provide as much information as the PD. Koyama and Takeuchi explained this as resulting from EDs' interface design; since the screen of an ED is small, it forces students to "push one button after another" (p. 73) to retrieve detailed information. Therefore, students might have felt that the ED did not offer sufficient information, although it actually did.

Koyama and Takeuchi (2004) compared the effects of bilingual EDs and PDs on students' behavior of searching for words and usage examples while reading. They also investigated the effects of EDs on word retention a week later. They found no significant differences between the PD and ED conditions in time spent searching or the quantity of information obtained. Although no differences in the rate of recall were found between the PD and ED conditions, the rate of recognition was significantly better in the PD condition.

The results of these studies indicate that it is difficult to determine the effects of EDs because many factors are involved, including students' proficiency in English, their familiarity with EDs, the difficulty of the text, and test formats.

The other group of studies examined how EDs are used among L2 learners (Bower and McMillan, 2007; Perry, 2003; Tang, 1997; Taylor & Chan, 1994). For example, Tang (1997) investigated the use of bilingual EDs by 254 Chinese students of English. She also compared students'

and teachers' perceptions of EDs using a mixed method; both quantitative and qualitative data were collected through a survey, observations, and documents. Tang found that 87% of the students owned an ED. Although students' EDs lacked detailed usage and grammatical information, they appeared to help learners with both the comprehension and production of English. Students valued their EDs highly for their portability, search speed, the availability of sounds, and explanation in their L1. In contrast, teachers exhibited concerns about their students' use of EDs on the grounds that EDs discouraged them from "making the leap from translation to guessing and predicting" (p. 54).

Perry (2003) looked into the use of EDs by Japanese learners of English in Japan. His subjects were 87 university students in Hokkaido who had an ED. They completed a questionnaire about their opinions of EDs as well as their use of them. Perry found that the majority of the students' EDs provided useful functions and features, including a monolingual dictionary and examples of usage, although most did not provide a sound function. Many students (83%) reported using their EDs more than their PDs, and all but three of the respondents reported using their EDs more than once a week. Respondents perceived that EDs were easier to use, easier to carry, and were better for checking spelling, meaning, and pronunciation. In contrast, they thought that PDs were cheaper, contained more words, and had more accurate information.

Bower and McMillan (2007) examined the use and perceptions of EDs by 1090 Japanese students at a university in Tokyo using a questionnaire. They found that almost all of the students (96%) owned an ED. The majority of them were active ED users; they used some functions, such as English-

Japanese and Japanese-English dictionaries, multiple times a day. Many of the students, however, appeared to be unaware of some potentially useful functions of their EDs, such as a memory function, while other functions, such as a learner English-English dictionary, a collocation dictionary, and a sound function, were seldom used.

As these studies were conducted in different places at different times, the capabilities of the EDs differed. For example, the EDs used by Japanese students in Bower and McMillan's (2007) study and Perry's (2003) study were apparently equipped with the full contents of the same version of the PDs, whereas the EDs used by Chinese students in Tang's (1997) study contained the abridged version of the PDs. The EDs used by Japanese students in Bower and McMillan's (2007) study appeared to be equipped with more functions (i.e., a sound function, a collocation dictionary) than those used by students in Perry's (2003) study. Therefore, it is difficult to generalize about the use of EDs among L2 learners, let alone to determine the effects of EDs on L2 learning, which largely depend on the conditions under which they are used. Furthermore, most previous studies, with the exceptions of Kobayashi's (2007) and Tang's (1997), were quantitative. More studies using a qualitative or a mixed method are needed in order to find out about the use of EDs in a balanced way. Accordingly, this series of studies examined students' use of EDs both quantitatively and qualitatively. The specific research questions addressed are as follows:

1. How often and for what purposes do Japanese university-level learners of English use EDs compared with PDs?

2. Are there differences between the users of PDs and the users of EDs in terms of their perceptions of their dictionaries?
3. Are there differences between the users of PDs and the users of EDs in terms of their use of dictionaries?

## Method

### Overview

This research comprised three studies. For Study 1, conducted in 2004, 279 Japanese students at three universities completed a questionnaire. Study 2 was also conducted in 2004, as a follow-up to Study 1. Twenty-two students, selected from the Study 1 participants, were interviewed. For Study 3, conducted in 2006, 97 Japanese students at a university completed a questionnaire. The participants in Study 3 were not involved in either Study 1 or Study 2. The results of Study 3 are included in this paper, in order to show the possible changes that might have occurred over the past few years.

### Study 1

The participants in Study 1 were 279 students enrolled in eight intact classes at three universities, all located in western Japan. The sample consisted of 169 freshmen, 81 sophomores, 21 juniors, and 8 seniors. The students majored in a variety of disciplines, such as agriculture (44), education (73), English (115), and cross-cultural studies (47). There were 110 male and 169 female students.

The students completed a two-section written questionnaire, adapted by the researcher based on the questionnaires constructed by Gu and Johnson (1996) and Tang (1997). This paper reports on the results of the first section of the questionnaire, and part of the second section (see Appendix 1). Part 1, which was primarily intended for ED owners, asked about the features of their EDs, their perceptions of them, and their use of them in comparison with PDs. Part 2 of the questionnaire asked about their patterns of dictionary use, regardless of their ownership of an ED.

The students were classified as either PD or ED users according to their responses to Item 3 of Part I of the questionnaire. Operationally, those who used an ED more than a PD (those who reported using an ED either “primarily” or “more”) were considered ED users, whereas those who used a PD more than or as much as an ED (those who reported using a PD either “primarily,” “more,” or “as much”) were classified as PD users.

Descriptive statistics (i.e., percentages) were used to analyze the students’ responses to the questionnaire. Additionally, chi-square tests were used to compare the ED and PD groups in their responses to Part 2 of the questionnaire.

### Study 2

The 22 participants in Study 2 were chosen from among the 279 students who participated in Study 1, so that they were as representative as possible of the 279 students in terms of school, dictionary use, and English proficiency. The 22

students were chosen from two of the three universities, where the researcher had greater access to students. Half of them were ED users, and the other half were PD users. All of them were freshmen, and their majors were agriculture (7), cross-cultural studies (5), and English (10). There were 5 male and 17 female students.

The students participated in a semi-structured follow-up interview, the purposes of which were to supply details regarding their responses to the questionnaire and to clarify any ambiguities. The interviews were conducted in Japanese, using an interview guide constructed by the researcher (see Appendix 2).

The interview data were coded based on grounded theory (Ryan & Bernard, 2000). For coding categories, the researcher consulted existing literature (Gu, 2003; Gu & Johnson, 1996); however, she derived categories mainly from the data. The transcripts were examined line-by-line to identify concepts and themes. Then conceptual models indicating the relationships among them were constructed and tested against the data.

### Study 3

The 97 students in Study 3 were from a university in western Japan and were all English majors. The sample consisted of 27 freshmen, 53 sophomores, 16 juniors, and 1 senior. There were 65 male and 32 female students.

The students completed a written questionnaire, adapted by the researcher from the one used in Study 1. It was the same as Part 1 of the questionnaire used in Study 1, except for a few alternatives added to some of the items, based

on the results of Study 1 (the revised questionnaire is not appended due to its similarity to the original one). Students were asked about the features of their EDs, their perceptions of them, and their use of them.

Descriptive statistics (i.e., percentages) were used to analyze the students' responses to the questionnaire.

## Results

### Results of Study 1

Seventy-two percent of the 279 students owned an ED. The percentage of ownership was slightly higher (78%) when including only English and English-related majors in the analysis. Many of those who did not own an ED reported that it was due to their high cost.

ED owners tended to use an ED almost exclusively, although they also owned a PD. Seventy-five percent of ED owners used an ED primarily, and an additional 16 % used an ED more than a PD. Only 31% of ED owners reported using a PD and an ED for different purposes. Those who used them for different purposes stated that they used an ED to find out a word's meaning quickly and used a PD to look at examples and detailed usage information (65%), and detailed grammatical information (54%).

ED and PD users seemed to differ in their weekly dictionary use. The results of a chi-square test ( $\alpha = .05$ ) indicated that a higher percentage of the ED users (51% as opposed to 22% of the PD users) consulted a dictionary more than 2 or 3 times a week, and that a higher percentage of PD users (37% as opposed to the 14% of the ED users) used one less than once a week,  $\chi^2(5) = 28.647, p = .000$ .

Furthermore, ED users appeared to use a dictionary in class more than PD users. The results of a chi-square test indicated that a higher percentage of ED users (92% as opposed to 78% of the PD users) consulted a dictionary in class,  $\chi^2(1) = 10.854, p = .001$ . These differences between ED users and PD users suggest that using an ED increases the number of instances where a dictionary is consulted.

The perceived strengths of EDs included:

- portability (91%);
- search speed (90%);
- a jump function (71%) (a function that allows a user to move from one dictionary to another);
- spell check/wild card (functions that show alternatives when a user is uncertain about the spelling of a word) (36%).

Also, some students wrote in other advantages, such as a memory function (a function that records the words looked up), an idiom search function, an example search function, the capability of adding dictionaries by inserting cards, and the availability of multiple dictionaries and other materials.

In contrast, the perceived disadvantages of EDs included:

- the unavailability of diverse examples (39%);
- the lack of detailed grammatical information (32%);
- the lack of usage information (27%);
- the small screen (19%);
- the limited number of headwords (16%);
- breakability (9%).

Some students also wrote in other disadvantages, such as the difficulty of use, the unavailability of a sound function, and the unavailability of a monolingual dictionary. Many of the perceived disadvantages of EDs were concerned with the quality or quantity of information. Since most of the students' EDs were equipped with the full contents of the same versions of the PDs, these perceived problems might be explained by the interface design of EDs (Koyama & Takeuchi, 2003), as previously discussed.

### *Results of Study 3*

Since the design of Study 3 is similar to that of Study 1, this section presents the results of Study 3 prior to those of Study 2 and compares them to the results of Study 1.

Eighty-two percent of the students, who were all English majors, owned an ED. Surprisingly, the percentage of ownership did not differ greatly compared with the percentage that was identified among English majors in Study 1 (78%), conducted three years before. Like those in Study 1, many of the students who did not own an ED reported that it was due to the expense.

Eighty-eight percent of ED owners used an ED primarily, and an additional 8% used an ED more than a PD. Thirty-one percent of ED owners used a PD and an ED for different purposes. They reported that they used an ED to find out a word's meaning quickly and used a PD to look at examples and detailed usage information (68%), and detailed grammatical information (32%). Compared with three years before, the percentage of the ED owners who used an ED primarily increased (from 75% to 88%), but the percentage of ED

owners who used an ED and a PD for different purposes was exactly the same (31%). A possible explanation for why the percentage of students who owned an ED and the percentage of those who reported using one exclusively showed relatively small increases is given in the following section.

The perceived strengths of EDs included the following:

- portability (90%);
- search speed (76%);
- a jump function (61%)
- an idiom search function (53%);
- an example search function (53%);
- spell check/wild card (39%);
- the availability of multiple dictionaries and other materials (38%);
- a sound function (36%).

The percentage of the students in Study 3 who cited portability as one of the advantages was as high as the percentage identified in Study 1. However, the percentage for citing search speed decreased from 90% to 76%. This might be a result of students' increased familiarity with their EDs; as they had been using them for a while, they became aware of other advantages, such as the jump function, the idiom search function, and the example search function. The high percentage of the students who cited these functions might support this explanation, although accurate comparisons cannot be made because these functions were not included in the questionnaire used in Study 1.

The perceived disadvantages of EDs included the following:

- the unavailability of diverse examples (44%);
- the lack of detailed grammatical information (38%);
- the lack of usage information (29%);
- the inability to create a notation (29%);
- high price (26%);
- short battery life (20%);
- the limited number of headwords (18%);
- the unavailability of illustrations (18%);
- the small screen (15%).

As can be seen, many perceived disadvantages of EDs were concerned with the quality or quantity of information, just as three years before.

### *Results of Study 2*

The interviews elicited the perceived advantages and disadvantages of the students' dictionaries from both ED and PD users.

The interviews identified perceived advantages of EDs similar to those identified by the questionnaire, such as search speed, portability, a jump function, an idiom search function, an example search function, a memory function, and the availability of multiple dictionaries (e.g., an English-Japanese dictionary, a Japanese-English dictionary, a



thesaurus, an English monolingual dictionary, and an English collocation dictionary). In particular, many ED users valued their EDs highly due to their search speed and portability. For example, R. O. was satisfied with her ED due to its search speed. She thought that this increased her frequency of dictionary consultation:

1. C. K. Why do you use an ED more than a PD?

R. O. It is time-consuming to look up a word in a PD. I often neglected to look up unknown words when I was using a PD, but I have been looking them up immediately since buying an ED.

Some ED users appreciated their EDs because of the availability of various functions and resources, such as the jump function, the idiom search function, the example search function, and the memory function. For example, M. S. explained why looking up idioms using the idiom function of an ED is easier than looking them up in a PD:

2. M. S. A PD lists idioms at the end of entries but sometimes disperses them as examples throughout the entry, so I have to scan the whole entry.

C. K. Do you mean that it is hard to look up idioms in a PD?

M. S. It is easier to look them up in an ED because it shows them together.

C. K. Can you do idiom searches with your ED?

M. S. When I type in a word [or words], I can see the idioms using it [or them], listed in alphabetical order.

The interviews also revealed perceived disadvantages of EDs similar to those identified by the questionnaire, such as the inadequate quantity or quality of information, the small screen, and difficulty of use. In particular, many students were dissatisfied with the quantity or quality of information. However, their judgments appeared to be based on their subjective impressions rather than careful observations, because no students gave specific examples.

The interviews also identified the perceived advantages and disadvantages of PDs, which contrasted sharply with those of EDs. The perceived advantages of PDs included the capability of making notations, the quality of information, the ease of use, the availability of illustrations, and their effectiveness for word retention. Several students felt that PDs were effective for word retention, possibly due to the “laborious” search process involved in using them, as one of the students reported.

Some PD users reported being satisfied with their PDs because they could make notations in them. They felt that making notations enhanced their vocabularies. For example, H. K. marked her dictionary for new information about pronunciation, grammar, and meanings, as she was taught in high school:

3. C. K. When do you mark your dictionary?

H. K. I mark it when I find new information, such as meanings, grammatical information, and pronunciation that I did not know or expect.

C. K. Do you mark only the contextual meaning or other meanings as well?



H. K. I typically mark only the contextual meaning, but when I have time, I also mark other meanings if they are unfamiliar.

C. K. Why do you mark your dictionary?

H. K. My teacher told us to mark our dictionaries because we would notice the marked information when we looked up the word again. I find this strategy useful, so I continue to do so.

In contrast, the perceived disadvantages of PDs included weight, time-consuming search processes, and limited headwords. Many students perceived weight as one of the major disadvantages of their PDs. Some PD users expressed a desire to buy an ED due to its portability, although, otherwise, they were satisfied with their PDs. Moreover, many PD users were limited in the types of dictionaries that they used, although they did not perceive it as a limitation. For example, nine PD users did not have a monolingual dictionary, and four did not have a full version of a Japanese-English dictionary. Research has shown, however, that students benefit from using a variety of dictionaries offering different kinds of information, according to their needs (Kimura, 2001).

Both PD and ED users were satisfied with their dictionaries, but for different reasons. The perceived advantages of their dictionaries appeared to lead to some differences between ED and PD users in their dictionary use, such as the frequency of dictionary consultation and the use of various functions and features of their dictionaries.

## Discussion

### *The use of EDs compared with PDs*

This series of studies confirms previous ones (Bower & McMillan, 2007; Perry, 2003) that found that EDs are used widely by Japanese university-level learners of English. The majority of the students owned an ED, and those who owned one tended to use it exclusively. Furthermore, many users consulted it multiple times a week.

Despite recent reduction in price and technological advances in EDs, however, the percentage of ownership did not change greatly in the three years between the first and third studies. Moreover, the percentage of students who used a PD and an ED for different purposes was stable. These rather unexpected findings suggest a persistent demand for PDs. An explanation might be that even if EDs are students' primary reference materials, PDs continue to serve certain roles in Japanese students' learning of English that EDs cannot fulfill.

### *Students' perceptions of EDs and PDs*

This series of studies also identified perceived advantages and disadvantages similar to those identified in previous studies (Bower & McMillan, 2007; Perry, 2003; Tang, 1997; Taylor & Chan, 1994). Both PDs and EDs were perceived as having unique advantages. Students perceived that EDs offered advantages over PDs in such areas as search speed, portability, the jump function, the idiom search function, the example search function, the memory function, and the availability of multiple dictionaries.

On the other hand, PDs were perceived to be superior to EDs in such areas as the ability to make notations, the quality or quantity of information, the ease of use, and the availability of illustrations. These unique advantages might be the reason for the continuous demand for PDs discussed above. Since most recently produced EDs contain the full contents of the same versions of PDs, the perceived inferiority in the quantity or quality of information available with EDs was probably based on subjective impressions rather than objective judgments. However, as Koyama and Takeuchi (2003) suggest, students might have such impressions because the small screen of EDs makes it troublesome to retrieve detailed grammatical and usage information, which highlights another limitation of EDs.

### *Differences between ED and PD users in their dictionary use*

The perceived advantages of their dictionaries appeared to result in some differences between ED and PD users in their dictionary use, such as the frequency of dictionary consultation, the marking of information, the use of different types of dictionaries, and the use of various functions and features of their dictionaries.

In particular, EDs appeared to facilitate students' dictionary consultation. Owing to their search speed, their use appeared to increase the number of instances where a dictionary was consulted. Furthermore, with multiple dictionaries linked through their jump function, EDs allowed students to use a wide range of dictionaries, which otherwise would probably not have been available to them.

## **Conclusion**

Students perceived that both EDs and PDs had unique advantages, which appeared to lead to some differences in their dictionary use between ED and PD users. The findings of this series of studies suggest that rather than encourage the use of one type, teachers should advise students to use EDs and PDs wisely, according to their purposes. For example, if the purpose of dictionary consultation is understanding the textual message, students could use an ED, whose superior search speed minimizes interference with comprehension processes. On the other hand, if the goal is learning words rather than just understanding the textual message, students could use a PD, which allows them to create a notation, browse surrounding words, and look at illustrations.

Finally, given that the use of EDs depends on various conditions, such as students' characteristics, and the capacities of EDs, more studies need to be conducted using different groups of students.

**Chiho Kobayashi** is an assistant professor in the Department of European and American Studies, Faculty of International Culture Studies at Tenri University. Her research interests include vocabulary acquisition, literacy development, and English as an international language.

## References

- Bower, J., & McMillan, B. (2007). Learner's use and views of portable electronic dictionaries. In K. Bradford-Watts (Ed.), *JALT 2006 Conference Proceedings* (pp. 697-708). Tokyo: JALT.
- Gu, P. Y. (2003). Fine brush and freehand: The vocabulary-learning art of two successful Chinese EFL learners. *TESOL Quarterly*, 37(1), 73-103.
- Gu, Y., & Johnson, R. K. (1996). Vocabulary learning strategies and language learning outcomes. *Language Learning*, 46(4), 643-679.
- Hashimoto, D. (2004). Bukku kakumei: Denshi shoseki ga kami no hon o koeru hi. [The book revolution: The day when electronic books surpass printed books]. *Joho kogaku: Passion for the Future*. Retrieved December 15, 2006 from <www.ringolab.com/note/daiya/archives/000837.html>.
- Iso, T., & Osaki, S. (2003, August). Denshi jisho to insatsu jisho ni miru eibun dokkai, goi kensaku, hoji no sai. [Differences between electronic dictionary and paper dictionary in comprehension, word search, and retention]. Paper presented at the meeting of the Japan Society of English Language Education, Miyagi Kyoiku University, Sendai, Japan.
- Kimura, T. (2001). *Jisho to iu hon o "yomu" gijutsu*. [Techniques for reading a book called a dictionary]. Tokyo: Kenkyusha.
- Kobayashi, C. (2007). Comparing electronic and printed dictionaries: Their effects on lexical processing strategy use, word retention, and reading comprehension. In K. Bradford-Watts (Ed.), *JALT 2006 Conference Proceedings*. Tokyo: JALT.
- 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. printed dictionary: Accessing the appropriate meaning, reading comprehension, and retention. In M. Murata, S. Yamada, & Y. Tono (Eds.), *Proceedings of ASIALEX '03 Tokyo*, 3 (pp. 205-212). Tokyo: Asialex.
- Perry, B. (2003). The use of pocket electronic dictionaries (PEDs) by Japanese university students. *Otaru University of Commerce, The Review of Liberal Arts*, 105, 165-176.
- Ryan, G. W., & Bernard, H. R. (2000). Data management and analysis methods. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 769-802). Thousand Oaks, CA: Sage Publications.
- Tang, G. M. (1997). Pocket electronic dictionaries for second language learning: Help or hindrance? *TESOL Canada Journal* 15(1), 39-57.

Taylor, A., & Chan, A. (1994). Pocket electronic dictionaries and their use. In W. Meijs, M. Moerland, E. ten Pas, P. van Sterkenburg, & P. Vossen (Eds.), *Euralex 1994 Proceedings* (pp. 598-605). Amsterdam: Euralex.

## Appendix 1

### English translation of the questionnaire

#### Part I: Pocket Electronic Dictionaries

1. Do you own a pocket electronic dictionary?
  - a. Yes
  - b. No
2. If you don't own a pocket electronic dictionary, why not?

- 
3. If you use both a printed dictionary and a pocket electronic dictionary, which type do you use more?
    - a. I use a pocket electronic dictionary primarily.
    - b. I use a pocket electronic dictionary more than a printed dictionary.
    - c. I use a pocket electronic dictionary and a printed dictionary with about the same frequency.
    - d. I use a printed dictionary more than a pocket electronic dictionary.
    - e. I use a printed dictionary primarily.

**If you don't own a pocket electronic dictionary, please skip the following questions.**

4. Which type of pocket electronic dictionary do you own?

Brand: \_\_\_\_\_

Model: \_\_\_\_\_

Cost: \_\_\_\_\_

5. Does your pocket electronic dictionary have an English-Japanese dictionary/a Japanese-English dictionary/an English-English dictionary? Mark all types of dictionaries that your pocket electronic dictionary has.
  - a. English-Japanese dictionary
  - b. Japanese-English dictionary
  - c. English-English dictionary
  - d. Thesaurus
  - e. Other ( )
6. If you use both a printed dictionary and a pocket electronic dictionary, do you use them for different purposes?
  - a. Yes
  - b. No

**If your answer is yes, for which purposes do you use each type of dictionary? Please mark all the items that are true of you.**

- a. I use a pocket electronic dictionary when I want to know the meaning of the word quickly, while I use a printed dictionary when I want to look at examples or know more about the usage of the word.
- b. I use a pocket electronic dictionary when I want to know the meaning of the word quickly, while I use a printed dictionary when I want to know detailed grammatical information.
- c. I use a pocket electronic dictionary for speaking and listening and use a printed dictionary for reading and writing.

- d. I use a pocket electronic dictionary at school or in the library and use a printed dictionary at home.
7. Are you satisfied with your pocket electronic dictionary?
  - a. Satisfied
  - b. Somewhat satisfied
  - c. Dissatisfied
8. What are the perceived strengths and weaknesses of your pocket electronic dictionary? Please mark all the items that are true of your pocket electronic dictionary.

#### **Strengths**

- a. It is quick and easy to look up a word.
- b. It is easy to carry around.
- c. It is easy to change from one dictionary to another (e.g. from a Japanese-English dictionary to an English-Japanese dictionary).
- d. The spoken pronunciation of the word is available.
- e. It allows me to look up words that I am not sure how to spell.
- f. It can be connected to another application.
- g. Other ( )

#### **Weaknesses**

- a. It does not provide detailed information about the usage of the word.
- b. It does not contain enough examples.

- c. It does not provide enough grammatical information.
- d. The screen is small, so I cannot look at the whole entry of the word at one time.
- e. The number of the headwords is limited, so I sometimes cannot find the word that I am searching for.
- f. It is easily broken.
- g. Other ( )

**Part II: Lexical Processing Strategy Use (Strategies Used to Deal with Unknown Words, i.e., Consulting, Inferencing, and Ignoring)**

1. How often do you use your dictionary (or dictionaries)?
  - a. Daily
  - b. 4 or 5 times a week
  - c. Several times a week
  - d. Once a week
  - e. Less than once a week
2. What percentage of unknown words do you look up when reading? Imagine that you are reading a text to prepare for your English class.
  - a. More than 90%
  - b. 70-90%
  - c. 50-70%
  - d. Less than 50%
3. Do you use other types of electronic dictionaries such as CD-ROM (or floppy disk) dictionaries and on-line dictionaries?

- |                          |                          |
|--------------------------|--------------------------|
| CD-ROM dictionary:       | On-line dictionary:      |
| a. Daily                 | a. Daily                 |
| b. 4 or 5 times a week   | b. 4 or 5 times a week   |
| c. Several times a week  | c. Several times a week  |
| d. Once a week           | d. Once a week           |
| e. Less than once a week | e. Less than once a week |
| f. Never                 | f. Never                 |

4. Where do you use your dictionary?
  - a. At home
  - b. In class
  - c. At the library
  - d. Other ( )

## Appendix 2

### *English translation of the interview guide*

1. What types of dictionaries do you have? Do you have printed dictionaries? Do you have pocket electronic dictionaries? What printed dictionaries do you have? What dictionaries do your pocket electronic dictionaries have? Do you use online dictionaries? Do you have CD-ROM (or floppy disk) dictionaries? Do you have specialized dictionaries such as thesauruses, technical dictionaries, usage dictionaries, and idiom dictionaries?
2. Among your dictionaries, which one (or ones) do you use most often? Do you use different dictionaries for different purposes? If so, for what purposes do you use which dictionaries?

3. Do you use a dictionary when reading and writing? How about speaking and listening? What dictionary (or dictionaries) do you use for reading, writing, speaking, or listening? Do you use different dictionaries for different kinds of activities?
4. When did you buy your dictionary (or dictionaries)? Why did you choose the one (or ones) that you bought?
5. Are you satisfied with your dictionary (or dictionaries)? Why are you satisfied or dissatisfied with it (or them)? Can you recall occasions when you could not find what you were looking for?
6. Are you familiar with the features/functions that your dictionary has? Do you understand grammatical codes? Do you understand phonetic transcripts? Did you read the manual/front matter carefully?
7. Do you use your dictionary often? When you look up a word, what information in the entry do you usually pay attention to (e.g., meanings, grammar, examples, pronunciation, idioms, etc.)? In what context do you pay attention to what information?
8. When the word has multiple meanings, do you look at all the meanings or just the contextual meaning? How do you choose the appropriate one from multiple meanings given in the dictionary? What do you do when you cannot find what you are looking for?
9. When do you look up a word while reading an English text? Right after you see it, after reading the paragraph that contains it, or after reading the entire text? Do you look up all unknown words in the text? If not, what kind of words do you look up? What do you do with the ones you don't look up?
10. Do you guess word meaning from the context? Do you look up a word to confirm your guess about it?
11. What do you usually do when you look up a word in the dictionary? Do you make any special effort to retain the word? Do you write down information about the word? Where do you write it down? Why do you write it down?
12. Do you use a vocabulary notebook, lists, or cards? If so, do you regularly review them?
13. Are you confident of your dictionary skills? Why or why not?
14. Have you received instruction on dictionary use at school? If so, when did you receive it? What kind of instruction did you receive? Have you received instruction on guessing word meaning from the context? If so, when did you receive it?
15. What features/functions of your dictionary do you think are the most useful?