People's Democratic Republic of Algeria

Ministry of Higher Education and Scientific Research

Mentouri Brothers University – Constantine 1

Faculty of Letters and Languages

Department of Letters and English Language

A Comparative Investigation of the Effects of CD-ROM and Printed Dictionary Use on Reading Comprehension and Vocabulary Retention of University EFL Students: The Case of 2nd Year EFL Students at Mentouri Brothers University – Constantine 1

Thesis Submitted to the Department of Letters and English Language in Candidacy for the Degree of "Doctorat LMD" in Applied Language Studies

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2015-2016

To my great parents who devoted their life to my education and have always wanted me to be successful, I dedicate this work.

Acknowledgements

First of all, I would like to express my deep thanks to my supervisor, Professor Zahri Harouni, for supervising this work. It is with deep gratitude and appreciation that I wish to thank her for the accurate advice she put forward and for her endless patience with me throughout the stages of this research.

I also wish to acknowledge my gratitude to professors Carolyn Madden and Judy Dyer of the English Language Institute at the University of Michigan. Judy and Carolyn lent a hand in countless ways, especially in providing me with unlimited access to relevant and recent bibliographical references.

I would also like to extend my special thanks to my adorable wife Amina Kammas and to my dearest friend Tareq Boudjadar. Amina and Tareq were greatly caring in moments of difficulty and frustration and were my resort whenever I felt down or experienced a research setback. Indeed, their encouragements contributed very much to my confidence in the completion of this study.

I gratefully wish to thank the members of the board of examiners who have kindly accepted to examine the present thesis. I also wish to thank all my teachers in the Department of English for supporting me throughout my academic life, particularly Professor Labed Nacif whose consistent support and encouraging advice from different perspectives have inspired me and broadened my vision.

Last but not least, I would like to thank all the students who took part in this study. This research work would not have been possible without their participation.

Abstract

The dictionary is one of the common learning tools for foreign and second language learners who use various types of dictionaries to help them work on their language development. Yet, to my knowledge, the effects of dictionaries, either in printed or electronic form, have never been systematically investigated in the Algerian context. Consequently, in order to investigate whether dictionary support improves (affects) text comprehension and vocabulary retention, this study compares readers' foreign language text comprehension and vocabulary retention across two dictionary conditions. Reading time, dictionary usage (lookup frequency), degree of comprehension, and recall of words were the dependent measures employed. The subjects of this study were 44 EFL sophomores studying in the English Department at Mentouri Brothers University-Constantine 1. They were assigned two reading tasks under two conditions: using a printed dictionary (PD) at one time and a CD-ROM dictionary (CD) at another. The presentation mode of the reading tests was on computer screen alone. I used a piece of monitoring software to record the subjects' lookups in the CD-ROM dictionary condition. The monitoring software also took notes of the time each subject needed to finish the reading task in both conditions. The recorded information was automatically saved in log files concealed in the subjects' computers, and a paired-samples t-test was then conducted to test the research hypotheses. In addition, Pearson's correlation coefficient was computed to examine any correlation between the subjects' lookup frequencies and their reading scores in both conditions. As for the vocabulary retention tests, I administered a pretest and posttest to the subjects in both lookup conditions (paper and CD-ROM), and an

independent-samples t-test was conducted to compare memory for words. The analysis of information retrieved from the log files revealed that the CD-ROM dictionary enabled the subjects to read the passage in significantly less time than the printed dictionary. It was also found that the subjects looked up significantly more words in the CD-ROM dictionary than in the printed dictionary. However, the results indicate that the type of dictionary does not significantly influence comprehension, and that no correlation exists between the subjects' lookup frequencies and their reading scores in PD and CD conditions. With regard to vocabulary retention, the findings revealed that printed dictionary lookup fosters better recall of vocabulary. It was concluded that CD-ROM dictionaries would be effective and motivating aids to reading comprehension but could be less effective to vocabulary retention.

Keywords: CD-ROM dictionary, printed dictionary, log files, reading comprehension, vocabulary retention

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List of Abbreviations

L1: First Language

L2: Foreign or Second Language

EFL: English as a Foreign Language

MLD: Monolingual Dictionary

BLD: Bilingual Dictionary

PD: Printed Dictionary

CD: CD-ROM Dictionary

PED: Portable Electronic Dictionary

ED: Electronic Dictionary

CALD: Cambridge Advanced Learner's Dictionary

MS: Monitoring Software

SAT: Scholastic Aptitude Test

GRE: Graduate Records Examinations

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General Introduction

1. Background and Motivation

Vocabulary is central to second language (L2) acquisition. As McCarthy (1990, p. 140) asserts, "without words to express a wider range of meanings, communication in an L2 just cannot happen in any meaningful way". The dictionary is widely recognized as one of the most important tools that help L2 learners understand or learn vocabulary.

Dictionaries are often considered as an essential tool in the process of foreign language learning, and are recognized as the first sources of information L2 learners refer to when they are faced with words they do not know. According to Songhao (1997), while there is a wide range of ways to deal with vocabulary, the use of dictionaries seems to be the conventional method of instruction. Thorndike (1991, p. 15) shared a similar opinion and said that the dictionary "is one of the most important instruments of … [L2] instruction".

Indeed, dictionaries provide foreign language learners with pertinent information about vocabulary such as the definition of a word, its spelling, pronunciation, contextual usage, etc. Chan (2005, p. 1), for example, comments:

A learner's dictionary is an indispensable self-learning tool, providing learners with invaluable banks of information about the language being learned, such as the meanings of a word, its pronunciations, synonyms, antonyms, collocations, and syntactic behavior. The correct usage of a word, often exemplified in example sentences or definitions, is also an important source of information.

One of the major advances in lexicography in recent years has been the focus on the "user perspective" (Hartmann & James, 1998, p. 152); a growing interest in the dictionary user can clearly be seen in research literature of the last two decades (Lew, 2011; Garcia, 2011; Chen, 2011). The literature on lexicography now has a new trend as it has started to focus particularly on dictionary users and seeks to know who uses which dictionary, and for what purpose (Hartmann, 1999a).

This focus on the user perspective and the need for empirical studies of what dictionary users do in real look-up situations are important concerns of applied linguistics (Hartmann, 2001). The significance of the user perspective was highlighted by Stein (1984, p. 4) in her lecture at the inauguration of the Dictionary Research Centre in Exeter in the following words: "Dictionaries are obviously written for their users. We therefore need much more research on the dictionary user, his needs, his expectations, and his prejudices".

The quotation by Stein underlines the idea that research into lexicography should not be merely restricted to the semantic aspect of dictionaries; rather, it must include some consideration of the users for whose benefit dictionaries have been compiled. As suggested by Hartmann (as cited in Laufer, 1997, p. 361), dictionary use has become "the most recent and promising division of dictionary research . . . [,] a research that examines the relationship between the lexicographer's product-the dictionary and the world of consumers-the users of dictionaries."

With the development of technology, the prevalence of conventional printed dictionaries (PDs) has slowly declined due to the remarkable advancements in computer-mediated aids. So in addition to PDs, various types of electronic reference materials have become increasingly available to L2 learners, creating more options for coping with unknown or partially known words. These materials, including pocket electronic dictionaries (PEDs), CD-ROM dictionaries (CDs), and online dictionaries, are likely to enhance L2 learning significantly with their features such as the ease and speed of look-ups, the quantity of information, the variety of search roots, and multimedia capacity (Nesi, 1999).

Along with many countries in the Arab world, Algeria is one of the counties where CDs are becoming particularly popular. One major reason for their popularity is their extremely cheap price in comparison to PDs. As a result of the government's failure to enforce strict copyright laws which would protect copyrighted works and materials, the Algerian uncontrolled CD-ROM market is now flooded with hundreds

of thousands of illegal copies of CD-ROMs, among which CDs are prevalent and mostly sold for less than DZD 100.

In addition, most CDs are shared and downloadable from the Internet, so it just takes a few tricks and clicks on the Web to have the most popular and up-to-date English dictionaries installed on one's computer. In the past decade, CDs have rapidly spread among Algerians, including adults, university students, and high and middle school pupils. With this variety of dictionaries in print and CD-ROM formats on the market, Algerian learners of English now have as wide a range of choices as ever.

2. Statement of the Problem

CD-ROM dictionaries are becoming one of the most popular reference tools among foreign language learners. They are especially popular among Algerian learners of English due to their rich and interactive content, their widespread availability on the market, and their extremely cheap price in comparison with PDs. While language learners appear to be excited about using CDs, many educators and researchers doubt their value for reasons such as the possibility of encouraging excessive look-up rather than guessing from context (Tang, 1997; Taylor & Chan, 1994). However, whether negative or positive, these new language learning technologies with their new and immense features appear to have impacted the way students consult dictionaries to aid their L2 learning.

To the best of my knowledge, although more Algerian EFL learners appear to take advantage of CDs nowadays, no research has been carried out on how EFL learners use them and how these might affect L2 reading and vocabulary learning and L2 learning in general. Given the widespread popularity of CDs among Algerian L2 students, investigating these areas is important and research is needed to uncover how these reference tools might impact L2 learning so that educators can provide students with informed advice on how to use them to their benefit.

This study was also inspired by my growing perception, based on my humble EFL teaching experience, that many EFL students felt reluctant using PDs so often in the classroom. However, most of them either preferred to use PEDs or dictionaries embedded in their smartphones. This perception, in addition to my keen interest in using information technology innovations in L2 learning, have prompted me to undertake this study on the use of CDs, which are very similar to the ones embedded in smartphones in terms of accessibility and presentation of information.

3. Purpose of the Study

In an attempt to fill in the research gap identified in the previous section, the present study investigates the use of CDs compared to PDs in relation to language learning. In particular, this study attempts to examine the potential effects of students' use of CDs and PDs on their reading comprehension and vocabulary retention. Algerian learners of English at the university level are the focus of this study because

they are one of the populations among whom CDs have most widely spread especially in the past decade.

4. Research Questions

Specifically, this study addresses the following research questions:

1. Will there be any significant difference in the reading time between the two dictionary conditions (CD and PD)?
2. Will the two dictionary conditions highlight any substantial difference in the reading scores of the subjects?
3. Will there be any notable difference in the number of look-ups between the two dictionary conditions?
4. Is there any relationship between the look-up frequency and the scores in reading comprehension? In other words, does higher/lower look-up frequency correlate with higher/lower reading scores in both conditions?
5. Is there any correlation between the type of the dictionary used and the degree of vocabulary retention?

5. Research Hypotheses

In the light of the previous questions, the following hypotheses have been made:

1. The students would spend less time reading the text in the CD condition than in the PD condition.
2. Comprehension performance would be higher in the CD condition than in the PD condition, since the CD is expected to promote better reading comprehension scores.
3. The students would look up more words in the CD condition to comprehend the text than in the PD condition.
4. There would be a positive correlation between the subjects' look-up frequency and their reading scores. Increased dictionary look-up frequency could induce better understanding of the reading passages; therefore, the comprehension scores would be higher. Similarly, lower look-up frequency could result in poor understanding of the reading passages and thus the reading scores.
5. The students would remember words better after using PDs than using CDs; that is, the words looked up in the PD will be better retained than those looked up in the CD.

6. Method of Investigation

To answer the aforementioned research questions and to examine the validity of their corresponding hypotheses, a quasi-experimental design was adopted.

The subjects who took part in this study were 44 EFL sophomores studying at the English Department at Mentouri Brothers University- Constantine 1, Algeria.

They were assigned two reading tasks under two conditions: using a PD at one time and a CD at another. The presentation mode of the reading tests was on computer screen alone. A piece of monitoring software was installed on the subjects' computers in the computer laboratory to record their lookups in the CD condition, and to take notes of the time they needed to finish the reading tasks in both conditions. The recorded information was automatically saved in data files concealed in the subjects' computers, and a paired-samples t-test was then conducted to test the research hypotheses regarding potential differences in reading time, lookup frequency, and degree of comprehension.

As for the vocabulary retention variable, a pretest and posttest were administered to the subjects in both lookup conditions (PD and CD). Half of the sample (22 students) were assigned to the PD lookup condition and the other half to the CD lookup condition. However, the subjects were not forewarned that a vocabulary retention test would be given a week later regarding the words looked up in the pretest. An independent-samples t-test was conducted to compare memory for words between the two groups.

Detailed information about the research strategy and the way the empirical phase was conducted to fulfill the research objectives is provided in the research methodology chapter.

7. Significance of the Study

The present study will hopefully benefit researchers and educators in the field of L2 learning. Since dictionary use is unlikely to have been researched in the Algerian context before, we know nothing about how learners use CDs and how CD use might affect L2 learning in general and reading comprehension and vocabulary learning in specific.

In addition, given the fact that L2 learners heavily depend on dictionaries (Fan, 2003; Gu & Johnson, 1996; Schmitt, 1997), it is necessary to find out more about dictionary use. This is particularly the case especially when EFL learners increasingly depend on new types of reference materials such as CDs, which are becoming more popular among Algerian L2 learners. This study investigating the use of CDs not only contributes to a better understanding of L2 learners' use of dictionaries, but also helps the understanding of how new language learning technologies impact dictionary use.

Furthermore, this study also has significant pedagogical implications. To my knowledge, no CD using skills are taught in Algerian EFL classrooms, and training is merely restricted to the use of PDs. CD-ROM dictionary skills are left to individual learners to learn on their own by trial and error. This is partially because the teachers themselves might not be aware of the potential benefits of CDs, or because there is only little empirical research on CD use on which teachers can base their instruction

and refine the existing dictionary training syllabus to fit the new trends in language learning technologies and reference tools.

It is my belief that the findings from this study would inform teachers about students' CD use and improve the ways and methods they use to train their students in dictionary skills. The significance of such a study is further endorsed by Hartmann's (1999b, p. 37) belief that:

> Research into dictionary use . . . provide[s] the framework for all lexicographic production, and more such research will be needed if the level of dictionary awareness is to be raised and the teaching of reference skills is to be improved.

8. Definitions of Terms

CD-ROM dictionary: A dictionary stored on a compact disk and installed on a computer so that users can look up words and display their definitions on the computer screen. It gives pronunciations for each word entry and provides a wide range of interactive and multimedia content. In the present study, it refers to the Cambridge Advanced Learner's Dictionary in CD-ROM format.

Printed monolingual dictionary: A dictionary presented on paper (hard-copy) that contains word entries with their definitions in the same language, and they are

sequenced in an alphabetical order. In the present study, it refers to paper dictionaries of the students' own choice.

Reading Comprehension: An activity in which a reader reads a passage to extract and construct meaning (White, 2012). This process involves "the interaction between the reader and the text, – how the reader is deciphering the writing on the page, what he or she is thinking about while reading, and how the reader is monitoring his or her reading" (McKay, 2006, p. 224).

Vocabulary retention: The kind of learning where vocabulary is picked-up during normal L2 learning tasks either from context or after looking up the unknown word in a dictionary. Retention could be short-term (immediate) or long-term (delayed). In the present study, it refers to long-term vocabulary retention after consulting the dictionary.

Monitoring software: A computer program designed to monitor and record all what is being done on a computer. It works like a surveillance camera, tracking and recording all the activity anybody does on a computer, and storing this in log files in a secure area for later review.

Log file: A full written record of all the activity a person does on a computer during a period of time.

9. Structure of the Thesis

The present study is composed of five chapters: Chapter 1 first describes the process of reading and then explores the role of vocabulary knowledge in reading comprehension. Relevant literature on the lexicography and development of monolingual learner dictionaries is also presented since they are one of the two dictionary types used in this study. The literature then opens out into a wider context of pedagogy; in particular, the controversy over dictionary usage and the debate on whether to use monolingual or bilingual dictionaries in L2 learning.

Chapter 2 first explains how the dictionary user, the lexicographer, and the language interact so that a new dictionary is born. Then, an important section of this chapter is the detailed description of the process involved in dictionary use and effective meaning retrieval. The types of dictionary use research are outlined and a general review of the beginnings of this field of enquiry is presented. Later in this chapter, findings of previous dictionary use studies in the areas that are pertinent to and addressed in the present study are reviewed, with a specific focus on the studies of dictionary use while reading.

Chapter 3 deals with electronic dictionaries, their typology, and the motivation behind using them. An important part of this section is the review of existing research on computerized dictionaries, among them CD-ROM dictionaries, as they are the main concern of the present study. This chapter finally reviews those studies of

dictionary use which rather compared electronic dictionaries to ordinary ones regarding their effects on language learning.

Information about the sample involved in the study, data gathering tools, research strategy and the procedures followed to meet the research objectives are set out in Chapter 4. The results from the data analysis as well as a few corresponding implications for teaching EFL are presented and discussed in Chapter 5. Summary of the study and recommendations for future research are then presented in the General Conclusion section. This section also highlights some methodological issues and limitations that impacted the design of the study. Finally, the testing instruments employed in the study are given in the appendices.

Chapter One

Reading, Vocabulary, and Dictionaries

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Introduction

As the present study involves reading, vocabulary, and dictionaries, the focus of this first chapter will be to provide an overview of each. Thus, it will first describe the process of reading and then will examine the role of vocabulary in reading comprehension. Relevant literature on the lexicography and development of monolingual learner dictionaries will also be presented since they are the main type of dictionaries used in this study. The literature will then open out into a wider context of pedagogy; in particular, the controversy over dictionary usage and the debate on whether to use monolingual or bilingual dictionaries in L2 learning.

1.1. What is Reading Comprehension?

Reading comprehension is an activity in which a reader reads a passage to extract and construct meaning (White, 2012). This process involves "the interaction between the reader and the text, – how the reader is deciphering the writing on the page, what he or she is thinking about while reading, and how the reader is monitoring his or her reading" (McKay, 2006, p. 224).

1.2. The Nature of Reading Comprehension

The process of reading has been studied from a cognitive point of view that led to theories of reading comprehension. A well-established cognitive theory of reading comprehension considers reading as an interactive process where words and phrases are processed in context and not separately (Spiro, Bruce & Brewer, 1980). This interactive view of reading focuses on the reader's effort to integrate textual information and prior knowledge to extract meaning from text, which means that input from text is first deciphered and then processed at a cognitive level.

For the purpose of constructing meaning, readers must combine the information in the text with their existing knowledge, and then through a series of processes, the text makes it possible for readers to build conceptual knowledge structures that allow the readers to make meaning (Adams, 1980). The text does not convey meaning by itself, but it merely guides readers and shows them how the meaning can be built, using previously acquired knowledge (Carrell, 1983), which is in turn unique to each reader. This uniqueness could result in individual differences in text comprehension. Thus, comprehension could differ regarding each reader's level of prior knowledge structures.

Research shows that reading comprehension comprises a set of complex cognitive skills. The cognitive mechanisms of reading consist of two parallel processes: (a) word recognition and (b) the comprehension processes (Perfetti, 1985).

The latter include comprehension processes at the text level (sentences) as well as the representation of the entire text or passage. When lexical processes including word recognition are linked to the comprehension processes, readers could then create a mental representation for a text to understand its meaning (Perfetti, 1985).

However, when making meaning, the reader must also infer information that is not openly indicated in the text, since a great proportion of the knowledge necessary to comprehend a text entails that the reader makes appropriate inferences to deduce meaning. For instance, understanding the sentence '*The mother tried to cut the steak but the knife was dull'* requires that the reader at least draws two inferences: The first is that a steak is cut with a knife, and the second is that the knife should be sharp to cut the steak. These two inferences can be implied and understood indirectly, but the success in their understanding depends on the reader's world knowledge (Perfetti, 1985). The ability to make appropriate inferences while reading is an essential constituent of text comprehension.

In summary, research on the process of reading comprehension indicates that reading is an interactive process where the reader integrates textual features as well as features of their prior knowledge to build up meaning. Both prior knowledge and text features' processing play a crucial role in reading comprehension. Yet, good readers must sometimes exert inference efforts to gain insight into knowledge not stated explicitly in text.

1.3. The Role of Vocabulary in Reading Comprehension

Research indicates that vocabulary knowledge is a crucial component in reading comprehension (Anderson & Freebody (1981). In addition, "[there is a] well-documented association between good vocabulary knowledge and the ability to read well" (Read, as cited in Flynn, 2007, p. 7). Anderson and Freebody (1981) proposed three hypotheses to explain why vocabulary knowledge is closely related to reading comprehension: the instrumentalist, aptitude, and knowledge hypotheses. The instrumentalist position regards vocabulary as a major factor in comprehension, and that knowing the meaning of words enables readers to comprehend a text. However, the instrumentalist position does not offer any clues as to where vocabulary knowledge comes from. The aptitude hypothesis proposes that individuals who have a wide vocabulary exhibit better text understanding because they have higher mental agility. Yet, rich vocabulary alone does not suggest better understanding, but it is verbal ability, measured by vocabulary tests performance, which actually determines if understanding will occur. The knowledge hypothesis suggests that a reader's background knowledge (culture) is an essential factor for text understanding, and that a person's performance on vocabulary tests serves as a mirror of this knowledge. This hypothesis emphasizes that knowing a word's meaning very well means knowing more words related to it, and this broad knowledge is important for text comprehension.

For example, a person who knows the meaning of the word ‘home page’ is likely to know a lot of words about computing. This knowledge would necessarily enable the person to understand instructions in a manual which do not contain the word ‘home page’, such as “Click on the ‘Edit’ drop-down menu in your browser, choose a function, and then select an option from the dialog box”

Whereas the Instrumentalist hypothesis stresses individual word meanings as an important factor in performance in reading comprehension, the Aptitude and Knowledge hypotheses emphasize that the more word meanings readers know and the more background knowledge they have, the better they are at reading comprehension.

Bearing in mind Anderson and Freebody’s (1981) Aptitude hypothesis which suggested that individuals should have a wide vocabulary to read well, two questions of interest in this regard are: What percentage of a text’s vocabulary should a reader know to understand the text well? And how many words must they possess to be able to read and comprehend an L2 text adequately?

In her study investigating the relationship between vocabulary size and the comprehension of academic texts, Laufer (1992) found that adequate comprehension in L2 reading entails knowing 95% of the text words, and to achieve this level of lexical coverage the reader must know at least 3,000 word families. Knowing a word family means that knowing the word ‘*conclude’*, for instance, necessarily implies knowing ‘*conclusion’, ‘conclusive’*, ‘concluding’, ‘*conclusively’* and their inflected forms. Laufer pointed that knowing 3,000 word families is the vocabulary threshold

required for full comprehension, and that any values below this level will automatically result in L2 reading being hindered because of insufficient vocabulary.

However, in a recent study involving 745 participants, Laufer and Ravenhorst-Kalovski (2010) revisited the lexical threshold required for adequate text comprehension. They found that the learners whose vocabulary size was between 6,000 and 8,000 word families understood 98% of text's words, whereas those whose vocabulary ranged between 4,000 and 5,000 word families reached 95% lexical coverage. Hence, Laufer and Ravenhorst-Kalovski suggested possessing 8,000 word families as an ideal vocabulary knowledge threshold leading to 98% of text comprehension, and a lower threshold of 4,000-5,000 word families to achieve 95% comprehension.

Similarly, Hu and Nation (as cited in Laufer, 2013) argued that a lexical text coverage of 98% is the required level for adequate comprehension, as only some learners in their study could read adequately at a 90% and 95% lexical coverage. However, it seems that students enrolled at university should have far more extensive vocabulary than 5000 and 8000, as suggested by Hazenburg and Hulstijn (1997) who claimed that freshmen university students should learn at least the 10,000 most frequent base words of the language to cope with first-year reading assignments.

Overall, vocabulary knowledge is paramount to L2 reading comprehension as it is ". . . the strongest predictor of comprehension, even more so than other factors including topic familiarity, strategy use, and grammar knowledge" (Prichard &

Matsumoto, 2011, p. 207). In the following section, literature pertaining to the development and lexicography of monolingual learner dictionaries is presented.

1.4. Dictionaries and Foreign Language Reading Comprehension

Many dictionaries are now available not just in printed format but also in electronic formats, such as CD-ROM dictionaries, online dictionaries, handheld devices, and even as Android applications on smart phones, palmtops, and tablets. There is a wide range of dictionaries with different languages, language varieties, vocabularies, sizes, formats, prices, intended purposes, and users. Of this variety of dictionary types, the following section gives a brief historical overview of the development of English monolingual learners' dictionaries, since they are the ones used in this study.

1.4.1. The Development of English Monolingual Learners' Dictionaries

For more than fifty years, the area of pedagogical lexicography for learners of English has been characterized by a "rapid and constant change, technological advance, innovative and creative development, and responses to users' needs and to teachers' suggestions and demands, and an increasingly competitive market" (Kirkness, 2004, p. 56). Recently, different English-speaking countries, like Australia and the United States, have compiled their own monolingual dictionaries (MLDs). Yet, the leading center for making English MLDs has been and is still Great Britain (Kirkness, 2004).

Four British MLDs for advanced learners have controlled the dictionary market worldwide: the Oxford Advanced Learner's Dictionary of Current English (OALD), the Longman Dictionary of Contemporary English (LDOCE), the Collins COBUILD English Dictionary (CCED), and the Cambridge International Dictionary of English (CIDE). These MLDs adopt the same principles, that is, "the need to limit the word list to only the most important words, but to treat them more fully, with pronunciation indicated through phonetic transcription, with grammatical information, explanation of idioms and use of examples, and meaning conveyed in simple terms" (Béjoint, 2000, p. 66).

Oxford University Press first published the OALD in 1942, entitled the Idiomatic and Syntactic English Dictionary. It was then republished as the OALD in 1963, 1974, 1980, 1989, 1995, and 2000 (Kirkness, 2004). Some of the major features of the OALD are: (1) the systematic indication of information necessary for encoding, such as whether nouns are countable or uncountable, and what the plurals of nouns, the comparatives of adjectives, and irregular verbal forms are; (2) a large number of examples representative of current usage;(3) the indication of the received British pronunciation (RP) by means of the transcription of the International Phonetic Association (IPA); (4) pictorial illustrations; (5) the presence of a certain number of appendices, such as illustrations, irregular verbs, punctuation, numerical expressions, and weights and measures (Béjoint, 2000, pp. 66-67); and (6) the use of stylistic

labels or pragmatic markers to indicate register and subject field (Kirkness, 2004, p. 69).

The LDOCE was first published in 1978, edited by Paul Procter, to compete against the OALD. It was again published in 1987, 1995, and 2001. It was basically similar to the OALD in layout organization and types of information provided, but also included other important innovations such as the use of a controlled defining vocabulary of 2,000 words, the availability of IPA transcripts for both British and American pronunciations, and finally the use of computer assistance, primarily to check the consistency of the defining vocabulary (Kirkness, 2004).

The CCED was first published in 1987, edited by John Sinclair. It was then published in 1995 and 2001. The CCED was claimed to be a corpus-based dictionary of "real English" (Kirkness, 2004), as all usage examples were extracted directly from a computerized corpus of 20 million words, whereas meanings and uses were explained in a discursive, full-sentence style, simulating teacher talk.

Cambridge University Press introduced the CIDE in 1995, edited by Paul Procter. It was largely based on the Cambridge Language Survey of 100 million words which were collected from the main standard varieties of English, mainly British, American and Australian English. It also used "a corpus of learner English, which identified typical learner errors . . . . [,] guidewords to help users to distinguish

between the senses of polysemous words . . . . [, and] a phrase index listing multiple-word items under each item a learner might look up" (Kirkness, 2004, p 75).

By now, the newer editions of the aforementioned dictionaries must have absolutely incorporated further changes and revisions, and should have significantly improved regarding the quantity and quality of information, and user friendliness. Moreover, the recent editions of the four dictionaries are all available in CD-ROM format and on the Internet with extra features that include native speakers' pronunciation for each word, further grammatical and usage information, "corpus examples, visual and audio materials, and interactive exercises and games" (Nesi, 1999, p 60). In fact, MLDs are being enhanced and refined on a regular basis because they are adapted from frequently-updated corpus data which provide an empirically-based account of the language (Rundell, 1998).

Alongside the previously mentioned titles, several other MLDs have been published. Currently, a wide range of MLDs are available for all levels of proficiency. In addition, there are many specialized dictionaries available on the market, such as dictionaries of collocations, pronunciation, phrasal verbs and idioms. Besides, a number of technical learners' dictionaries for specific disciplines, such as business and computing, are also available. Interestingly, a recent innovation in lexicography is the bilingualized dictionary, which is the MLD with translations into the students' native language. This type of dictionary has become increasingly available for many languages including Arabic.

In the following section, literature related to whether dictionaries should be used in L2 learning is reviewed.

1.4.2. Controversy over Using Dictionaries in Language Learning

Language teachers are repeatedly perplexed about the role of dictionaries in foreign language learning and teaching, and the debate of whether to use dictionaries in the foreign language classroom has always been a lively one amongst language teachers and lexicographers. Amongst many questions that can be asked about dictionaries, one question has received the most attention: Which is better, looking up an unknown word in a dictionary or simply guessing its meaning from context? Or to put it differently: Do dictionaries have any notable effects on L2 learning?

1.4.2.1. Negative Attitudes towards Dictionaries

Many language teachers have often had a negative view towards using a dictionary; they adopted the premise that dictionary use encourages laziness (the learner should normally make the effort to guess the meaning of unknown words), or that it distracts students' attention away from the teacher in the classroom (Kisito, 2007), or that bilingual dictionaries would necessarily lead to unwanted thinking in the first language. Because of the teachers' negative views towards dictionary use, they hardly ever encourage their students to use dictionaries. Consequently, students' dictionary skills are often poor.

In the same way, some EFL teachers do not recommend the use of dictionaries in the belief that they do not allow students to comprehend vocabulary in context because students overuse them at the expense of developing their self-confidence and attempting to guess the meaning from context (Bensoussan, Sim & Weiss, 1984; Kisito, 2007). Similarly, teachers' concerns about vocabulary learning could be attributed to students' using bilingual dictionaries too blindly, or from students expecting a one-to-one correlation between their mother language and English (Stein, 1990).

As far as the reading fluency is concerned, teachers and educators are concerned that students' excessive use of dictionaries may interfere with their short-term memory, thereby impeding their comprehension (Knight, 1994), and in this way dictionaries can be cognitively disruptive. A student must know how the word is spelled, stop reading to search for the word in an alphabetical order in the dictionary and then read through the entries to select the appropriate connotation or sense. This could obviously suspend the process of forming a cohesive connection on both sentence and text level.

As a result, the constant lookup may interrupt the flow of concentration to make reading a process of word-by-word decoding in which the whole meaning or part of it is often missed (Summers, 1988; Scholfield, 1982). Hence, Rhoder and Huerster (2002) claimed that students may not be very motivated to stop reading each

now and then to look up a word in the dictionary, so they may just skip those unknown words hoping that the context will explain them.

1.4.2.2. Positive Attitudes towards Dictionaries

Despite researchers' and educators' concerns, research in L2 learning has shown that dictionary use can actually benefit language learners. Those who are in favor of using the dictionary in L2 learning propose that dictionaries can be useful to learners because, after all, their main use is for lexical information, which is of the utmost importance in L2 learning (Anderson & Freebody, 1981). This view is also reflected in the undeniable truth that dictionaries are commonly considered among the language learning aids much favored and mostly used by language learners (Laufer, 2011).

Similarly, Laufer (as cited in Hayati & Fattahzadeh, 2006) asserted that when a word looks familiar to the learner but the sentence in which it is found does not help explain its meaning, the learner in this case should be encouraged to consult a dictionary for this word. Consulting a dictionary while reading is "an integral part of the reading process" (Bensoussan, 1983, p. 341), as it helps the reader to find out about the meaning of the difficult vocabulary, determine its meaning based on contextual information, and learn more meanings of that word in other contexts and uses, with different collocations and structures.

Moreover, dictionaries proved effective in facilitating not only vocabulary learning (Hulstijn, Hollander, & Greidanus, 1996; Knight, 1994; Luppescu & Day, 1993) but text comprehension as well (Knight, 1994; Summers, 1988). Knight (1994) stated that using a dictionary has indeed a facilitating effect on improving learners' vocabulary; she found out that in addition to incidental learning of vocabulary through guessing from context, learners who further consulted a dictionary after guessing not only learned more words following reading but they even remembered more vocabulary after two weeks. Knight also discovered that the low verbal ability participants benefited more from the dictionary than the high verbal ability participants.

Furthermore, in their study focusing on the role of using bilingual dictionaries in vocabulary learning while reading by 293 Japanese EFL undergraduates, Luppescu and Day (1993) found out that the students who used a dictionary during the reading task scored significantly higher on vocabulary tests than those who did not.

In fact, dictionary use, as a vocabulary learning technique, could also be used alongside more decontextualized vocabulary learning strategies. For instance, a learner memorizing wordlists or glossaries may use the dictionary to check information on a particular word, or to scan the entry for additional senses and information. Similarly, examples in dictionaries help enhance L2 learners' comprehension by providing them with real-life models of appropriate usage to

remember and eventually produce, through setting individual words into a range of typical contexts and appropriate phrases (Wang, 2007).

Overall, the conviction of the usefulness of dictionaries has become very common not only among lexicographers but among L2 learners themselves, who most probably cannot do without dictionaries, as the latter offer substantial lexical benefits. Therefore, it is obvious that dictionary use will remain an important basis for gaining further understanding of the various uses of new words.

1.4.2.3. Context and Meaning

Using dictionaries is an extremely effective vocabulary learning strategy. Yet, teachers' criticism of dictionary use often stems from the fact that dictionary definitions are not presented in context (Bensoussan, Sim, & Weiss, 1984). The role of dictionaries in L2 learning has been ignored due to the preconceived belief that words should by no means be taught individually or in isolation from context; yet, dictionaries are deemed to be reinforcing the learners' tendency to learn individual words when acquiring an L2. Nevertheless, a review of the relevant literature concerning L2 dictionary use while reading advocates that selective dictionary consultation may actually bring about better comprehension and thus efficient vocabulary development (Prichard, 2008).

As a matter of fact, during the reading process, dictionary use generally competes with guessing or just ignoring the unknown words. Yet, good readers

should normally take smart decisions about when to use each of these strategies; they should not use the dictionary only, but should do so after taking guesses at possible meanings according to context. Hosenfeld mentioned (as cited in Wang, 2007): "It is not that successful readers never look up words . . . but only after efficient strategies have failed" (p.6).

So, rather than relying on a dictionary as the sole support, L2 learners should be encouraged to use context as an aid to derive the right meanings of words. In this regard, Bensoussan (1983) suggested that the dictionary "does not really give the meaning of a word. The reader has to negotiate that [meaning] according to the context" (p. 545). This belief stresses the importance of guessing from context as an effective strategy to comprehend unfamiliar words.

Similarly, Nation and Coady (1988) contended that looking up words in a dictionary should be for the purpose of checking a guess, whereas guessing attempts are only made if the context in which the unknown word occurs does not explain its meaning. Likewise, Jones (1995) argued that dictionary use is an effective learning strategy for EFL learners, but such a claim should not be taken as emphasizing the primacy of dictionaries as the sole or the best sources of linguistic information; dictionaries are only one of the tools that L2 learners make use of to figure out the meaning of words (e.g., deducing the meanings of the unknown words from the clues in a text).

Having assumed that dictionaries can indeed offer help to L2 learners, the question that has always been of interest to lexicographers, L2 learners, and teachers as well, is which dictionary type is of greatest benefit to learners? Is it the monolingual dictionary or the bilingual one? In the following section, I review some arguments for and against bilingual and monolingual dictionaries in the context of L2 learning.

1.4.3. Debates on What Type of Dictionary to Use in L2 Learning

1.4.3.1. Positive Attitudes towards Monolingual Dictionary Use

The issue of whether an L2 learner should use a monolingual or a bilingual dictionary has sparked a heated debate among educators and language teachers (Chen, 2011). Baxter (1980), for instance, was one of the educators to endorse the usefulness of MLDs to vocabulary development. He recommended encouraging L2 learners to use MLDs as they often have a positive effect on improving their fluency by offering them definitions in context.

On the other hand, Baxter (1980) pointed that bilingual dictionaries (BLDs), seem to encourage L2 learners to get into the habit of translating from their mother language; consequently, they discourage learners from thinking directly in the foreign language. In this regard, Baxter argued that the frequent consultation and exposure to the defining language in the MLDs would actually be of a great benefit, particularly in enhancing learners' L2 paraphrasing skills.

Likewise, Stein (1990) claimed that using BLDs emphasizes the users' belief in absolute equivalence between the words of the two languages, L1 and L2, while it is lexically acknowledged that the meaning of two words in two different languages is virtually never identical, except for certain technical and scientific terms of specialist usage. Furthermore, Stein argued that most BLDs usually offer many target language equivalents than just one per headword, which may confuse the users about what equivalent to choose. To illustrate this argument, an example entry from Al Mawrid Arabic-English dictionary is given below.

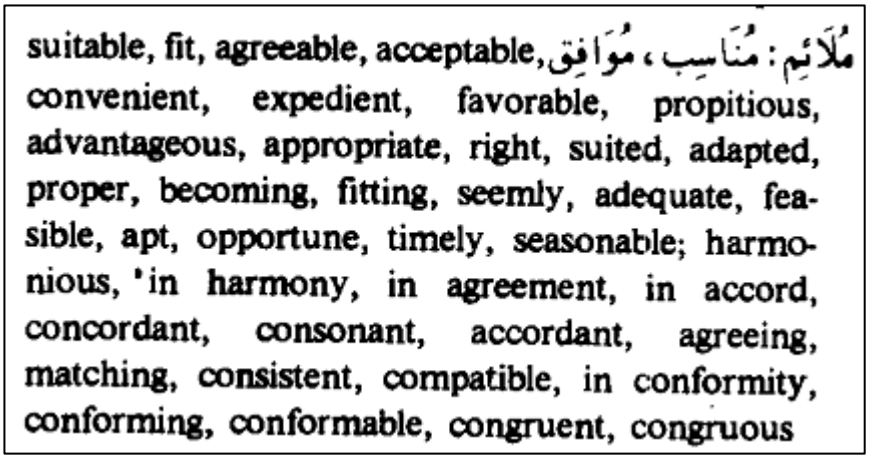
مُلَائِم : مُنَاسِب ، مُوَافِق, suitable, fit, agreeable, acceptable, convenient, expedient, favorable, propitious, advantageous, appropriate, right, suited, adapted, proper, becoming, fitting, seemly, adequate, feasible, apt, opportune, timely, seasonable; harmonious, 'in harmony, in agreement, in accord, concordant, consonant, accordant, agreeing, matching, consistent, compatible, in conformity, conforming, conformable, congruent, congruous

Figure 1. English equivalents for the adjective 'ملائم' in Al Mawrid Modern Arabic-English dictionary (Baalbaki, 1995, p. 1100)

As shown in Figure 1, the proposed English equivalents for the Arabic adjective 'ملائم' could pose a great difficulty for the learners who want to use the equivalent for this adjective in writing or in communication. The dictionary suggests many equivalents for this single word without even providing collocational

information or examples of possible use to help learners determine the most appropriate equivalent. Indeed, such a poor presentation should absolutely leave learners confused about which equivalent to select and use, especially that not all the equivalents proposed can be used in the same context.

1.4.3.2. Positive Attitudes towards Bilingual Dictionary Use

On the contrary of the arguments made in support of the use of MLDs, researchers like Piotrowski (1989) and Bogaards (1996) contended that BLDs have long been the conventional vocabulary resources that L2 learners use more often. In contrast, MLD use is a relatively a new development (Cowie, 1999). Piotrowski (1989) has further pointed out to the innate difficulty involved in finding the needed information in a MLD. He noted that users often get stuck in the paradoxical situation where they ought to know how the L2 word is spelled in order to look it up in the MLD; yet, that L2 word is exactly what they do not know and are trying to find.

In the same way, Tomaszczyk (1983) gave two arguments in favor of BLD' use in foreign language learning. The first of which is the interference between Language One (L1) and L2. Tomaszczyk argued that "whether one likes it or not, language learners do rely on their mother tongue to quite a considerable extent. If this cannot be avoided, why not capitalize on it?" (p. 44).

The second point raised by Tomaszczyk (1983) in support of BLD use is that the vast majority of L2 learners exhibited strong preference for using BLDs, as

reflected by the results from some questionnaire-based studies. He eventually argued that if the users themselves opted for the use of BLDs, so they must have found them beneficial to their language learning development.

Moreover, Hanks (1987) assumed that the exposure to the language in MLDs could not really benefit L2 learners, as the metalanguage of MLDs' definitions is quite different from natural language as regards numerous features like register, collocations, vocabulary, syntax, and a lot more confusing abbreviations which are typical of lexicographical description.

Furthermore, Rundell (1999) and Neubach and Cohen (1988) argued that MLDs' users often find definitions or words which make up the definitions challenging and really difficult to understand. To better illustrate the difficulty in understanding MLD definitions, Neubach and Cohen quote the following comments from a few students:

> I don't understand this definition. What should I do – look up meanings of words in the definitions? Where does it stop? Actually the dictionary hardly ever helps me. I don't understand the definition and I feel that it hinders me more than it helps me. (p. 8)

As we have seen, there is no shortage of arguments for and against both types of dictionaries. On the one hand, because MLDs may be seen as solving some of the problems presented by BLDs, most EFL teachers prefer their students to use the MLD

(Koren, 1997). However, it may be difficult for a student with insufficient vocabulary to understand an MLD entry that contains unknown words, which makes the whole lookup process time-consuming and even frustrating for low-level learners, especially if understanding the entry requires looking up other entries which, in turn, contain more unknown words.

1.4.3.3. Bilingualized Dictionary Use as an Alternative Solution

A recent development in dictionary making is the 'bilingualized dictionary', or also known as the 'hybrid dictionary'. The basic principle in a bilingualized dictionary is that it uses both the source and target language to explain meaning; the term 'bilingualized' conveys the idea that the dictionary is in fact an adaptation of a monolingual dictionary (Lew, 2004). As such, the bilingualized dictionary could be an alternative to monolingual and bilingual dictionaries. See Figure 2 below.


walking or climbing. حَقِيبَةُ الظَهْر

backpacker /'bækˌpækə/ (**backpackers**) NOUN A **backpacker** is a person who goes travelling with a backpack. حَامِل حَقِيبَةُ الظَهْر

backpacking /'bækˌpækɪŋ/ UNCOUNTABLE NOUN If you go **backpacking**, you go travelling with a backpack. حَمْل حَقِيبَة الظَهْر

back pain /bæk peɪn/ UNCOUNTABLE NOUN **Back pain** is pain that you feel in your back. أَلم الظَهْر

bad /bæd/ (**worse, worst**) **1** ADJECTIVE Something that is **bad** is not nice or good. ❑ *The weather is bad today.* سَيِّء
2 ADJECTIVE Someone who is **bad** does things they should not do. ❑ *I'm not a bad person.* رَدِيء

badge /bædʒ/ (**badges**) NOUN A **badge** is a small piece of metal or cloth showing a design or words, which you attach to your clothes. ❑ *...a police officer's badge.* شارَة

badger /'bædʒə/ (**badgers**) NOUN A

Figure 2. Sample entries from an English-English-Arabic bilingualized dictionary

As seen in Figure 2, the great benefit of a bilingualized dictionary for L2 learners lies in the fact that they integrate L2 definitions with the learners' mother tongue equivalents (Lew, 2004). Lew (2004, p. 13) cited a publisher's description of the advantage behind bilingualized dictionaries as follows:

> By providing a brief equivalent in the language of the learner, the dictionary incorporates the useful features of both monolingual and bilingual dictionaries, while avoiding their drawbacks. The learner can immerse in the English language, with active support from the mother tongue. In this way the dictionary user is encouraged to read the information in English, whereas the translation serves to provide psychological reassurance, to reinforce understanding, and to correct misunderstanding when it arises.

Surprisingly, despite their perceived benefits for L2 learners, relatively little research examining the use of bilingualized dictionaries could be found in the field. Hartmann, for instance (as cited in Thumb, 2002), examined 28 EFL learners' attitudes towards using bilingualized dictionaries while engaged in a reading activity. He found that 19 subjects read both L1 and L2 information in the dictionary, while two others read the L1 information and eight the L2 information only. When interviewed, the subjects said that the combined presentation of L2 and L1 information in one entry was a motivational factor for their reading.

Likewise, Laufer and Melamed (1994) compared monolingual, bilingual, and bilingualized dictionaries regarding their effectiveness on the comprehension of words and on the production of new sentences using these words. The subjects were 76 high school students and 46 university EFL students in the Zionist Entity. They first looked up 15 low-frequency words in dictionaries, took a multiple-choice test to verify their comprehension of the words, and then were asked to use them to compose new sentences. Laufer and Melamed found that bilingualized dictionary use not only induced significantly better comprehension scores than MLD and BLD did (p = .02 and p = .008 respectively), but also proved more effective for writing than the MLD (p = .006).

Moreover, Laufer and Kimmel's (1997) study was mainly interested in knowing the entry part that high school learners read in a bilingualized dictionary to cope with unknown words. Laufer and Kimmel found that their subjects exhibited various lookup patterns according to their personal preferences. Some opted for only one part of an entry, whether monolingual or bilingual, whereas others read the whole entry information (13%). Interestingly, some subjects preferred to look up some words in one language and other words in the other language.

Although reading the whole bilingualized entry was not common in their study (13%), Laufer and Kimmel (1997) argued for the effectiveness of the bilingualized dictionary for L2 learning. Their argument is that both L1 and L2 are involved in the bilingualized dictionary, and thus it offers a variety of lookup patterns. Learners could

consult any language they want for any words they prefer, depending on their personal choice.

The studies discussed earlier have to some extent revealed L2 learners' use of bilingualised dictionaries by exploring their attitudes on the effectiveness of the bilingualised dictionary and their use of bilingualised entries. However, research is needed to arrive at a better understanding in this regard.

Conclusion

This chapter has provided an account of the reading process as well as the contribution of vocabulary to L2 text understanding. Particularly, researchers seem to agree that at least 98% of text lexical knowledge is prerequisite to enable full comprehension. In addition, despite some researchers' and teachers' negative perceptions, the literature emphasizes dictionaries as important tools for L2 learning and mainly for reading.

Moreover, and as has been discussed, both MLDs and BLDs have advantages and drawbacks, and this makes it difficult to favor one type of dictionary at the expense of the other. However, most L2 learners were found to depend on BLDs regardless of the perceived disadvantages that are associated with their use. Interestingly, in order to bridge the gap between the two types of dictionaries, the bilingualized dictionary was introduced to L2 learners to aid them in reading comprehension.

Chapter Two

Dictionary Use Research

Chapter Two

Dictionary Use Research

Introduction

This chapter will first explain how the dictionary user, the lexicographer, and the language interact so that a new dictionary is born. Then, an important section of this chapter will be the detailed description of the process involved in dictionary use and effective meaning retrieval. The types of dictionary use research will also be outlined and a general review of the beginnings of this field of enquiry will be presented. Later in this chapter, findings of previous dictionary use studies in the areas that are pertinent to and addressed in the present study will be reviewed, with a specific focus on the studies of dictionary use while reading.

2.1. The Nature of Dictionary Design and Use

Dictionary use is a complicated process that deserves a thorough investigation from different angles. As shown in Figure 3 on next page (Tono, 2001, p. 12), the user of a dictionary is the major element in this process. S/he is already conditioned by the acquisition stages, learning difficulty, and L1 background.

However, three other elements, namely the language, the lexicographer, and the dictionary, are intertwined with one another. The lexicographer has to glean the language data to design and compile the dictionary with the user's expectations in

mind, while the latter gives feedback to the lexicographer either verbally or through purchasing the final product, which is the dictionary. The aforementioned complex relationship between all the stakeholders generates considerable research in various areas.

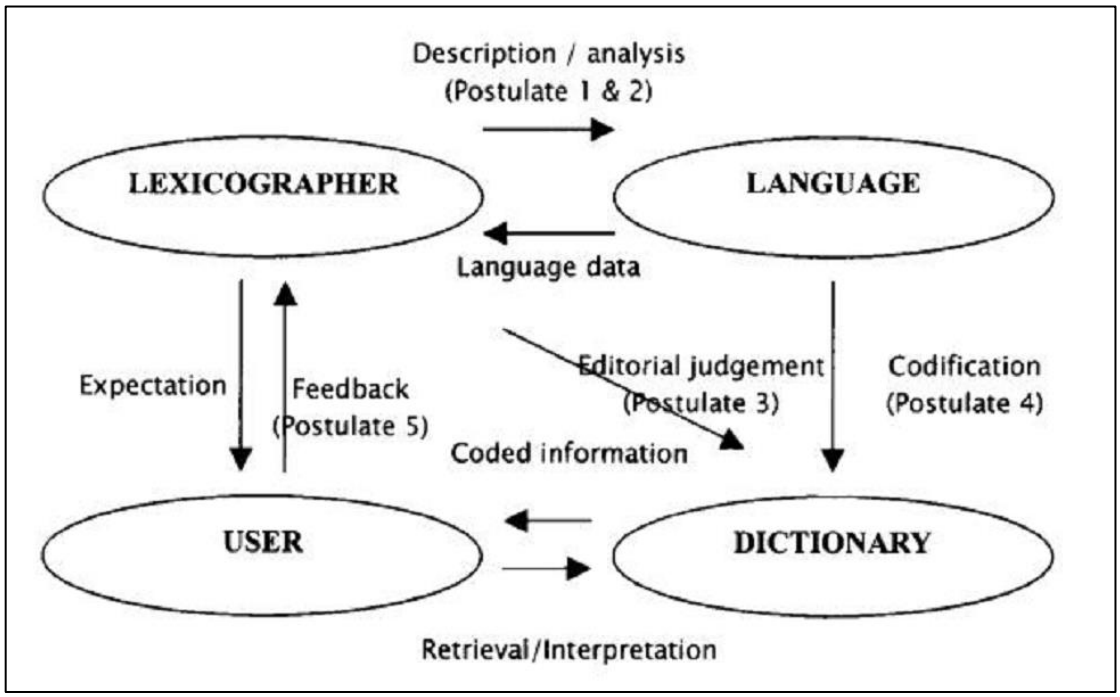

Figure 3. Intricacy of dictionary design and use (Tono, 2001, p. 12)

2.2. The Process of Dictionary Use

When we consider the interaction between the dictionary and its user, the lookup process which lasts for barely a few minutes can be very complex (Béjoint, 2000; Nesi, 1999). Research in the field suggests that using a dictionary constitutes an advanced cognitive task, as it requires the readers to stop reading when they encounter an unknown word, keep the context of the passage they are reading in mind while

they look up the word and select an appropriate dictionary meaning (Scholfield, 1982). Therefore, searching through a dictionary may be the most difficult part when learning another language.

According to Hartmann (2001), seven stages are involved in the consultation process:

1. The user realizes that there is a problem arising in the activity that s/he is engaged in, and wants to solve it.
2. The user determines the problem word(s) which has/have to be looked up.
3. The user selects the most appropriate reference work.
4. The user searches for the appropriate headword in the macrostructure of the reference work.
5. Having found the appropriate entry, the user locates the sought data in the microstructure of the entry.
6. The user extracts the information from the entry.
7. The user integrates it into the context that prompted the reference process (pp. 90-91).

A general description of the consultation process is illustrated in Figure 4 (Hartmann, 2001, p. 91).

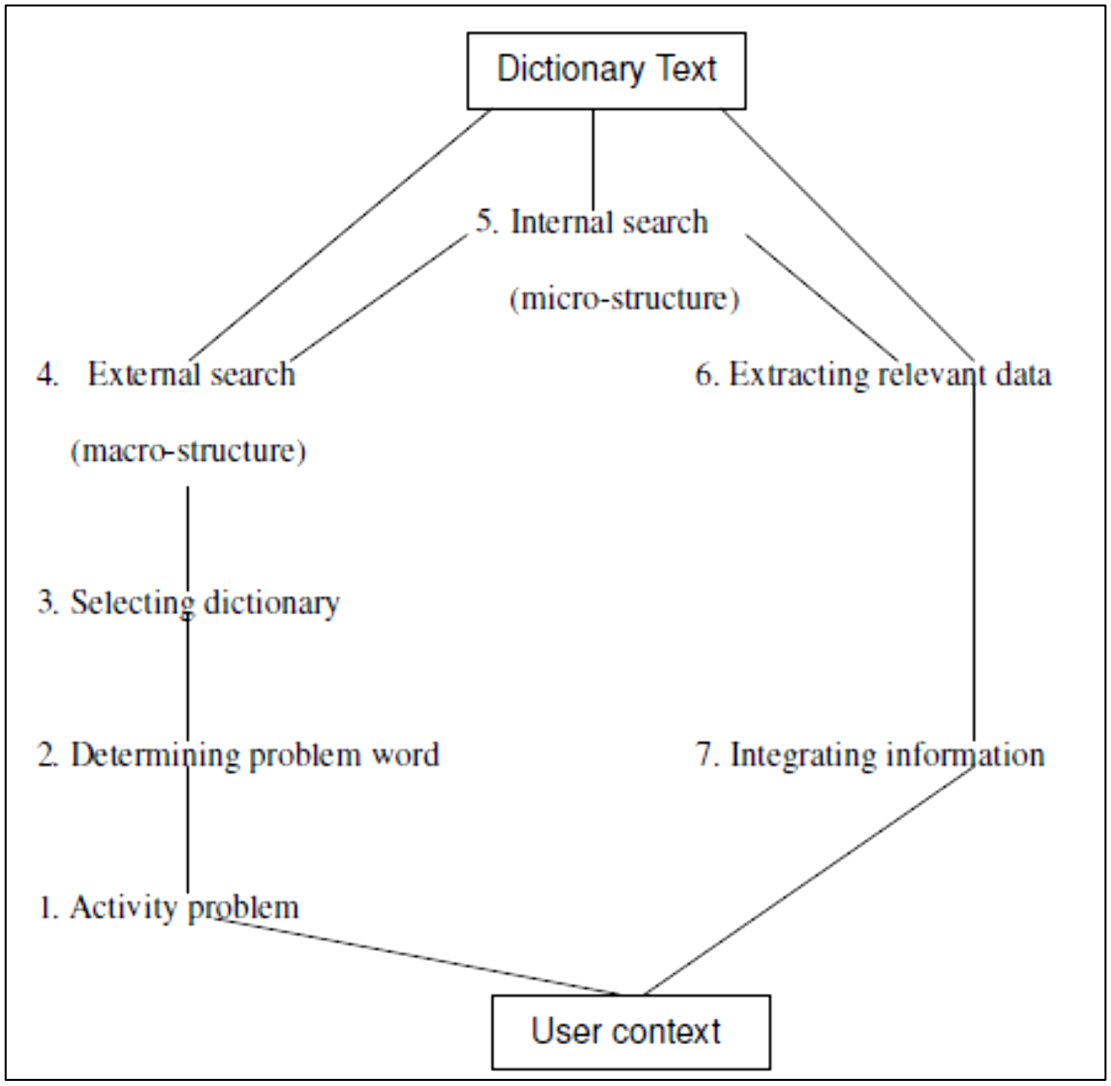

Figure 4. Components of the dictionary consultation process (Hartmann, 2001, p. 91)

2.3. Effective Dictionary Use

As mentioned in the previous section, the process of using a dictionary is a complex and tiring cognitive task. Scholfield (1982) suggested that looking up an unknown word in a dictionary requires applying a given set of skills in a systematic way. He discussed in detail the seven steps that EFL students should follow for

efficient dictionary use to aid their reading comprehension. Based on Goyette's description (1995, pp. 22-24), Scholfield's procedures of using the dictionary to retrieve meaning are as follows:

First, the reader must identify the word or words to be looked up; this may not be an easy task if the word is part of a syntagm (phrase); Scholfield gives as example, "the baby cut a molar," where "molar" may be unknown, but this specialized meaning of "cut" may also be unknown (p. 186).

Secondly, any inflectional information must be removed from the word. The problem of suppletion (inflectional irregularity) in languages such as French or Spanish may make this step particularly problematic, requiring readers to possess large stores of syntactic and grammatical knowledge to enable them to retrieve from memory the simplest or base form of the unknown word in order to look it up. In French, remembering that the base form of the verb savoir (to know) can appear as *su, sais, savais, saura* as well as *sachant, sachent,* etc., may make its retrieval problematic for the second-language reader.

The third step is the actual process of looking up the word in the alphabetic listing in the dictionary. The fourth step takes place if no main entry has been found for the unknown word. In such a case, a series of procedures is initiated (a) to look up the different elements of a set phrase or idiom, (b) to remove the suffix and look up the stem, or (c) to search nearby entries if the word appears to have an irregular

inflection. As in step two, the irregular lexical surface structures encountered in reading in a highly inflected second language may cause faulty or unproductive dictionary searches.

The fifth step explains how polysemous words (words with multiple meanings) and homographs (different words with the same spelling) must be reduced by using part of speech (e.g., noun, verb), stylistic (e.g., technical), and/or pronunciation information (e.g., polish and Polish). However, in second-language reading, the pronunciation of the word may not be known, which makes such information useless. Inferring the appropriate meaning from part of speech and grammatical information provided by these dictionary abbreviations requires practice and skill. Dictionary abbreviations may be problematic, especially across languages, since similar concepts may have different abbreviations, while the same abbreviation may stand for totally different concepts. For example, to mark an obsolete meaning, the Webster uses the abbreviation obs while Le Petit Robert uses vx (vieux, archaïsme); on the other hand, the abbreviation ab (about in the Webster) closely resembles (in form only) the French abbreviation ab (d') (d'abord in Le Petit Robert); mil stands for military while mil stands for milieu. These dictionary abbreviations may add a level of difficulty for those who are novice in dictionary usage.

Readers may select the first word sense listed in a dictionary definition thinking that the meaning it represents is the most frequent for that word; however,

not all dictionaries list word senses by frequency; thus, Scholfield advises readers to scan all the meanings of a word before choosing the most likely one. Context may also be used to select the appropriate word sense. By a process of elimination, possible word senses are compared to inferences made about the unknown word to reduce the meaning to one (which, as Scholfield points out, could still be inappropriate).

The sixth step involves understanding the definition of the word and integrating it into the context of the text. Understanding the definition may entail further dictionary searches as unfamiliar words in the definition must in turn be looked up. Words defined using new or unfamiliar terms are especially likely to occur in second-language dictionary usage (Hammerly, 1979). Familiarity with the way hyponyms (superordinates) are used in dictionaries to classify words, as well as the special ‘dictionary’ vocabulary are also needed.

To complete the process of looking up a word (the seventh step), it is suggested that if none of the available meanings fit, readers try to infer the correct meaning from the dictionary senses provided. If several meanings fit, readers should try to find contextual indices to further reduce the various senses. These techniques of disambiguation "require sophisticated skills of inference" (Scholfield, 1982, p. 193).

2.4. Variety of Dictionary Use Topics

Dolezal and McCreary (as cited in McCreary & Dolezal, 1999, p. 110) published an annotated bibliography of the 178 studies on dictionary use in the last thirty-seven years, and divided them into five categories: (a) experiential studies, 73 in total; (b) comparative studies, 29 in total; (c) users' needs and skills surveys, 26 in total; (d) cultural articles, 12 in total; and (e) experimental research, 36 in total.

While McCreary and Dolezal's categorization considered mainly the methods, Hartmann (1987, p. 12) concentrated on the dictionary users and categorized the studies by theme including: (a) the most important types of linguistic information sought by dictionary users ("dictionary typology"); (b) their assumptions and expectations in resorting to the dictionary ("user typology"); (c) the reference needs of the users ("needs typology") ; and (d) the training of the users' reference skills ("skills typology"). These four themes could be incorporated under "users' needs and skills" in McCreary and Dolezal's categorization.

In addition, Tono (2001) put together a more exhaustive list of research areas based on Hulstijn and Atkins's (1998) summary:

- History of dictionary use
- The functions of the dictionary
- Dictionary typology

- The image of the dictionary
- The attitudes, needs, habits and preferences of dictionary users
- Variations in use: (i) comprehension, (ii) production, (iii) other test performance, and (iv) vocabulary learning.
- Reference skills
- Teaching dictionary skills
- Critical comparisons and reviews of dictionaries (p. 61).

Moreover, Tono (2001) outlined all the empirical studies on dictionary users since 1962. Of these studies, questionnaire-based research was found to be the method which was mostly-used in investigating the use of English dictionaries, with both native-speakers and non-native speakers (Nesi, 2000b; Tono, 2001). Other investigative methods included tests on reading, vocabulary learning, dictionary-using skills, and observation (Nesi, 2000b).

The previous overview shows that research on dictionary use is multidisciplinary and is an area of lexicography that is interesting and worth exploring, in view of the high status of the dictionary in L2 learners' lives. Because dictionary use is a very personal intellectual experience, considerable differences could occur regarding the kinds of dictionaries, their users, and the methods used in studies (Tono, 2001).

According to the classification list of Tono (2001), the present study is concerned with the attitudes, needs, habits and preferences of dictionary users; dictionary use for comprehension and for vocabulary learning.

2.5. Research on General Dictionary Use

2.5.1. Studies on Printed Dictionary Use

The earliest method in dictionary use research was the survey by questionnaire, which was pioneered by the American lexicographer Clarence Barnhart in the early 1960s (Diab & Hamdan, 1999). Barnhart's study, however, was not so authentic because it relied on the opinions of college teachers about their students' dictionary use patterns. The argument is that the relationship between the teachers' reports and actual dictionary use is indirect since the teachers were not involved at all in the dictionary-using activity; thus, Barnhart's study has been regarded as too weak to yield reliable results (Hartmann, 2003).

The first important questionnaire study involving dictionary users directly was the survey by Tomaszczyk (1979) who asserted that administering questionnaires directly to the users is the most popular technique of collecting data from dictionary users (as cited in Béjoint, 1981). Similarly, Nesi (2000b, p. 3) noted that "questionnaire-based research is perhaps the commonest method of enquiry into the use of English dictionaries"; however, she pointed to some of the problems that are associated with the use of questionnaires in dictionary use research:

> Results are often a measure of the respondents' perceptions, rather than objective fact. The respondents' desire to conform, their (perhaps unconscious) wish to appear in some way better than they really are, or their inability to recall events in detail may distort the data. (p. 12)

Considering the significance of knowing L2 learners' needs regarding dictionary use, Tomaszczyk (as cited in Harvey & Yuill, 1997) surveyed 449 learners of 16 foreign languages to learn about their use of L2 reference resources such as MLDs, BLDs, technical dictionaries, and restricted dictionaries (dictionaries of slang, usage, etc.). Tomaszczyk recognized several patterns of learners' dictionary use. For example, the subjects used dictionaries more frequently for reading, writing, and translation than for speaking and listening. In addition, although the subjects tended to use MLDs more extensively as their proficiency level increased, almost none of them abandoned using BLDs.

In addition to Tomaszczyk's research, similar studies were carried out with different subjects. Baxter (1980) employed a questionnaire to investigate the dictionary use patterns of 342 Japanese students of English. The results showed that bilingual dictionaries were the primary source of understanding vocabulary for the subjects, as they tended to use them on a daily basis, unlike monolingual dictionaries that were rarely consulted. However, Baxter alleged that overusing bilingual dictionaries prevented the students from using their paraphrasing skills in oral

activities. The argument is that bilingual dictionaries use a single word as an equivalent meaning, whereas learner's monolingual dictionaries use a structure of words and phrases as a definition.

In the same way, Béjoint (1981) surveyed 122 students of English at a French university through a questionnaire to explore their habits of using monolingual dictionaries. Béjoint found that a large proportion of the subjects used the dictionaries on a daily basis because they believed that they were more suitable than bilingual ones. The subjects used monolingual dictionaries more often during writing in order to find information about meaning, spelling, synonyms, and pronunciation. Moreover, Béjoint's study suggested that the subjects were not experienced in using their dictionaries, as most of them did not read the front matter and did not make use of the coding conventions given in the dictionaries.

Fan (2000) examined bilingualized dictionary use of Chinese EFL students. Fan found that the vast majority of informants (90%) consulted bilingualized dictionaries because they considered them useful for their L2 learning. They generally searched for the meaning of words but sometimes looked up Chinese equivalents, derived forms, and usage information. In addition, the informants indicated that they rarely looked up collocations and pronunciation information. Fan also found that the students who are advanced in vocabulary knowledge used the information provided in

the dictionary more often than the less proficient students did. This study also suggested that many students did not make full use of bilingualized dictionaries.

The previously mentioned studies surveyed L2 learners' general patterns of using conventional printed dictionaries. These studies showed that: (a) most L2 learners, among them advanced learners, used dictionaries; (b) although they mostly used dictionaries to learn the meaning of words , L2 learners also used dictionaries to check further information like spelling, pronunciation, and synonyms; (c) L2 learners used dictionaries mainly during the reading and writing tasks; (d) bilingual dictionaries were used for L2 learning more frequently than monolingual ones; (e) learners who had wide vocabulary used monolingual dictionaries more often than those whose vocabulary was limited; and (f) some L2 learners did not make the most of their dictionaries as they were not skilled enough in dictionary use.

2.5.2. Studies on Portable Electronic Dictionary Use

With the advent of technology and the breakthroughs in language learning technologies, PEDs have become available and widely used by L2 learners. Therefore, a few studies have been carried out on their use (Nesi, 1999; Tang, 1997; Taylor & Chan, 1994). Taylor and Chan (1994) surveyed 424 students in Hong Kong to identify their general patterns of using PEDs. In addition, 12 teachers were interviewed about their students' use of PEDs. Taylor and Chan found out that 80 % of the students reported using PEDs, of which the vast majority were bilingual

Chinese and English dictionaries. The students who did not use PEDs reported that they did not use them because they were of poor quality (43%) and unaffordable (35%). All the respondents said that they used PEDs to find the meaning of English words, their spelling (60%), Chinese equivalents (44%), English equivalents (34%), parts of speech (30%), synonyms (27%), and antonyms (22%). Twenty-eight percent of the respondents said they used their PEDs more frequently than PDs, whereas 46% reported they used PDs more frequently.

Whereas the respondents considered PEDs advantageous because of their portability, ease and speed of search, and the availability of sound, they also thought that they had some limitations such as the conciseness and inaccuracy of information, the lack of examples, and the insufficient number of entries. More than that, most of the teachers who were interviewed showed their concerns over the quality of PEDs, and some of them thought that relying on PEDs too much would have a negative impact on the students' learning performance, as they might discourage them from using context to guess the meaning of words. Eventually, all the teachers preferred that their students use PDs.

Similarly, Nesi (1999) surveyed dictionary use of international students attending a British university. She found that only ten students, mostly from Asian countries, had a PED. All of the ten students said they liked using their PEDs for reasons like portability, ease of use, availability of sound, the variety of search routes,

and the possibility of being linked to other computer applications. However, the students reported a few shortcomings in their PEDs like the limited number of headwords, insufficient grammatical, pragmatic, and collocational information.

In Tang's (1997) study, 254 Chinese EFL students as well as 20 teachers were surveyed. However, Tang's study was different from the ones mentioned earlier in that she used other data collection methods alongside questionnaires like observations, assignments, vocabulary notebooks, and handouts. Moreover, interviews were carried out with the teachers to explore their attitudes towards their students' use of PEDs. Tang found that the majority of the students (87%) had PEDs and used them mainly while reading and writing. The students perceived their PEDs useful due to their portability, speed of search, availability of sound, and the provision of their L1 equivalents. Contrary to their students' views, the teachers exhibited concerns about PEDs' use regardless of their potential benefits.

Despite the highlighted shortcomings regarding their quality, the studies discussed previously seem to suggest PEDs as convenient aids that L2 learners should use to boost their vocabulary development, considering the significant benefits that they offer. As a matter of fact, the quality of PEDs has improved in a remarkable way as a result of the rapid progress that is being made in L2 learning technologies. Thus, we cannot come to a definite conclusion vis-à-vis the weaknesses and drawbacks that PEDs might have.

Overall, the studies which have been reviewed in this section were all questionnaire surveys that contributed in one way or another to the understanding of L2 learners' general patterns of dictionary use. However, using questionnaire technique to elicit data may provide less accurate information because the questionnaire' questions are always asked outside the context of actual dictionary use (Harvey & Yuill, 1997; Nesi, 2002). Interestingly, Tang (1997) seems to have slightly overcome this problem through combining a questionnaire survey with other research methods to obtain more reliable information.

The research reviewed in the next section will hopefully yield more accurate data by studying learners' use of dictionaries while being engaged in a particular reading task.

2.6. Dictionary Use and Reading Comprehension

Although L2 learners use dictionaries in the four language skills, they use them predominantly while reading (Béjoint, 1981; Chon, 2008). Several studies examined learners' use of dictionaries when they are engaged in a particular reading activity and regarded the dictionary using act as "a very private matter, occurring as the need arises, and often behind closed doors" (Nesi, 2002, p. 1). Many of the studies which investigated dictionary use during reading were carried out either by using experimental design or computer monitoring, and at times combining the two methods.

Three types of studies could be identified regarding dictionary use while reading, based on the three phases of dictionary use that were proposed by Scholfield (1999): choice, look-up, and learning. Prior to consulting the dictionary, the learners have to decide first which words to look up. Then, they have to consult the dictionary to find the information they seek. However, the look-up activity would not necessarily suggest an effective learning of the looked up word, as this depends on how well the learners did in the first two phases.

The first type of studies examined L2 learners' strategic choice to use a dictionary. While reading, learners may use any of the three lexical processing strategies (LPSs) to figure out the meaning of an unknown word: Inferring its meaning, ignoring the word, or simply look it up in the dictionary. Language learners should be careful as to which of these strategies to use when encountering unknown words as this is a key skill for an effective learning of vocabulary (Fraser, 1999a).

Hulstijn's (1993) study falls in this group. Hulstijn examined 44 Dutch EFL learners for their dictionary look-up behavior while reading a text on computer screen. The subjects read the text using an electronic glossary, while the whole activity was recorded through computer tracking. Hulstijn's study revealed that the learners managed to use the dictionary in a good way in that they did not look up all the unknown words they encountered, but rather looked up only the words that they considered relevant for their reading goals.

The focus of the second type of studies was on the learners' look-up strategies. Such studies examined the type of information that learners searched for as well as the strategies they used when they looked up words. Neubach and Cohen (1988) studied six Hebrew-speaking EFL students' use of MLDs and BLDs while engaged in a reading activity. Think-aloud protocols and interviews were employed in the study.

The results showed that dictionary use was not an easy task for the students, as finding what a word means depended on making attempts at guessing from context before consulting a dictionary for that word. In addition, the learners found it difficult to deal with such mechanics in the dictionaries such as alphabetical order, abbreviations, and symbols. Neubach and Cohen (1988) also found that the high proficiency students preferred using MLDs, whereas BLDs were more preferred by the intermediate and low proficiency students.

Similarly, Laufer and Hill (2000) examined 72 EFL university students in Hong Kong and the Zionist Entity to explore their look-up patterns. The subjects read a text on computer screen and had access to lexical information of the highlighted words in the text. The subjects' look-ups were electronically saved in the computers. Laufer and Hill found that the learners within each group had different look-up behavior, and that even the learners from each country behaved differently. The subjects from Hong Kong consulted words almost twice as often as the Zionist

subjects did, and they preferred to look up English meanings of unknown words, whereas the Zionist learners preferred to check L1 translation immediately.

The last type of studies focused on the effects that dictionary use could have on learning the looked up words. Language learners may retain the meaning of the looked up word and may also forget it. Luppescu and Day (1993) examined 293 Japanese EFL learners to find out how BLDs could affect their vocabulary learning. The subjects in the experimental group read a passage with access to a BLD; however, those in the control group read the same passage except that they did not use any dictionary. Immediately after finishing the reading task, a multiple-choice test regarding the target words encountered in the passage was given to the subjects.

Luppescu and Day (1993) found that the experimental group did better than the control group on the test. However, the subjects in the experimental group found it problematic when it came to dealing with polysemous words, as most of them had difficulty choosing the right meaning from the group of meanings listed in the dictionary. As a result, the subjects in the experimental group took longer to read the passage than the control group.

Likewise, Knight (1994) investigated the effects that dictionary use could have on the vocabulary retention and reading comprehension of 105 American university students of Spanish. The students were split up into experimental group (dictionary)

and control group (no-dictionary), and read articles on computer screen, whereas the subjects' look-ups were recorded by the computer.

Knight (1994) found that the experimental group performed better than the control group on vocabulary retention tests. In addition, the subjects who read with a dictionary got higher scores in reading comprehension than the subjects who read the articles without access to the dictionary. Moreover, the subjects with limited vocabulary used the dictionary more often than those with rich vocabulary. However, the latter group seemed to have spent less time on reading. Knight's study was indeed a significant one, as it proved that learners can also benefit from dictionary use in enhancing their reading comprehension and not only to acquire vocabulary.

On the other hand, Hulstijn et al. (1996) examined 78 Dutch university freshmen studying French in order to investigate the effects that could occur on their retention of words as result of using a dictionary and marginal glosses. The subjects were set into groups; each read a short story under one of the conditions: Marginal Glosses, Dictionary, and Control (no-dictionary). The study revealed that the use of marginal glosses induced better retention of vocabulary, and that the students in the Dictionary group rarely looked up any words in the dictionary. However, when they did, they had a better chance to remember the word's meaning than did the Marginal Glosses group.

Fraser (1999b) investigated the effects of dictionary use on word retention and comprehension of 80 EFL learners. Fraser found that only 39% of the subjects consulted dictionaries, of whom 55% used a dictionary alone and 45% after making an inference about meaning. Interestingly, the latter group seemed to have been more successful in getting the right meaning of words, and therefore exhibited almost full comprehension (83%). Fraser also found that the subjects had a retention rate of 30% when used a dictionary alone. However, when they inferred meaning and then consulted the dictionary, their retention has increased (50%).

Fraser's study suggests that L2 learners were able to use the dictionary efficiently, in that they did not use it in isolation but often after making inferences about possible meaning. Therefore, consulting a dictionary in combination with inferencing is the most effective strategy for recall of vocabulary and comprehension of text.

The studies discussed earlier have demonstrated how L2 learners behaved using dictionaries in reading and how consulting influenced their performance. Research in this field suggested that: (a) dictionary use is a private complex activity; (b) the users were able to determine the words to look up in a good way; (c) the learners differed in their look-up preferences; (d) dictionary use decreases the reading rate; (e) in addition to improving vocabulary, dictionary consultation enhances

reading performance; and (f) combining dictionary use with inferencing proved effective for vocabulary learning.

Conclusion

This chapter has demonstrated that the use of dictionaries is a complex task that necessitates applying certain lookup skills carefully. However, L2 learners could manage this activity by using different lookup strategies. The choice of these strategies seems to be correlated to the learners' level of proficiency, their preferences, and origins.

In addition, although L2 learners used dictionaries mainly while reading to search for word meaning, they also consulted them to check other information such as spelling, pronunciation, and synonyms. However, some L2 learners do not seem to be making the most of dictionaries, as some of them overused BLDs, whereas others ignored grammatical codes provided in learner's MLDs. Moreover, some high- verbal ability learners seem to favor using MLDs more often. Furthermore, recent research demonstrates that new types of reference materials, PEDs in particular, are convenient for enhancing vocabulary development and thus L2 learning.

Chapter Three

Electronic Dictionary Use

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Introduction

In the light of their increasing popularity, electronic dictionaries have gained widespread acceptance among students and are becoming essential reference tools that they often use. Therefore, their importance in students' lives cannot be overlooked. This chapter will first provide a general overview of their typology and the motivation behind using them in L2 learning. In addition, an important section will be the review of existing research on computerized dictionaries, and CD-ROM dictionaries in particular, as they are the main concern of the present study. This chapter will finally review studies of dictionary use which rather compared electronic dictionaries to ordinary ones regarding their effects on language learning.

3.1. What is an Electronic Dictionary?

An electronic dictionary (ED) is a "hyper-reference" tool providing instant access to the looked up word and any related information, with easy and direct return routes to the target word (Aust, Kelley & Roby, 1993, p. 64). Hartmann and James (1998) defined the term as being a language tool that makes use of computers and similar technology to display information on-screen. They mentioned as examples of EDs "spelling checkers and thesauruses built into word processors, . . . multilingual

terminological databanks and translation systems, . . . research corpora, hypertext and the Internet." (p. 47). Nesi (2000a, p. 839) presents a good working definition of EDs:

> The term electronic dictionary (or ED) can be used to refer to any reference material stored in electronic form that gives information about the spelling, meaning, or use of words. Thus a spell-checker in a word-processing program, a device that scans and translates printed words, a glossary for on-line teaching materials, or an electronic version of a respected hard-copy dictionary are all EDs of a sort, characterised by the same system of storage and retrieval.

Unlike PDs, EDs offer a wide range of information related to vocabulary such as thesaurus, corpus, and lexical relationship information, through various lookup paths and techniques (Cumming, Cropp & Sussex, as cited in Law, 2009). However, EDs are particularly unique because of their way of retrieving information. Printed dictionaries arrange information in a way that does not allow setting words based on their semantic and pragmatic similarities, and collocational patterns. Thus, PDs do not offer information about how distant words in the dictionary are related (Nesi, 2000a).

On the contrary, the ED provides easy and immediate access to groups of words in any kind of information created during its making (Nesi, 2000a). In this way, the ED "search allows the user to locate every occurrence of a word or combination of

words within the dictionary, thus retrieving multi-word units, collocations, and groups of similarly-worded definitions" (Nesi, 1999, p. 62).

3.2. Typology of Electronic Dictionaries

The latest technological advances and the Internet revolution have modified the concept of the dictionary. Almost all PDs have been converted into CD-ROMs, or/and have become widely available online. Electronic dictionaries can be classified into several types, and a number of researchers have proposed different typologies of EDs using different criteria (e.g. Lehr, 1996; Nesi, 1999, 2000a).

An example of an ED typology is the one presented by Lehr (as cited in de Schryver, 2003), which classified EDs based on their technical and meta-lexicographic aspects (Figure 5). With regard to technical analysis, Lehr differentiated between online and offline dictionaries. Offline dictionaries are then divided into PEDs and PC dictionaries. The latter type comprises dictionaries in CD-ROM, floppy disk(s) and in other formats. As for meta-lexicographic analysis, Lehr distinguished between EDs which are based on their paper counterparts, and newly developed EDs; each of these types can further be subdivided into EDs which have a print appearance (look like a PD page) or which have an innovative appearance (do not display like PDs).

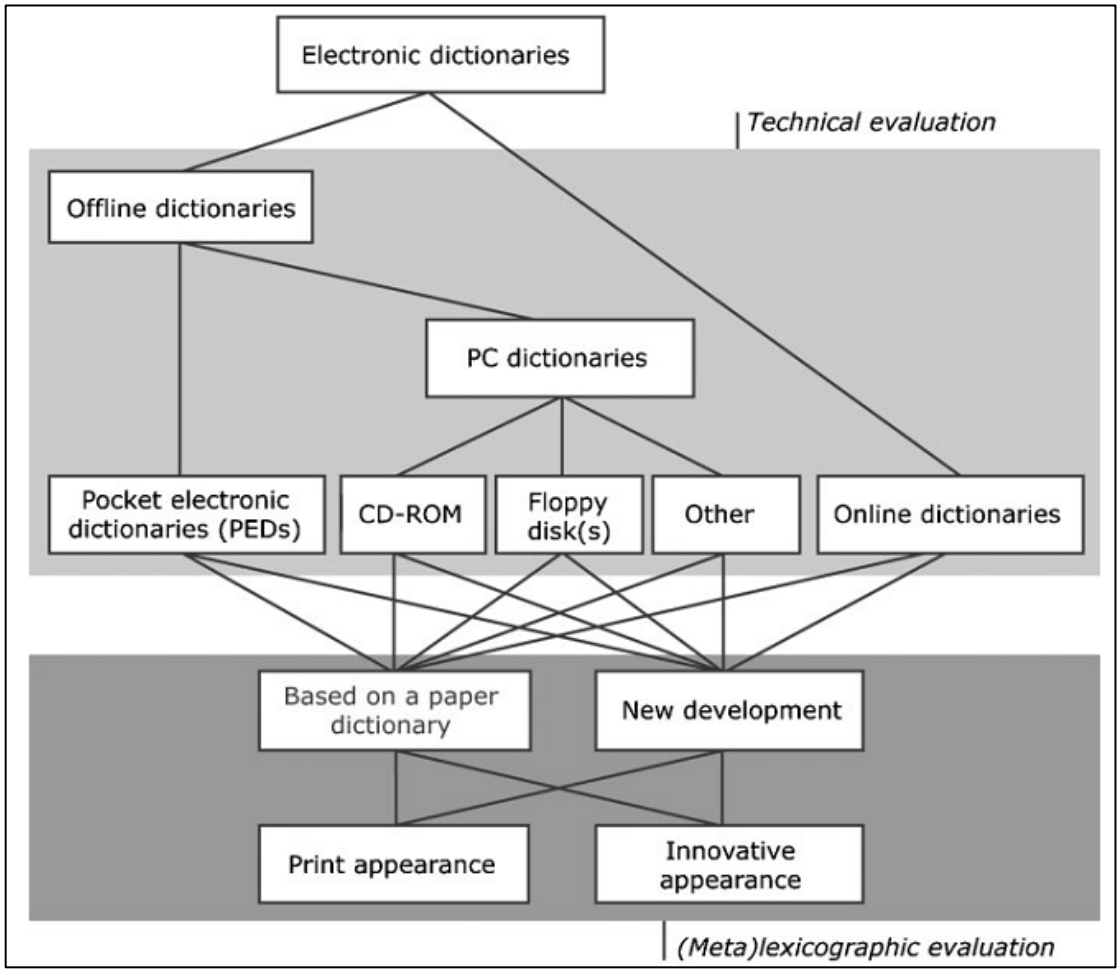

Figure 5. Typology of EDs presented by Lehr (translated in de Schryver, 2003, p.148)

Another typology of EDs is that by Nesi (1999); her classification focused on the types of access to EDs. She pointed that EDs can be stored and accessed in a number of ways. They can be designed as PEDs, which makes them more portable than a PD. They are also available as applications on mobile phones or through the Internet as online dictionaries. They can also be stored on a CD-ROM that can be installed on a computer hard disk for use with a desktop or a laptop computer.

One year later, Nesi (2000a) proposed another typological classification. She pointed that the 1990s witnessed the birth of four types of EDs for L2 learning: the Internet dictionary, the glossary for on-line courseware, the learners' dictionary on CD-ROM, and the PED. Her comparison results of the three types have been summarized in Table 1 (de Schryver, 2003, p. 148).

Table 1 Dictionary Typology for the Electronic Age (Nesi, as cited in de Schryver, 2003, p. 148)

#	*Type?*	*Source?*	*Who?*	*Profit?*
1	Internet dictionary	(outdated) copyright-free material & users' contributions	[Netizens]	—
2	glossary for online courseware	[new material]	language-department staff members at universities	—
3	learners' dictionary on CD-ROM	reputable hardcopy reference books	major dictionary publishing houses	✓
4	PED	[no-named (hardcopy) source]	makers of electrical goods	✓

Even if Nesi's (2000a) comparison had been valid to some extent at that time in the 1990s, she noted that things were starting to change in the following years, as highly innovative dictionaries were being developed for the Internet, and some of which could only be accessed through paid subscription, online courseware were becoming commercially available and stored on CD-ROMs, CDs were loaded on the Internet, and PEDs were starting to be designed with more lexicographical attention.

Whether EDs are stored on a computer or CD-ROMs, available through the Web or built into PED, the difference between the three types of EDs is just their size or storage capacity. The types of information as well as the search possibilities in all the three types are expected to be the same with the promise of increased multimedia capacity at all levels as technology advances (Nesi, 1996; Pasfield-Neofitou, 2009).

3.3. Electronic Dictionaries in Language Learning

Language learners relied on PDs for decades; however, with the advent of ED technology, their preferences and dictionary use patterns have changed dramatically, and EDs use has become the rule rather than the exception (Chen, 2010). So what advantages have the users found in such dictionaries that their use is so popular?

In Nesi's study (1999), the ten PED owners mentioned as good points in their PEDs which makes them superior to PDs: the dictionaries provided a variety of search routes; they could be expanded and/or linked to other applications; sound was available; they were easy to carry around and use; and the database contained extra information (p. 58).

Similarly, PED search could be a motivational factor for users to look up a large number of unknown words out of curiosity, as they will just need to type in the letters of the words (Gulliot & Kenning, as cited in Nesi, 1999). In line with this, Laufer and Hill (2000, p. 60) quoted from Roby's (1999) study revealing that the "subjects who had access to . . . [an electronic dictionary] read the passage in

significantly less time . . . [and] looked up significantly more words than those who used a paper dictionary". Hence, Laufer and Hill (2000, p.68) made this argument in support of PEDs use:

> Studies show that L2 readers often decide not to use the dictionary when meeting unfamiliar words in a text (Bogaards, 1998; Hulstijn, 1993). One of the reasons often reported by students is the time involved in flicking through the dictionary pages and the subsequent disruption of the flow of reading. An electronic dictionary may provide a good solution to this problem.

Laufer and Hill (2000) argued that PED use enhances students' motivation, as "the ease and speed of using [them] may encourage the learner to look up unfamiliar words. This in turn, will not only contribute to more fluent reading, but will also increase the chance of acquiring the looked up words" (p. 68).

In addition, Torres and Ramos (2003) highlighted some of the features of CDs such as interactivity, quick access, multimedia effects, and extra features. Similarly, Hulstijn et al. (1996) suggested that because computerized entries are easier to use than the PD ones, students will be motivated to use them, unlike the time consuming process of finding information by leafing through PDs.

Moreover, Chiu and Liu (as cited in Wang, 2014, p. 18) pointed that PEDs include functions that could be beneficial to L2 learners, like integrated pronunciation

of words, which helps L2 learners develop their pronunciation and speaking. In addition, and unlike the case with PDs, PEDs' could be updated to add recent words to their memory. The PED also allows users to search multimedia information like pictures to ease their comprehension, and this could lessen their anxiety when learning vocabulary.

According to Midlane (2005), the learners' interest in PEDs is partially because the latter include the pronunciation feature, which allows learners to hear how words are spoken without having to be acquainted with complex phonetic symbols, and this is a good reason which makes PEDs more advantageous than PDs. However, Stirling (2003) examined some PEDs and found that their pronunciation feature was of low quality, while Tang (1997) described the sound in the PEDs she examined as "synthetic … not always clear, and the pronunciation is artificial".

However, despite the reported EDs advantages regarding their speed and ease of lookup, some believe that the ease of use may result in shallow processing of the looked up words and will therefore be detrimental to retention (Hulstijn, 2001). While the ease and speed might encourage more dictionary use and reading (Weschler & Pitts, 2000), the convenience might not be a good thing for vocabulary learning (Stirling, 2003), as the increased speed of ED lookup may be at the expense of engagement and deeper processing of the words resulting in less vocabulary learning (Peters, 2007).

Moreover, Hulstijn (2001) claimed that processing lexical information more elaborately leads to better retention than less elaborately, both incidentally and intentionally. This deep semantic processing enhances memory by creating memory traces that are stronger than the traces created when the items are shallowly processed (Baddeley, 1997). Students should have done some useful linguistic processing when looking up words. They should trace the inflected form of the word back to its basic form, and then distinguish and evaluate the different entries for each word (Summers, 1988).

In the same way, this perception is supported by The Depth of Processing Hypothesis (Al-Hadlaq, 2003), which suggests that memory is a function of the depth or shallowness of the processing in which people engage in when facing new material in the input. In addition, Al-Hadlaq claimed that there are different levels of processing. With regard to the processing of lexical items, he argued that the phonological and orthographical aspects of a lexical item are processed at a shallower level while the processing of its meaning takes place at a rather deeper level.

It should be noted that, with the appearance of EDs, a couple of the problems posed by PDs appear to have been solved, like the time spent looking up a word and the issue of which dictionary type to better use. Currently, many contemporary EDs combine monolingual and bilingual dictionaries to give users more freedom to switch between both types. In addition, these EDs allow users to look up words more quickly, thereby reducing distractions from their concentration while reading.

3.4. English Learners' Dictionaries on CD-ROM

As we have seen earlier, the term 'electronic dictionary' comprises a variety of devices and technology innovations. However, the focus of the present study is only on the dictionary stored in CD-ROM and installed on a computer. Literature on PEDs, online dictionaries or some other electronic types of dictionaries will be reviewed in the coming sections just because these dictionaries have a lot of features in common with CDs, while literature on CD use per se is relatively scarce as a result of the paucity of related studies.

CD-ROM Dictionaries are amongst the latest innovations in lexicography, as they contain far more information than their paper versions, include multimedia content like sound and video, and allow users to look up words much faster than when they turn pages in a PD. The significant difference between PDs and CDs is in the way of presenting information. Printed dictionaries provide printed information in sequence from beginning to end, whereas CDs provide audiovisual information in the form of text, sounds, or graphics, all accessed through diverse search routes (Nesi, 1996). Nesi (p. 537) mentioned four advantages which make CDs superior to their PD versions:

- They can cross-reference within and between sources published separately in book form;
- They can provide direct links to other computer applications;

- They can enable ‘fuzzy’ and complex searches;
- They can interact with users to develop vocabulary and dictionary skills.

CD-ROM dictionaries use has become so common in many schools and universities, and classes with access to computers can benefit from some CD features such as exercises, pictures, usage information, etc. This makes the consultation process “more visible and open to discussion” (Nesi, 1999, p. 64).

However, the major drawback with CDs use is that they can only be accessed on a desk-top computer at home or on a laptop, which makes CD use a site-dependent activity and thus not very suitable for receptive tasks such as while listening to a lecture in the classroom. Nevertheless, such a dictionary could be convenient for learners writing a text with a word-processor or reading a text on the computer screen.

In addition, CDs are experiencing a number of issues such as copyright laws, since most of which are shared and downloadable through the Internet illegally and for free, except for very few highly-protected versions which require the users to insert the genuine CD into the computer’s CD-ROM player each time they run the dictionary. Ironically, with the advent of computer software, even the highly-protected CDs could be burned and installed on a computer without any problem.

Until recently, dictionaries published in CD-ROM format have been the best EDs for L2 learners. However, Android dictionary applications as well as online dictionaries that can be accessed through smart phones connected to the Internet are

becoming more dominant due to the advantages that they offer, such as portability, the huge amount of memory, and the ability to be updated and linked to other computer applications.

3.5. Computerized Dictionary Use

The latest developments in computer technology have launched growing interest in CDs, online dictionaries, and vocabulary glosses embedded in L2 learning software and Internet pages. Roby (1999) pointed that the use of glosses in L2 learning dates back to the Middle Ages, when glosses were first used by L2 learners of Latin. Then teachers adopted glossing later and produced glossaries, or word lists, to help their learners on reading tasks. The development of glossaries paved the way for compiling dictionaries.

In fact, research on CD use is very limited compared to research on using PEDs and PDs. Perhaps the only study that could be found about CD use is the one by Winkler (2001), who surveyed 100 subjects about their dictionary use habits and compared their use of two monolingual CD titles. Winkler found out that most of the subjects appreciated the CD and thought that it was much better than a conventional PD because of its innovative features like the provision of pronunciation, pictures, and games. In addition, 75% of the subjects appreciated the point that "typing in the first few letters in an Entry box on screen will take him/her to the respective part of the dictionary" (p. 198).

However, Winkler (2001) pointed that the "users needed to familiarize themselves with the presentation of information on screen. . . . [and] discover the different features and facilities that the CD-ROM dictionary offers" (Winkler, 2001, p. 239). Indeed, CDs have a complex hyper-textual macrostructure, and each type is designed and organized differently, so even advanced dictionary users will find it necessary to learn how to access information in a new CD (Nesi, 2003, p. 379).

Some researchers investigated the different modes of presentation available to L2 learners who use computerized dictionaries or glosses. Al-Seghayer (2001), for instance used a hypermedia-learning program to investigate which of the modalities; i.e. picture or video, is more efficient in vocabulary learning while reading. The program displayed to the readers an English text accompanied with glosses and annotations in the form of text, video, graphics and sound. The results showed that a video was more effective for the learners in acquiring unknown words, as it combined different modalities (vivid or dynamic image, sound, and text).

Similarly, Akbulut (2007) investigated the effects of different hypermedia glosses on vocabulary learning and reading of advanced L2 learners. The subjects were 69 EFL students who were randomly supplied with three types of annotations: (a) definitions of words only, (b) definitions combined with pictures, and (c) definitions linked to short videos. The subjects did a vocabulary pretest, a vocabulary posttest, a delayed vocabulary test, and then a reading comprehension quiz. The

results showed that the subjects who had access to definitions combined with pictures and videos had significantly higher vocabulary scores on both immediate and delayed posttests than the subjects who had access to definitions only.

Moreover, Karp (2002) examined university students' lexical development while engaged in reading comprehension activities. Lexical development was investigated through observing the effects of different forms of glosses on vocabulary growth. The subjects were split into five groups; (1) definition, (2) multiple-choice definitions, (3) a definition with a picture, (4) multiple-choice definitions combined with pictures, or (5) no glosses. The results revealed that students in the definition only group used the glossary more frequently than the other groups. Apparently, the definition only group did not want to be distracted and confused by multimedia content and multiple-choice definitions available to them, so they opted for straightforward definition. This finding opposes what Akbulut (2007) and Al-Seghayer (2001) found in their studies, as the subjects in the hypermedia groups did not use the glossaries so often.

3.6. Electronic versus Printed Dictionary Use

Leffa (1992) was one of the first educators interested in the effects of EDs on L2 learning. Leffa compared electronic glossaries to PDs regarding their effectiveness on text comprehension in a translation task performed by 20 university students. Leffa found that the subjects who used an ED exhibited better understanding of the passage

than the subjects who used PDs, 86% and 62% respectively, and it took them 50% less time to translate the passage. Leffa asserted that when learners are engaged in using the PD while reading, they lose the context of the passage during the lookup process. He suggested that this shortcoming can easily be avoided with an ED, as the speed of access allows the context to remain in the short term memory, which accelerates comprehension.

Similarly, Aust, Kelley and Roby (1993) examined 80 undergraduate L2 learners for their use of online and printed dictionaries. The measures were lookup frequency, reading time, efficiency, and degree of comprehension. The findings revealed that the subjects used online dictionaries much more frequently than PDs. Online dictionaries provided easier and more efficient use, which motivated the subjects to be fully engaged in reading. Findings from this study also suggest that online dictionary use might reduce the overall reading time.

Moreover, Koga (1995) compared online dictionaries and PDs regarding their effects on L2 reading comprehension. Forty university students read six texts in three conditions (no dictionary, PD, and online) and answered comprehension questions. Koga found out that the subjects finished the reading tasks in less time in the no-dictionary condition than in the ED condition, and faster in the ED condition than in the PD condition. In addition, the subjects had higher reading scores in the ED condition than in the no-dictionary condition, and higher scores in the no-dictionary

condition than in the PD condition. Koga suggested that the ED had less interference in the reading process, which facilitated the students' comprehension.

Some researchers had an interest in PEDs, among them Iwamato (1998) who compared a PED with a PD as to which type was more efficient in locating the first meaning in an entry as well as the contextual meaning. Iwamato instructed 10 university students to locate the first meaning in an entry for a group of words, using a PED and a PD. Then the students had to locate the contextual meaning in an entry for another set of words, using a PED and a PD.

Iwamoto (1998) found that the students accessed the first meaning significantly faster with a PED than with a PD, and that they accessed the contextual meaning much faster with a PED than with a PD. Unlike in the PD condition, no substantial differences in performance between the students were found in the PED condition, indicating that a PED allowed more efficient access to information for all students.

Likewise, Shimizu (2003) investigated the effects of a PED compared to a PD on retrieving meaning and example by 77 university students. The subjects took a speed test to locate word meanings and examples, using either a PED or a PD. They also filled out a questionnaire about their perceptions of the two dictionary types. The results revealed that the PED was more effective in finding word meanings, and that the users' familiarity with the PED accelerated the task. However, no significant

differences in the efficiency of accessing examples were found between the two conditions. Interestingly, the vast majority of participants preferred the PED search.

Moreover, Koyama and Takeuchi (2003) examined 26 university EFL students and 16 high school students to see how their lookup patterns differed using a PED and a PD. The subjects finished a reading task using either a PD or a PED. A week after later, they were given two types of tests: recall and recognition. The subjects also completed a survey about their impression regarding the dictionaries they used.

The findings revealed no significant differences in the number of lookups and search time. In addition, there were no significant differences in the scores for recall and recognition. Interestingly, most of the students appreciated PED use because of its portability and ease of use. However, some of them complained about the PED not providing as adequate information as the PD; although both dictionary types contained the same amount of information. Koyama and Takeuchi (2003) explained this belief by the fact that the PED's screen was small, thereby making the students switch between different screens to get detailed information.

In another study, Koyama and Takeuchi (2004a) examined how the difference in the interface designs between a PED and a PD could affect EFL students' search behavior. Eighteen undergraduate students read two texts without using any dictionary type, and then took a vocabulary test with a PED or a PD. The students had to supply definitions for four target words using the dictionary and to quote usage

examples from the dictionary for the other four words. After a week lapse, the subjects took recall and recognition vocabulary tests. Koyama and Takeuchi found that there were no significant differences in search time and the quantity of retrieved information between PD and PED conditions, and this was due to the improvement of the PED's interface design.

In addition, although no significant differences were found between the PD and PED conditions concerning recall scores, the mean score for recognition was significantly higher in the PED condition. Finally, although they regarded it as convenient, the students did not necessarily believe in the effectiveness of a PED for L2 learning. Koyama and Takeuchi (2004a) concluded that the PD lookup process leads to better retention.

Koyama and Takeuchi (2004b) also conducted a study on EFL learners' lookup behavior in PEDs and PDs, and more particularly to examine the potential link between their lookup frequency and reading comprehension performance. The subjects who took part in the study were 72 undergraduate students of the same proficiency level, divided into two groups; each group completed a reading task in one of the conditions, PED or PD. Statistical examination of the subjects' reading scores indicated that they looked up more words in the PED to comprehend the text in a shorter period of time than the subjects in the PD condition. However, no significant differences were found in the subjects' reading scores.

To further consolidate their findings, Koyama and Takeuchi (2007) replicated their study with a group of 34 EFL students whose proficiency level was higher than those in the previous study. Despite that the subjects and text used in this study were different, the findings from this study were similar to the ones found in their previous study; the subjects looked up more words in the PED than in the PD (*M* = 11.12 & 7.41 respectively). However, no significant differences were found regarding their reading scores (*M*= 8.50 & 8.76 respectively). Koyama and Takeuchi concluded that the increased lookup frequency involved in PED use does not necessarily suggest better performance in reading comprehension.

Furthermore, Osaki, Ochiai, Iso, and Aizawa (2003) compared the effects of a PED and a PD on locating appropriate meanings, reading comprehension, and word retention by 167 Japanese university students. The subjects had to read a text and supply definitions for the target words in one of these conditions: PED, PD, and no-dictionary (ND). After that, the students took a comprehension test in the fill-in-the-blanks format. In addition, the two groups using the dictionary were given immediate and delayed vocabulary tests that required supplying definitions for 15 target words.

Osaki et al. (2003) found that the PED group scored significantly better than the PD and ND groups on the definition test. The PED group scored better than the PD group on the reading comprehension test, which in turn outperformed the ND group. The findings from this study suggest the advantage of PEDs in helping the subjects select the contextual meaning as well as in facilitating text understanding,

although the PD was still more efficient than not using a dictionary at all. In addition, no significant differences were found between the PED and PD groups on both immediate and delayed vocabulary tests, which indicates that the dictionary type did not affect word retention.

Conclusion

The studies related to EDs use seem to have yielded significant findings on their use. These studies were mostly about EDs effectiveness to the user's search purposes. Most of the findings have supported the convenience that various electronic features could provided to the users, allowing them more helpful functions and faster search results. The main reason for using an ED was the speed of access, meaning that L2 learners would access the target words much easier and more quickly than with the PD.

The review of the related literature has also revealed that some researchers such as Laufer and Hill (2000) believe that EDs have a positive effect on vocabulary learning, while others such as Koyama and Takeuchi (2004a) believe that using EDs does not guarantee the enhancement of the retention of vocabulary. In addition, the increased lookup frequency induced by PEDs was not found to enhance L2 learners' performance in reading comprehension.

Nevertheless, given the increasingly sophisticated needs of dictionary users, it can be argued that the future of dictionary making holds a lot for EDs because of their

huge memory and innovative functions (Li, 2003, p. 108). As research in CD use is still very rare, research should be done to explore their effects on language learning, and how such dictionaries are used, or how they might be used (Nesi, 1999). The CD use patterns of some Algerian students will be explored in the present study, as Algerian EFL students use them heavily to improve their L2 performance.

Chapter Four

Research Methodology and Procedures

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Research Methodology and Procedures

Introduction

An essential part of this study is the detailed description of the research design and methodological procedures used to answer the proposed research questions. Such description not only allows for an objective evaluation of the appropriateness of the selected methods to the objectives of this study, but also helps in checking the validity and reliability of the research results. Thus, this chapter presents detailed information related to the selection of participants, research design chosen for the study, research instruments and procedures followed, as well as the statistics used to analyze the obtained data.

4.1. Participants

The population from which the sample of this study was drawn consists of sophomore-level students enrolled in the Department of English at Constantine University 1. The main reason for the choice of the population is that students, at this level, with more English learning experience than freshmen students, are expected, and at times required to do some outside readings by themselves. To fill this need, students very often find themselves under situations where they have to cope with

longer texts and entirely new vocabulary items during reading. So, to ease this burden, they would feel it necessary to use dictionaries to facilitate their understanding.

The sample of this study consists of 44 students from two classes, 14 males and 30 females (age average = 20.25, age range: 18-30 years). They were chosen to be the sample due to my easy access and familiarity with them since they were regularly taking classes in 'Oral Expression' with me. The subjects were all sharing similar educational and linguistic backgrounds, and had at least seven years of EFL instruction. However, they seemed to differ in their proficiency in that most of the students in *Group A* were less motivated and did not actively participate in the classroom, whereas those in *Group B* were so energetic and they enthusiastically participated in classroom activities.

4.2. Research Design

Previous studies on dictionary use have used various investigative procedures, such as written questionnaires, interviews, observations, think-aloud protocols, tests and experiments, and log files. In the following, I will briefly state the objective as well as the shortcomings of each method in the context of dictionary use.

Questionnaire surveys seek to understand the relationship between the users and their dictionaries through gathering information about their habits, attitudes, and

knowledge in using dictionaries. Yet, one major problem with this method is the inability to check the truth value of the informants' responses unless combined with other methods.

In this respect, interviews are more efficient in that the informants cannot cheat if asked about their dictionaries. However, using such a method could be time-consuming, especially with large groups of informants, and the analysis of data may be difficult and tiring in the case of open questions which entail thorough examination to extract and sort relevant information (Welker, 2010).

Observation-based studies are concerned with "setting subjects observable tasks and collecting data either during the task itself or immediately … [afterwards]" (Nesi, 2000b, p. 33). Unlike questionnaires and interviews, real-time observation of the users' consultation process reveals their actual dictionary use. Still, this method is not without shortcomings, as subjects would probably not feel comfortable being observed while doing a task, which makes them feel inhibited and not behaving normally.

In protocols, the dictionary users describe orally how they proceed in their lookups the first moment they encounter an unknown word or when they need to know more about one they already know. The dictionary user should report whatever thoughts might occur during the consultation process. A major limitation that could be

highlighted using this technique is the inability to check if the informants' reflections were true of their actual behavior (Welker, 2010).

In studies on dictionary use, tests may be used to verify the effects of dictionary look-ups on any kind of L2 linguistic activities like reading, writing, vocabulary learning, etc. In a test, subjects perform a given task and the results of which are then examined and evaluated (Welker, 2010).

Experimental studies, on the other hand, seem to be very common in dictionary use research. However, Tono (2001, pp. 71-72) distinguished between various experimental designs, based on Cohen & Manion (1994):

- Pre-experimental design:

In this type of design, a group of subjects are given a test to measure some variable (e.g. the number of spelling mistakes in an essay); after a new factor has been introduced (e.g. instruction on dictionary use), the subjects are given another test to see if that factor influenced the subjects' performance.

- Quasi-experimental design:

The investigation in this design is conducted with two groups of subjects who are not randomly selected; for example, two classes of students could be chosen. In both groups, two tests are given. In the "experimental group", a new factor is introduced between the tests (e.g. using the dictionary), but not in the "control group". As such, the researcher verifies if that factor has any influence.

- True-experimental design:

The only difference between this type and the quasi-experimental design is that the two groups have been randomly selected. Tono (p. 71) argued that "In theory, random assignment … controls all possible independent variables. In practice, of course, it is only when enough subjects are included in the experiment that the principle of randomisation has a chance to operate as a powerful control". Tono (2001, p. 71) classified the studies carried out by Summers (1988), Hulstijn (1993), Hulstijn, Hollander & Greidanus (1996) and Knight (1994) as true experiments.

Yet, one major problem for tests and experiments is the objectivity of evaluation and interpretation of the results. Therefore, it is recommended that the evaluation of results is carried out by more than one person (for example, in the case of scoring an essay or a translation task), unless there is little margin for biased interpretations, as in the case of multiple-choice tests (Welker, 2010).

Among the aforementioned wide range of methods, experiments and log files were chosen as the main investigative techniques for this study. Taking into account their validity, reliability, appropriateness for the research objectives, and feasibility, the two methods were combined to reveal a more complete picture of how CDs use could influence L2 learners' performance.

I adopted a quasi-experimental design since the study was carried out with two groups of subjects who were not randomly selected. I could by no means have

students from different classes participate in the study because it was impossible to gather those randomly selected subjects to attend several treatment sessions considering that they had different classes and perhaps would find it disruptive missing a class each now and then. In addition, I could not guarantee that the randomly selected subjects would be willing to attend all the treatment sessions, especially if we know that the phases of the study were carried out near the end of the academic year in summer, when it usually gets very hot and most of the students would rather stay at home to revise for their final exams. Any irregular attendance or withdrawal would have affected the process of obtaining data negatively.

4.3. Instruments and Data Collection Methods

4.3.1. Reading Tests from the TOEFL PBT

This study employed two authentic reading tests (Appendix A and B) adapted from a TOEFL PBT Reading Collection, which contains the previously administered paper-based TOEFL tests. The Reading Comprehension Section requires reading passages on various topics and answering questions about them. The questions typically ask about information that is stated in or implied by the passage, as well as knowledge of some of the specific words.

The passages' themes were very similar to the ones the students usually have in "Culture of the Language", which is a very important subject in their major, dealing with issues in American or British history and civilization. The first passage dealt

with the rise of cotton as the most important American export product in the eighteenth and nineteenth centuries, whereas the second passage discussed the early people and cultures of the United States. Each test included ten multiple-choice questions aimed at assessing the students' overall understanding of the text and some words and structures. Each question was assigned one mark and the total score for each test was 10 marks.

Text readability statistics were produced for both passages employed in the study to ensure they were identical in length and difficulty and to determine whether their reading level suited the proficiency level of the subjects of the study.

The Microsoft Word readability add-on automatically generated reports to determine the reading level of the texts based on five common readability formulas along with the *familiarity* formula. Whereas the five readability measures all use word length to measure word difficulty, the *'familiarity measure'* uses word frequency information to determine word difficulty based on the British National Corpus. For each measure, the text is then rated as either *'Simple'*, *'Easy'*, *'Good'*, *'Challenging'* or *'Difficult'*. The different grades from each measure help give a more reliable assessment of the text difficulty ("Readability Plugin,"2011). Figures 6 and 7 on next page represent the readability statistics reports for PD and CD reading texts respectively.

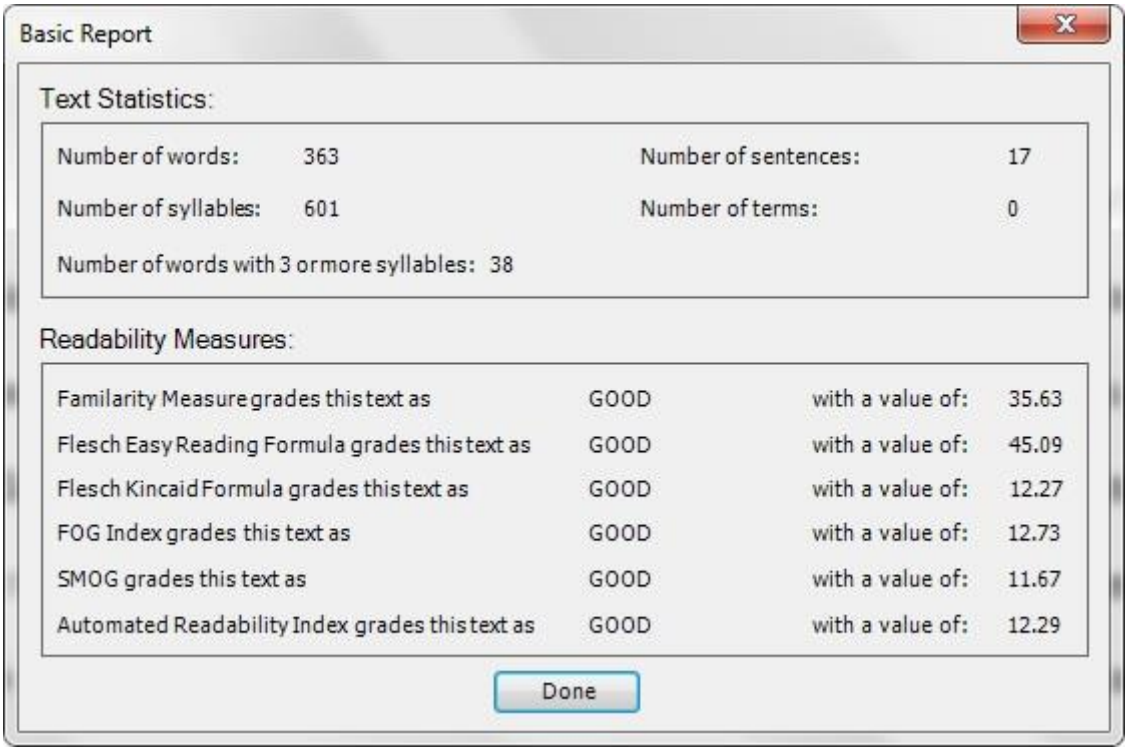

Figure 6. Readability statistics for PD condition text used in the study

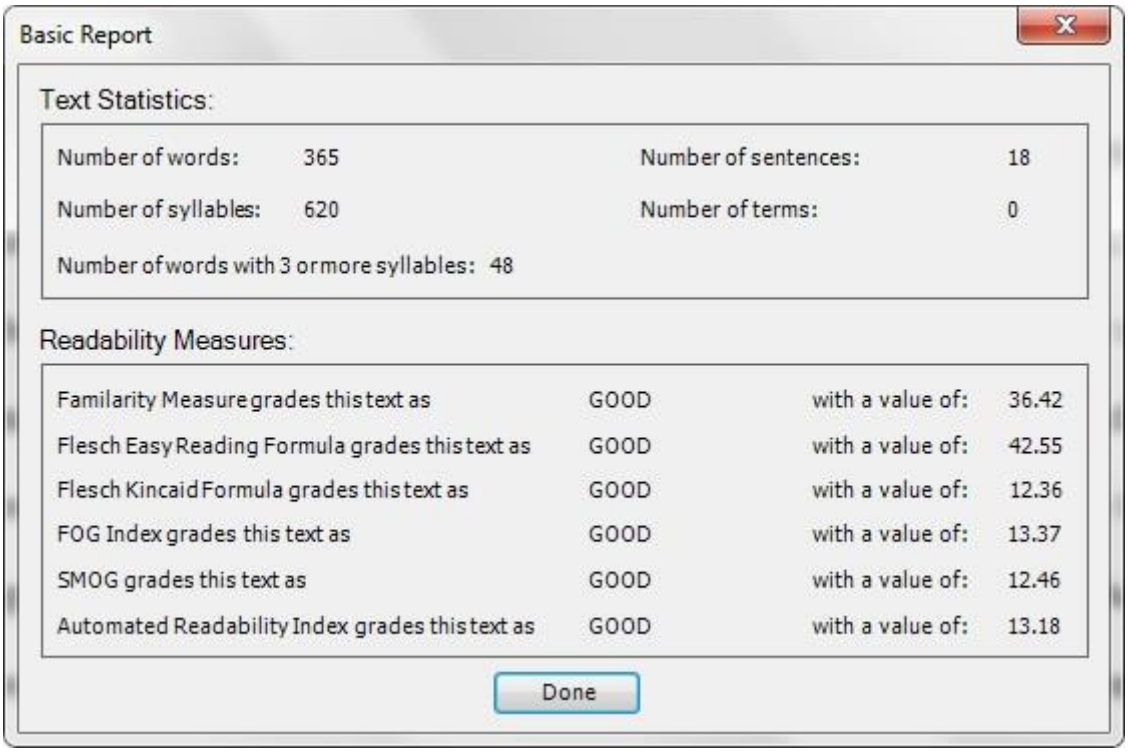

Figure 7. Readability statistics for CD condition text used in the study

Overall, both passages seem to be comparable in form-Word count: 363/365; Sentence count: 17/18; Syllable count: 601/620. As for readability tests, relevant measures are *Flesch Reading Ease* and *Flesch Kincaid Grade Level*. Flesch (as cited in Al-Otaibi, 2011, p. 53) mentioned that "higher scores on the Reading Ease test indicate that the passages are easier to read than those with lower scores"; the higher the value, the more readable the text. The Flesch Kincaid Grade Level transforms the Flesch Reading Ease score to a United States school grade, which means that the text can be read and understood by an average student in that grade.

As shown in figures 3 and 4, the selected PD and CD reading passages had Reading Ease values of 45.09 and 42.55 respectively, which makes them identical in difficulty and suitable to students at grade 12 who completed a four-year high school program and are in their freshman year at university. As a rule, texts with a Flesch Reading Ease score of 0-30 are best understood by university graduates who completed a four-year program. Considering the differences between the American and Algerian school systems, and the fact that the subjects who took part in the study were non-native speakers of English and still had to study for one more year to graduate, the selected passages were deemed to be of an average difficulty and suitable to the subjects' level.

4.3.2. Vocabulary Tests

The vocabulary tests were adapted from the "501 Vocabulary Questions" book published by LearningExpress (2003). The aim of the book is to measure students' knowledge of words generally encountered in textbooks, newspapers and magazines, and especially in standardized tests like the SAT (Scholastic Aptitude Test) or the GRE (Graduate Records Examinations). This book was chosen for its high practicality in assessing L2 learners' vocabulary.

4.3.2.1. Pretest

The vocabulary pretest required supplying definitions for ten supposedly unknown words in ten sentences (See Appendix G). The words were printed in bold face and were considered to unlikely be known to a fair proportion of the students, in view of their level.

4.3.2.2 Posttest

The vocabulary posttest was divided into two parts (5 target words each): The first part was a "multiple-choice" test in which the words were given with a very little contextual support. There were four choices per item: one key (correct answer) and three distractors (options other than the correct answer). Each item of the test required picking the appropriate word. The second part was a "fill in the blank" test in which

the words were given alone. The test required filling the blanks with the right word (See Appendix H).

4.3.3. Tests Validity

Two types of validity were investigated regarding reading comprehension and vocabulary retention tests used in this study. The first one is 'face validity'. According to Heaton (1975), a test is said to have face validity if it looks as if it really reflects what it is supposed to measure based on the personal judgment of other observers, testers, or colleagues. The second type of validity is 'content validity'. Hughes (1989) said that a test has a content validity if its content constitutes a representative sample of the language skills and structures that is meant to be tested.

Prior to any administration, the reading comprehension and vocabulary retention tests were read and assessed by my research supervisor, who is specialized in applied linguistics, and she agreed that the tests had both face and content validity, as they satisfactorily served the objectives of the study and sufficiently covered the content that they were supposed to measure.

4.3.4. Dictionaries

Two types of dictionaries were used by the students in this study: a paper dictionary of the students' own choice and the Cambridge Advanced learner's

Dictionary on CD-ROM 3rd edition (CALD), published by Cambridge University Press.

The reason for allowing the students to use their own PDs was that good dictionaries of the same title were very limited in number in the department of English or in the university library. Thus, I had to ask the students to bring their own dictionaries and recommended a few titles which I thought would better serve the experiments' tasks.

Interestingly, having the subjects use their own dictionaries would make them feel at ease using the dictionary that they were more familiar with, thereby eliminating any unwanted variables related to the unfamiliarity with the dictionary layout and organization of information, which might invalidate the results of the experiments. Since the PDs used in the study were brought by the subjects themselves, I assumed that they were familiar with them.

Presentation of Cambridge Advanced Learner's Dictionary on CD-ROM

The Cambridge Advanced Learner's Dictionary on CD-ROM is an easy-to-use electronic dictionary for advanced learners of English. It contains all the words, phrases and examples found in the printed version of the dictionary, plus the following additional features:

- Recordings of every word in British and American English - listen, record and play back to practice pronunciation.
- Extra collocation information and thousands of example sentences.
- Cambridge SMART thesaurus which turns the dictionary into a thesaurus at the click of a button.
- QUICKfind and SUPERwrite, which are mini pop-up versions of the dictionary, giving the user instant definitions when reading or writing on-screen.
- Interactive exercises including exam practice and real past papers for IELTS, FCE, CAE, CPE and BEC.
- Helpful buttons to see extra information on Verb Endings, Word Building, Usage Note and Common Learner's Errors.

The main elements of the dictionary window are explained below. (See Figure 8 on next page for CALD main search window).

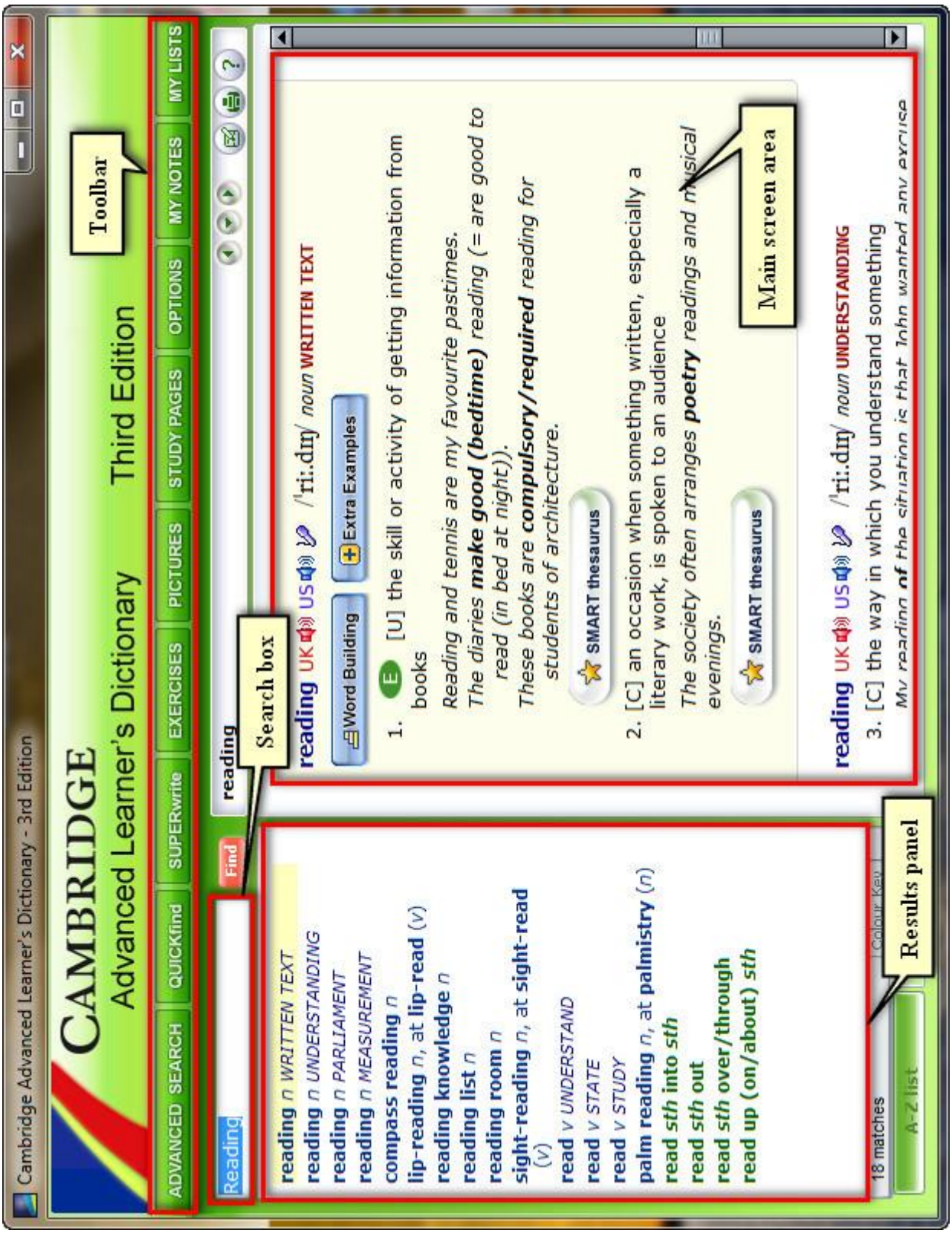

Figure 8. Main window in Cambridge advanced learner's dictionary on CD-ROM

- **Toolbar**. The toolbar contains buttons to access different facilities in the dictionary.
- **Search box**. Type a word you want to find in the dictionary and click **Find**. All matching words are shown in the results panel.
- **Results panel**. After searching for a word, the first search result is highlighted at the top of the **Results** tab. Click a word in the results panel to see the dictionary entry in the main screen area.
- **Main screen area**. Dictionary entries are shown in the main screen area.

As shown in Figure 8 on previous page, the students will simply have to type in the word they want to find in the *search box* and then click *Find.* All matching words and phrases will be displayed in the *results panel*. The dictionary entry for the highlighted search result is shown in the *main screen area.* The subjects will then read through the presented definitions and choose the word meaning most appropriate to the context of the text being read.

4.3.5. Monitoring Software

In dictionary use research, tests and experiments generally aim at investigating the effects that dictionaries might have on L2 learning. However, using methods like observation and protocols, researchers can only study actual dictionary use; that is,

how dictionaries are consulted or why look-ups are made and what subjects think about the consultations. In the case of electronic dictionaries, there is another effective method to research how users interact with the dictionaries, namely by using log files.

According to Tarp (2009, p. 289):

> There are basically two types of log files. The first one is the registration of all movements on the user's computer, i.e. activation of the keyboard and use of the mouse. The second basic type is the registration of all transactions between the user's computer and the database where the dictionary is located.

In the present study, I used Golden Eye version 4.5 (Figure 9 on next page), which is a piece of monitoring software (MS) designed to monitor and record all the activity on one's computer. Golden Eye works like a surveillance camera pointed directly at the computer monitor, monitoring and recording anything anybody does on a computer, and storing this in a secure area for later review.

Figure 9. Golden Eye main window

Golden Eye was installed on the students' computers to record their lookups in the CD condition, and to take notes of the exact time each student needed to finish the reading tasks in both conditions. The information recorded by the MS was electronically saved in secure log files concealed in the students' computers for later retrieval and analysis. See Figure 10 for MS features used in the study.

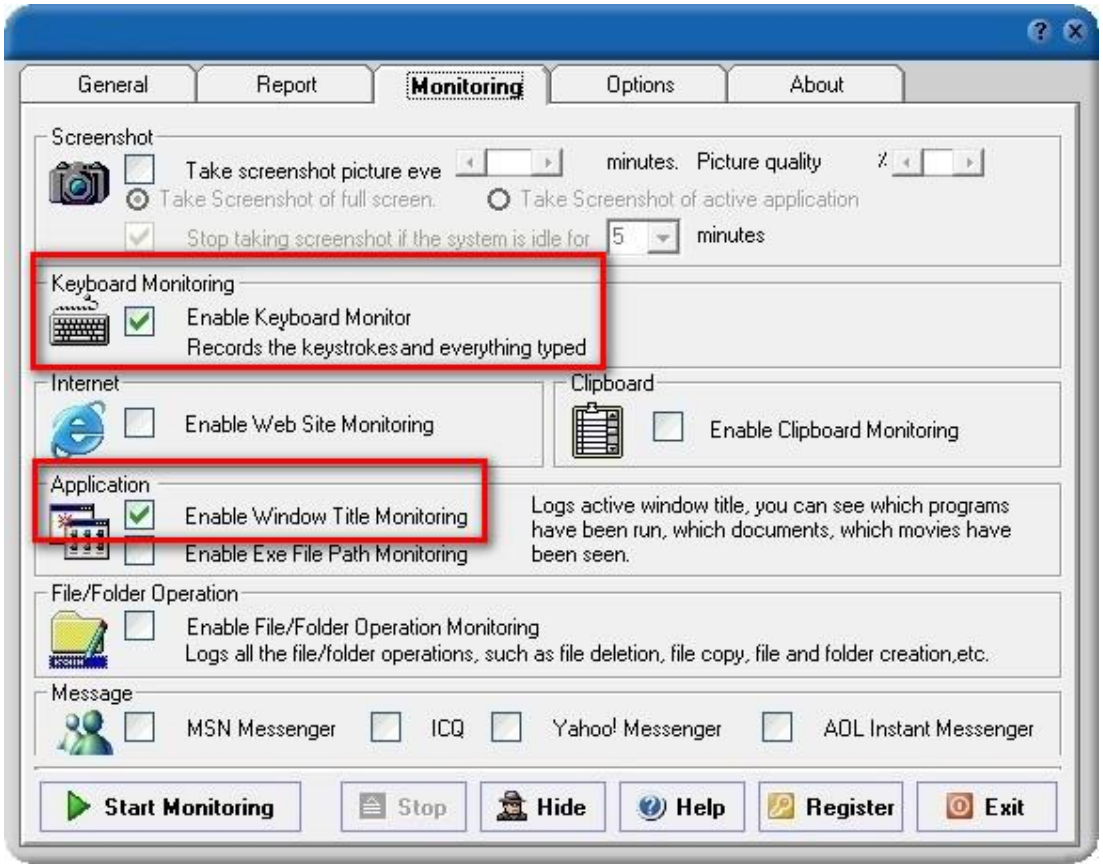

Figure 10. Time and lookups recording features in monitoring software

As shown in Figure 10, enabling the *Window Title Monitoring* feature will start monitoring and recording all applications' windows title on the computer to see what files have been opened and closed, all marked with a timestamp. Therefore, the reading time spent by the subjects was calculated through subtracting the file-opening time (Starting Time) from the file-closing time (End Time). See Figure 11 on next page for a sample window title monitoring log.

Microsoft Excel - Test-1 (8), 04/27/2011 12:34:40 **Starting Time.**
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 12:57:06
Microsoft Excel - Test-1 (8), 04/27/2011 13:00:02
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:00:32
Microsoft Excel - Test-1 (8), 04/27/2011 13:00:47
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:08:39
Microsoft Excel - Test-1 (8), 04/27/2011 13:10:25
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:10:35
Microsoft Excel - Test-1 (8), 04/27/2011 13:12:08
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:12:29
Look Up | CALD3, 04/27/2011 13:13:45
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:13:51
Pictures | CALD3, 04/27/2011 13:16:26
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:16:51
Pictures | CALD3, 04/27/2011 13:17:59
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:18:02
Microsoft Excel - Test-1 (8), 04/27/2011 13:18:07
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:19:41
Smart thesaurus, 04/27/2011 13:20:05
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:20:09
Smart thesaurus, 04/27/2011 13:20:58
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:21:03
Look Up | CALD3, 04/27/2011 13:21:05
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:21:27
Microsoft Excel - Test-1 (8), 04/27/2011 13:21:40
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:22:25
Pictures | CALD3, 04/27/2011 13:22:38
Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:22:43
Microsoft Excel - Test-1 (8), 04/27/2011 13:23:42 **End Time.**

Figure 11. Sample window title monitoring Log

Similarly, enabling the *Keyboard Monitoring* feature will start the keystroke spy to monitor and log all keystrokes and everything typed during monitoring sessions (Figure 12).

Figure 12. Sample keyboard strokes log file

Bergenholtz & Johnsen (2005, p. 117) explain:

> Analyses of log files reveal exactly which lemmas and which types of information have been requested, and, perhaps more significantly, which lemmas and which type of information have been requested but were not found in the dictionary. Furthermore, log files allow lexicographers to see the types of information which have not, or not yet, been searched for. All in all, log files may thus be used as a tool for improving internet dictionaries – and perhaps also printed dictionaries – quite considerably.

The great advantage of computer monitoring is that it is not annoying, i.e. the user does not know that s/he is being monitored, which consequently makes the consultation process more natural than in the case of other methods. According to Tarp (2009, p. 289), log files provide "easy access to a big amount of data representing the whole population of actual users, from which reliable information of the consultation can be retrieved using the proper methods", and "the processing of the collected data is relatively easy in terms of quantitative research".

4.3.6. Lookup History-List in CD-ROM Dictionary

Along with using the MS to record the subjects' lookups in the CD condition, I could also make use of an interesting feature embedded in the CD itself, which is the *History List*. The function of this feature is that it keeps record of all the words (entries) that the subjects looked up in the CD, whether those words have been typed immediately in the *search box* or accessed via cross-referencing by clicking on matching words in the dictionary's *results panel*.

The purpose behind using the *history list* feature was to explore any potential lookup activity that might not be visible through the MS keyboard-strokes recording feature. However, the main shortcoming of the *history list* feature is that it stores the entries in the computer's memory only temporarily; therefore, the entries will be erased from the memory as soon as the subjects have closed the CD application by

clicking on the *Close button* , which is located at the top right corner of the dictionary window.

To overcome this problem, I used a computer tool which could disable the *Close button* in the CD main window (Figure 13). Having the *Close button* disabled, the subjects would not be able to close the CD application, as the button would be inactive and out of service (Figure 14 on next page). As such, the CD window would be still active and the full history list would be still in the computer memory, which would allow me to retrieve the lookup list afterwards using the *Print Screen* feature in the keyboard (Figure 15).

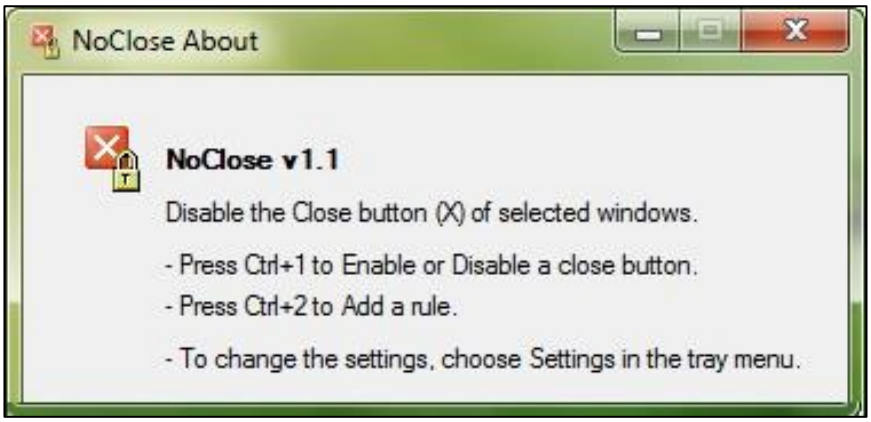

Figure 13. NoClose tool to disable "close button" in CD

Figure 14. CD "close button" disabled

Figure 15. Sample CD lookups' history list

4.4. Research Procedures

4.4.1. Research Site

The study took place late May to mid-June 2012 during the subjects' regular classes and under my supervision, in a computer laboratory in the Department of English at Mentouri Brothers University-Constantine 1. The laboratory had 24 computers; all running perfectly except two which were down due to a system crash.

4.4.2. Instructions and Training

The subjects were told that the tests were only part of a research project and that the results would not affect their marks in the final exam. However, I strongly recommended doing the tasks seriously to have good scores. Interestingly, all the subjects seemed to be motivated and willing to take part in the study since they were expecting me, their teacher, to give them good marks in the exam in return for their participation in the study.

Prior to the experiments, the students received 15 minutes of training and watched a short video tutorial about the features and main search functions in the CD. The subjects were briefly introduced on how to use the mouse to move the cursor and then left-click inside the search box of the CD, which was all they had to do in the computer if they wanted to find out the meaning for a given word in the text. The

students were then allowed to freely practice on their own so that they could interact with the computers and become familiar with the search process and interface design of the dictionary. Since most of the subjects were familiar with computers, this seemed to offer no difficulty for them and they all affirmed that they were comfortable using the mouse and keyboard and understood the procedure for retrieving dictionary definitions.

4.4.3. Procedure in Reading Comprehension

The presentation mode of the reading tests was on computer screen alone. The reason for this was twofold: Firstly, to allow the monitoring software to capture the time each student spent on reading; I would not have been able to record the time spent on reading if the tests were administered on paper. Secondly, to ease the scoring procedure using the Microsoft spreadsheet software "Excel", since I mainly used this software to design the reading tests in such a way that all students' scores would be calculated automatically at a single mouse click.

It is worth noting that there was no time limit set on the reading tasks, and that the students were allowed to freely use their dictionaries and look up as many words as they wanted, and whenever they found it necessary. They were instructed to open the reading files by themselves and then save the changes and close the files as soon as they had finished doing the tasks, so that the MS could make notes of the exact

time each student started and finished the reading tasks. The reading tests were administered in two separate sessions:

4.4.3.1. Reading with Access to a CD-ROM Dictionary

In the first session, and before the students were allowed to enter the test lab, I activated the MS in all the computers. The CD application was also loaded and its "Close button" was successfully disabled. The students read a text and answered comprehension questions with access to a CD (Figure 16). The MS recorded the students' look-ups without them being aware that they were being monitored for their lookup behavior (See Appendix A for full test).

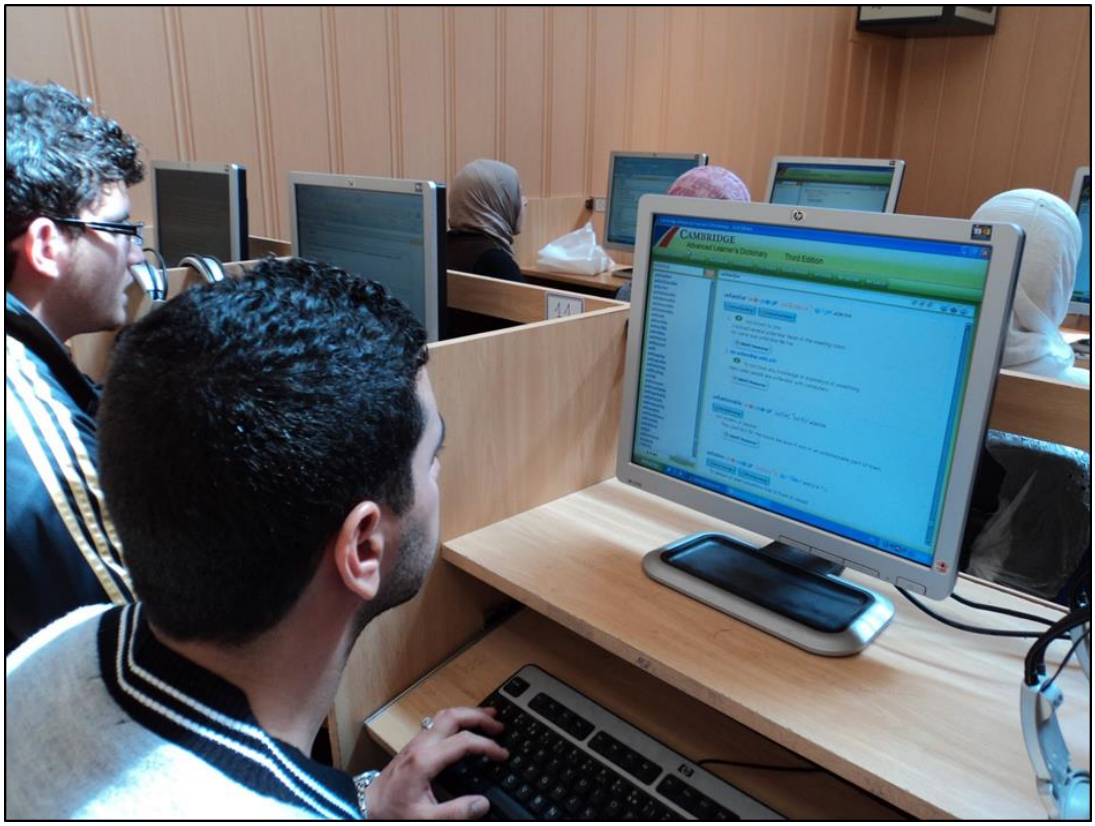

Figure 16. Students reading in CD-ROM dictionary condition

4.4.3.2. Reading with Access to a Printed Dictionary

In the second session (after a week), the students read another text with access to a PD (Figure 17). However this time, they were requested to insert the words they had looked up in a box imbedded into the text (See Appendix B for full test).

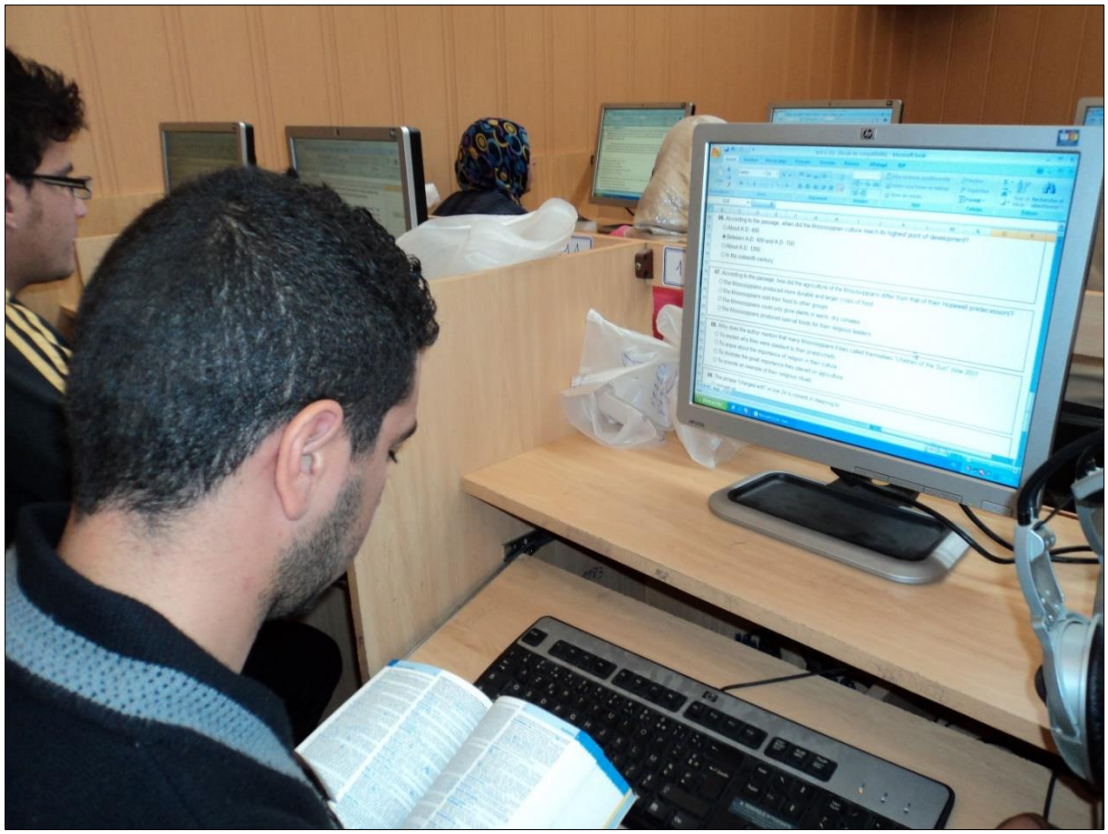

Figure 17. Students reading in printed dictionary condition

To account for the problem of test wiseness, the subjects did the reading in the CD condition first, since it would have been impossible for them to find out that the tests were also about their lookup behavior and reading time, and not only about their reading scores.

However, if the subjects did the reading in the PD condition first, they would have at least realized that the tests were also about their lookups, since I would have asked them to report on their lookups in the PD. This would have eventually made the subjects feel suspicious and they might have acted differently the next time they did the reading in the CD condition.

4.4.4. Procedure to Test Vocabulary Retention

In order to test students' vocabulary retention, I administered pretests and posttests to the subjects in both PD and CD lookup conditions. The tests were administered only on paper since the only variable tested was memory for words. The time taken to find the target words in the dictionaries was not considered for it is not a variable of interest.

To account for the problem of test wiseness, I assigned half of the sample -22 students- to the PD lookup condition and the other half to the CD lookup condition. I did not assign all the subjects to both conditions because it would have been impractical if the students did the pretest and posttest in one condition, and then did a similar pretest and posttest in the other. I could speculate that after taking the first series of tests in either condition, the subjects would have absolutely realized that they would be tested on their lookups the next time the pretest in the second series of tests is carried out. If this had happened, they might have copied the target words for later

review and further lookup and consolidation of meaning at home, which would have definitely invalidated the tests' results.

4.4.4.1. Vocabulary Pretest and Posttest

In the pretest, the students were instructed to supply the definitions for the words in **bold** in the sentences using either a PD or a CD (See Appendix G). However, they were not informed that a vocabulary retention test would be given regarding the words looked up in the pretest, and were assured that what really mattered were their scores. I also made sure the students did not take any notes regarding vocabulary outside the test room in that they were neither allowed to use mobile phones nor rough papers.

After a week lapse, the students were given the posttest to measure their retention of the words they had looked up a week earlier (See Appendix H). Yet, this time, the students were not allowed to use any dictionary type, but were encouraged to rely solely on their memory.

4.5. Method of Data Analysis

It should be noted that I designed and administered the entire reading and vocabulary tests in such a way that the students would not be aware of their real objectives, except in the PD condition reading task, in which I could by no means find a trick to make the subjects unaware of the 'lookup frequency' variable. Before I

proceed to analyze the results of the study (next chapter), it is worth mentioning how the results of the tests were calculated in the first place.

Since the study consisted of one independent variable, i.e. dictionary type, and four dependent variables, i.e. reading time, reading scores, lookup frequency, and vocabulary retention, comparison between pretests and posttests was made using paired-samples t-tests, except for the last dependent variable (i.e. vocabulary retention) where an independent-samples t-test was used since each half of the subjects did only one test type (either a CD or a PD). Pearson's correlation coefficient was conducted to examine whether there was any kind of correlation between the subjects' lookup frequencies and their reading scores in both conditions.

4.6. Statistical Procedures Used in the Study

T-tests are often used to compare the means from two different groups of data. They can help us find out if the means are significantly different from one another or if they are relatively the same. If the means are significantly different, we can say that the variable being manipulated (independent variable) had an effect on the variable being measured (dependent variable).

Paired Samples T-Tests

These types of tests are used to compare groups that are related in some way. There are so many ways that participants in two groups can be related. One way is

that participants in the first group are the same as participants in the second group. This is sometimes called a repeated measures design.

Independent Samples T-Tests

These types of t-tests are used to compare groups of participants that are not related in any way. The groups are independent from one another. So, participants in one group have no relationship with participants in the second group. This is sometimes called a between subjects design.

Pearson's correlation coefficient *(*Pearson's *r)*

Pearson's *r* is a statistic that helps us understand the strength of the linear relationship between two variables. Sometimes we want to know whether two variables are related to one another. If they are related, we want to know how much. Is there a strong relationship between two variables or is it a weak relationship? What is the direction of the relationship? When one variable goes up, does the other go down? Pearson's *r* can help us with that. When *r* is:

- Close to 1, there is a strong relationship between our two variables.
- Close to 0, there is a weak relationship between our two variables.
- Positive (+), as one variable increases in value, the second variable also increases in value. This is called a positive correlation.

- Negative (-), as one variable increases in value, the second variable decreases in value. This is called a negative correlation.

The Statistical Package for Social Sciences (IBM SPSS Statistics version 21) was used to analyse the data retrieved from the log files. Descriptive statistics were produced for every variable in the study and the calculations of the means and standard deviations were used. Inferential statistics including Independent and Paired-samples t-tests were conducted to examine if there were any significant differences between the two conditions regarding reading time, reading scores, lookup frequency, and vocabulary retention; thereby validating or refuting the hypotheses suggested for this study.

In doing research in education, it is a convention that if the alpha value *p* is less than 0.05, then the effect or the correlation between two variables is considered to be significant, which means that the researcher can be 95% confident that the relationship between two variables is not due to chance, but due to a real effect or correlation. Therefore, the significance level in this study was set at $p = 0.05$.

Conclusion

This chapter described the research strategy and methodologies used to empirically investigate the research questions relevant to this study on the effects of CD-ROM and printed dictionaries on EFL students' reading comprehension and vocabulary retention. The next chapter will report and discuss the findings of this

study as a result of the data analysis procedure. These findings will hopefully provide an accurate account of the ways CDs and PDs might affect EFL students reading performance, vocabulary retention, and L2 learning in general.

Chapter Five

Data Analysis and Discussion

Chapter Five

Data Analysis and Discussion

Introduction

The analysis of data and the reporting of the results are fundamental phases of the conduct of research. This chapter reports on the collected data and the analyses performed on those data relevant to the present research whose main concern is to investigate the effects of using CDs and PDs on reading comprehension and vocabulary retention of EFL students. The findings of the data-analysis phase will be reported and discussed in sufficient details in this chapter. Moreover, based on these findings, we will offer some pedagogical implications for CD use in EFL learning and teaching.

This study was designed to answer the following research questions:

1. Will there be any significant difference in the reading time between the two dictionary conditions (CD and PD)?
2. Will the two dictionary conditions highlight any substantial difference in the reading scores of the subjects?
3. Will there be any notable difference in the number of look-ups between the two dictionary conditions?

4. Is there any relationship between the look-up frequency and the scores in reading comprehension? In other words, does higher/lower look-up frequency correlate with higher/lower reading scores in both conditions?
5. Is there any correlation between the type of the dictionary used and the degree of vocabulary retention?

In the light of the previous questions, the following hypotheses have been made:

1. The students would spend less time reading the text in the CD condition than in the PD condition.
2. Comprehension performance would be higher in the CD condition than in the PD condition, as the CD is expected to promote better comprehension scores.
3. The students would look up more words in the CD condition to comprehend the text than in the PD condition.
4. There would be a positive correlation between the subjects' look-up frequencies and their reading scores. Increased dictionary look-up frequency could induce better understanding of the reading passages; therefore, the comprehension scores would be higher. Similarly, lower look-up frequency could result in poor understanding of the reading passages and thus the reading scores.
5. The students would remember words better after using PDs than using CDs; that is, the words looked up in the PD will be better retained than those looked up in the CD.

Along with using the significance level of $p = 0.05$ to determine the strength of dictionaries' effect on reading comprehension and vocabulary retention, I used *box plots* to visually illustrate the distribution of the subjects' reading times, reading scores, lookup frequencies, and vocabulary retention scores.

A box plot is a common type of a graph that enables us to study the distributional characteristics of a group of scores. A box plot summarizes quantitative data by displaying its first quartile (25 %), median (50 %) which is the middle value of the dataset, third quartile (75 %), minimum and maximum values (whiskers), and any unusual values in the data (outliers). See Figure 18 for an explanatory box plot.

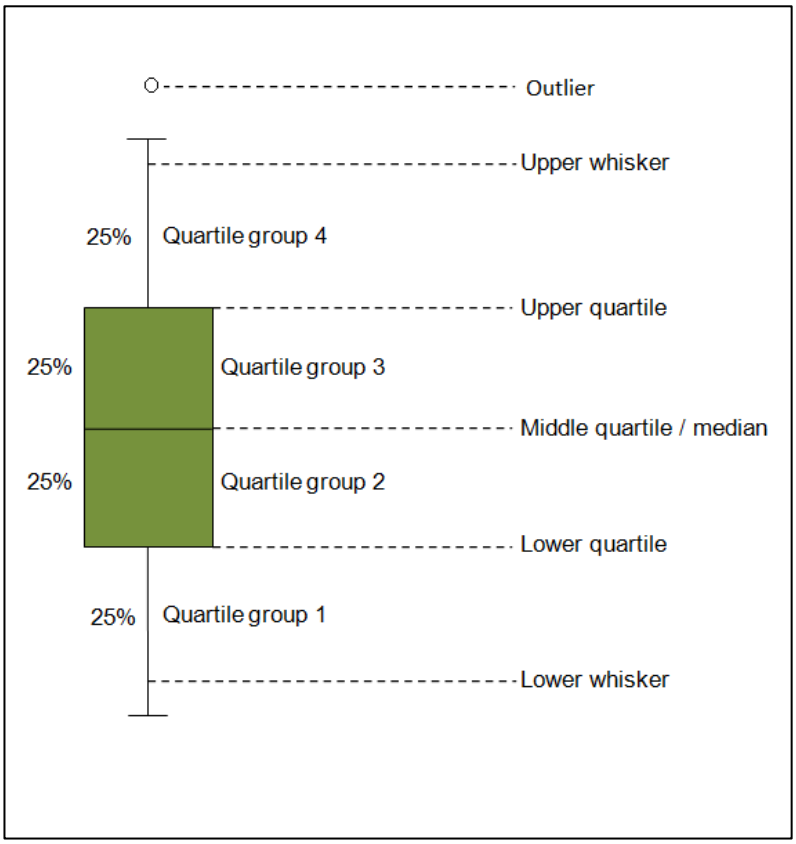

Figure 18. Explanatory box plot

Box plots not only help map the subjects' distribution of values and detect any unusual values in the obtained data, but are also good at showing differences between distributions in comparative groups, which is relevant to the scope of this study. Some general observations and interpretations when considering box plots include:

- The box plot is comparatively short: This suggests that the subjects have a high level of agreement with one another as far as their performance or scores are concerned.
- The box plot is comparatively tall: This indicates that the subjects hold quite different scores and that their performance varies from one subject to another.
- One box plot is much higher or lower than another: This could suggest a notable difference between comparative groups of subjects.
- The 4 sections of the box plot are uneven in size: This shows that many subjects have similar scores at certain parts of the scale, but in other parts of the scale subjects are more variable in their scores.

In the following, I will report on the findings for each question as a result of the data analysis procedure. The results of each research question will be statistically described and analyzed. "Researchers use numerous approaches to the analysis of data, and no one approach is uniformly preferred as long as the method is appropriate to the research questions being asked and the nature of the data collected" (American Psychological Association, 2010, p. 33). Yet, accurate, unbiased, complete, and

insightful reporting of the analytic treatment of data (be it quantitative or qualitative) are paramount to justify the research conclusions and recommendations to come later in the next section (General Conclusion).

5.1. Reading Times

Question One examined whether there was a statistically significant difference in the subjects' reading times between the two dictionary types, CD and PD. Reading times for participants were statistically compared and examined to find out whether dictionary type affected the subjects' reading rate in any way.

Table 2 reports on the exact time spent by each subject on the reading tasks in the two conditions. Box plots for the distribution of subjects' reading times in PD and CD are illustrated in Figures 19 and 20 respectively. Descriptive statistics including the means and standard deviations, shortest and longest values for the subjects' reading time are presented in Table 3. The reading *starting time* and *end time* for each participant in both conditions are tabulated in Appendices C and D.

Table 2 Subjects' Reading Times in CD and PD Conditions

S	PDT	CDT	S	PDT	CDT
1	0:45:13	0:52:11	23	0:57:31	0:26:03
2	0:46:01	0:52:19	24	1:01:46	0:31:25
3	0:43:30	0:33:35	25	0:54:57	0:32:22
4	0:42:27	0:40:21	26	0:57:14	0:37:19
5	0:57:52	0:45:03	27	0:54:45	0:46:45
6	0:57:48	0:40:46	28	0:52:37	0:30:40
7	0:57:42	0:40:11	29	0:55:03	0:38:31
8	0:55:37	0:49:02	30	1:14:48	0:59:34
9	0:56:41	0:51:28	31	0:49:08	0:35:35
10	0:52:32	0:42:26	32	0:57:17	0:40:27
11	0:59:01	0:51:57	33	0:47:14	0:24:23
12	1:01:26	1:04:30	34	0:47:26	0:37:59
13	0:55:09	0:44:23	35	0:59:52	0:58:05
14	1:00:05	1:00:02	36	0:52:22	0:34:57
15	0:51:39	0:58:26	37	0:58:39	0:50:37
16	0:53:48	0:54:44	38	1:03:50	0:40:55
17	0:57:18	0:59:00	39	0:47:43	0:32:40
18	0:43:11	0:37:23	40	0:43:36	0:32:47
19	0:47:53	0:45:20	41	0:40:08	0:29:38
20	0:56:03	0:47:43	42	0:51:27	0:36:05
21	0:55:42	0:33:30	43	1:04:43	0:47:21
22	0:57:35	0:56:24	44	1:01:25	0:49:02

Note. S=Subjects, PDT=Reading time in PD condition, CDT=Reading time in CD condition.

The subjects' reading times in PD and CD conditions are visually summarized in the box plots in Figures 19 and 20 respectively. Apparently, the subjects' widely-scattered reading times did not allow for setting the time values from both conditions on the same scale for a better visual comparison. Therefore, producing parallel box plots in a single graph using IBM SPSS proved being impossible.

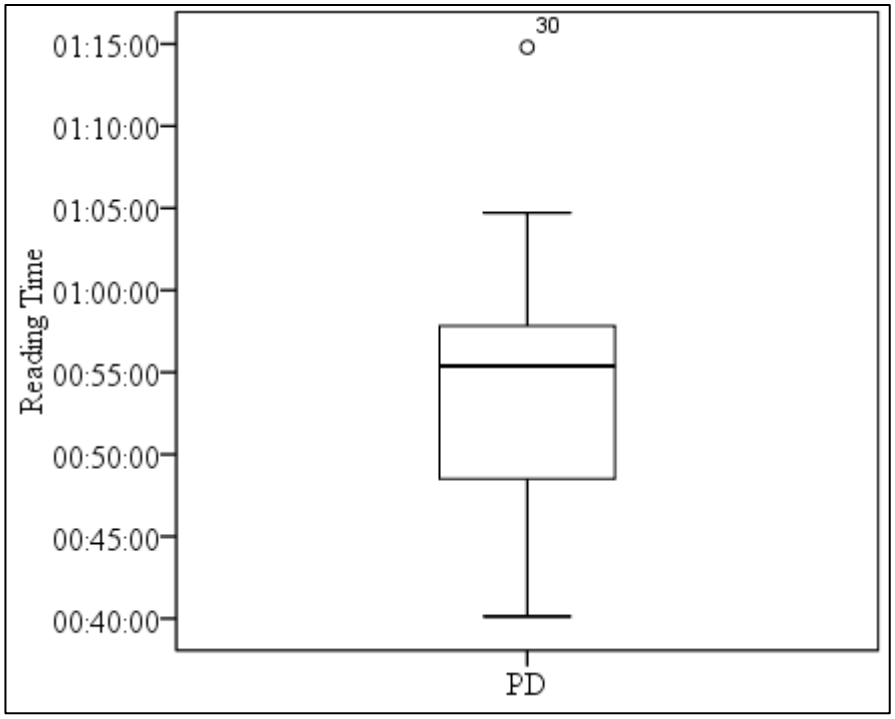

Figure 19. Box plot for subjects' reading times in PD condition

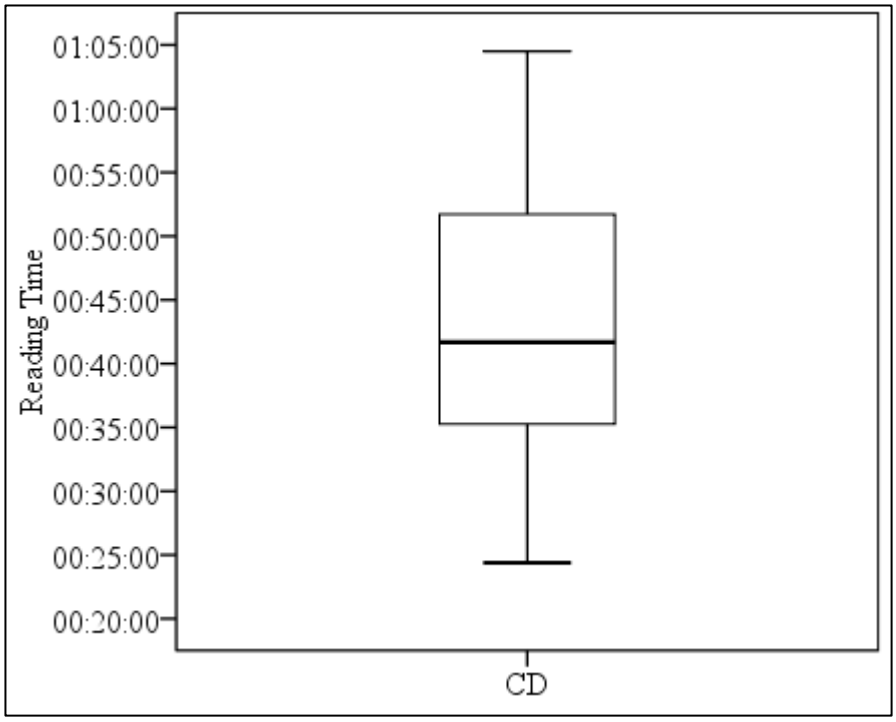

Figure 20. Box plot for subjects' reading times in CD condition

Since the middle-half of the values in a distribution fall between the 25th and 75th percentiles (bottom and top lines of the box), we notice that the middle 50 % of the subjects' reading times in the PD condition are between 48 min 11 s and 57 min 51 s, whereas the middle-half of their reading times in the CD condition fall between 35 min 06 s and 51 min 49 s.

This distribution of middle time values across the two reading conditions could be visually identified from the shape of the box plots in Figures 19 and 20. The box plot for the subjects' reading times in the PD condition is comparatively shorter than the one in the CD condition. This indicates that the middle-half of the subjects' reading times in the PD condition were very close to one another and all fell in the

range of 9 min 40 s, compared to the middle-half of the subjects' reading times in the CD condition, which were rather scattered across a time range of 16 min 43 s.

In addition, the condensed size of the third quartile section in the PD box plot indicates that the subjects' in this group (25 % of the sample) had extremely similar reading times, all falling in a time interval of 2 min 28 s. On the other hand, the third quartile section of the CD box plot indicates that the subjects in that group were more variable in their reading times which were spread across a range of 10 min 09 s.

Information from the box plots also suggests that the subjects generally read the text faster in the CD than when they did in the PD, with a median of 41 min 40 s and 55 min 23 s respectively. Interestingly, there is an observation of a subject who spent far longer reading than all the subjects did in PD or CD conditions, spending 1 h 14 min 48 s (small circle in boxplot for PD reading = subject 30).

Considering the reading times for each subject in Table 2, we notice that the vast majority of subjects took longer to read the text with access to the PD than with the CD- 37 subjects in total. Moreover, and as shown in Table 3 on next page, the subjects spent 54 min 16 s on average reading the text in the PD condition, with a minimum time of 40 min 08 s and a maximum time of 74 min 48 s. However, in the CD condition, reading time mean was reduced to 43 min 29 s, with shortest and longest time values of 24 min 23 s and 64.5 minutes respectively.

Table 3 Descriptive Statistics for Reading Time in PD and CD Conditions

Paired samples statistics						
Variable	Total observations	Mean	Std. deviation	Minimum	Median	Maximum
PD	44	0:54:16	0:06:55	0:40:08	0:55:23	1:14:48
CD	44	0:43:29	0:10:12	0:24:23	0:41:40	1:04:30

At first glance, the aforementioned results might suggest that the PD affected the subjects' reading rate negatively compared to the CD. Yet, we cannot come to a valid conclusion about this assumption looking at the subjects' reading times and time means only. Thus, a paired-samples t-test was conducted to find out whether the reading time difference between the two conditions is statistically significant. The results for reading time analysis are presented in Table 4.

Table 4 T-test Results for Reading Time in PD and CD Conditions

Paired samples test								
Variable	Paired differences					t	df	Sig. (2-tailed)
	Mean	Std. deviation	Std. error mean	95% CI				
				Lower	Upper			
PD-CD	0:10:46	0:09:27	0:01:26	0:07:54	0:13:39	7.56	43	**.000**

Note. PD= Printed Dictionary, CD= CD-ROM Dictionary, CI= Confidence Interval, df = Degree of Freedom

The results indicate that there was a highly significant difference in the reading time for PD (M = 0:54:16, SD = 0:06:55) and CD (M = 0:43:29, SD = 0:10:12) conditions; t (43) = 7.56, p = **.000**, which is less than **0.05**. These results suggest that using the CD did have an effect on reducing the subjects' reading time. Specifically, the results suggest that when the subjects used the CD, they managed to finish the reading task in significantly less time than when they used the PD. These results reflect the longer reading and dictionary consultation time needed by the subjects to read the passage using the PD, compared to the CD which seemed to have eased and accelerated the reading tasks considerably.

These results were expected and are consistent with the results of previous studies which investigated the effect of using electronic dictionaries on reading time. Consulting definitions in a conventional dictionary is a time-consuming task which increases reading time significantly.

The hypothesis which stated that students would spend less time reading with access to a CD than with a PD is safely validated. But, does the higher reading time in the PD condition reflect greater number of lookups? In other words, did the subjects look up far more words in the PD than in the CD? Findings related to these questions will be discussed later in this chapter.

5.2. Reading Scores

Question Two examined whether there was a significant difference in the subjects' reading scores across the two dictionary types, PD and CD. The subjects' scores in both conditions were statistically examined and compared to yield clear insight into how dictionary type affects the degree of comprehension.

Table 5 reports on the reading scores of subjects in both conditions. Box plots for the distribution of subjects' reading scores are set in Figure 21. The means and standard deviations of the subjects' reading scores as well as the lowest and highest scores recorded in both reading conditions are presented in Table 6. The subjects' individual scores regarding each question in the reading tests are detailed in Appendices E and F.

Table 5 Subjects' Reading Scores in PD and CD Conditions

S	PDS	CDS	S	PDS	CDS
1	6	6	23	8	9
2	6	6	24	9	8
3	6	9	25	8	8
4	6	9	26	6	6
5	6	2	27	6	6
6	6	8	28	8	7
7	3	4	29	9	9
8	6	9	30	4	2
9	7	5	31	7	9
10	4	6	32	6	6
11	6	3	33	3	7
12	4	5	34	4	8
13	8	7	35	4	6
14	5	5	36	4	8
15	5	2	37	4	6
16	3	6	38	6	7
17	2	5	39	6	3
18	9	6	40	8	5
19	6	3	41	6	6
20	8	5	42	5	6
21	6	7	43	8	9
22	5	3	44	5	8

Note. S= Subjects, PDS= Reading scores in PD condition, CDS= Reading scores in CD condition.

Since the scoring scheme for each reading condition was set at a 10-point scale, producing parallel box plots using IBM SPSS seemed to be feasible. Therefore, the distribution of the subjects' reading scores in PD and CD conditions are visually summarized and compared in parallel box plots in Figure 21 below.

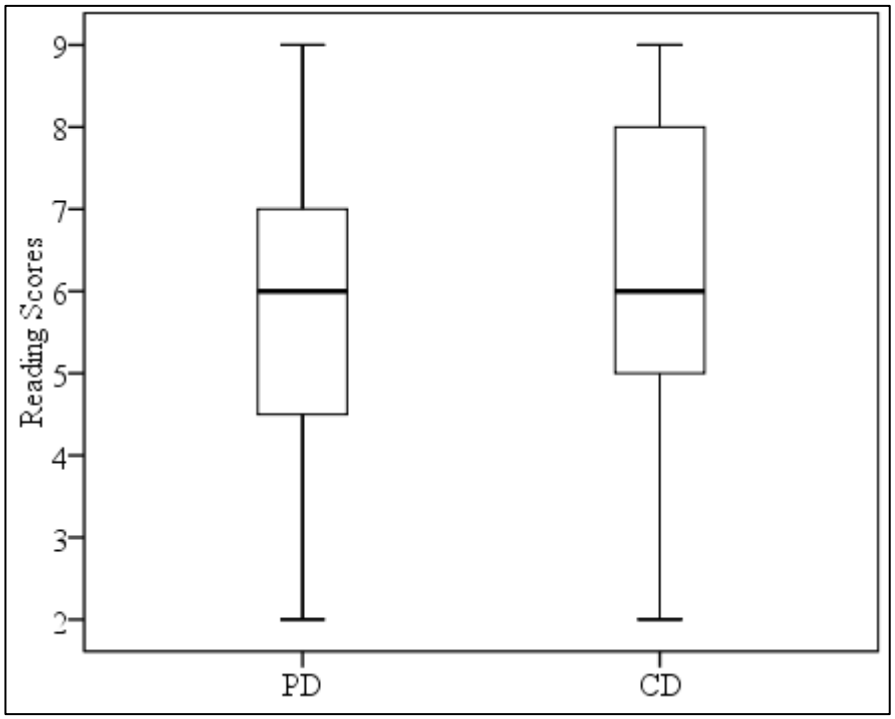

Figure 21. Box plots for subjects' reading scores in PD and CD conditions

As shown in Table 5 on the previous page, the subjects' reading scores in CD and PD conditions ranged from a minimum score of 2 points to a maximum score of 9 points. Twenty-one subjects scored better in reading with access to a CD, whereas 14 subjects achieved better scores reading under the PD condition. The reading scores of the remaining nine subjects were the same whether in CD or PD.

The parallel box plots in Figure 21 indicate that the middle half of the subjects' reading scores in PD condition fall between 4.25 and 7 points, whereas the middle half of their reading scores in CD condition fall in the range of 5 to 8 points, with a median of 6 points in each condition. In addition, comparison of sections in the two box plots indicates that the third quartile of PD reading scores has the same shape of variability as the second quartile in CD reading scores, with PD and CD distributions ranging from 6 to 7 points and from 5 to 6 points respectively.

Similarly, we notice that most of the reading scores in the CD condition (75 %) seem to fall in the upper part of the box plot, ranging from 5 to 9 points, which suggests a positive skew in the distribution of scores in the CD condition. Moreover, the long lower whisker in the CD box plot means that subjects' reading scores are varied amongst the low-performing quartile group whose scores range from 2 to 5 points, and very similar for the high-performing quartile group whose reading scores range from 8 to 9 points (upper whisker). Descriptive statistics for the subjects reading scores are set in Table 6 below.

Table 6 Descriptive Statistics for Reading Scores in PD and CD Conditions

Paired samples statistics						
Variable	Total observations	Mean	Std. deviation	Minimum	Median	Maximum
PD	44	5.84	1.751	2	6	9
CD	44	6.14	2.075	2	6	9

The descriptive statistics set in Table 5 indicate that the subjects scored 5.84 points on average in reading under the PD condition, and 6.14 points in reading with access to the CD. These score means suggest only a slight difference in reading between the two conditions, which might propose no significant effect for any dictionary type.

To arrive at a better understanding of whether dictionary type affected reading comprehension of the subjects of this study, a paired-samples t-test was computed to find out whether the mean difference between the reading scores in the two dictionary conditions is statistically significant (Table 7).

Table 7 T-test Results for Reading Scores in PD and CD Conditions

Paired samples test								
Variable	Paired differences					t	df	Sig. (2-tailed)
	Mean	Std. deviation	Std. error mean	95% Confidence interval of the difference				
				Lower	Upper			
PD – CD	-.295	2.258	.340	-.982	.391	-.868	43	**.390**

The results indicate that there was not any significant difference in the scores for PD (M = 5.84, SD = 1.751) and CD (M = 6.14, SD =2.075) conditions; t (43) = -.868, p = **.390**, which is greater than **0.05**. These findings suggest that there were no differences between the two conditions on the comprehension measure, and that the

students' performance was fairly the same regardless of the type of dictionary used. However, the mean scores indicate that the subjects performed slightly better while reading with access to a CD than with a PD, achieving average scores of 6.14 points and 5.84 points respectively.

The research hypothesis which stated that CD use promotes better comprehension scores is refuted. Yet, a possible reason for the subjects' similar reading scores in both dictionary conditions could be the fact that no time limit was put on the reading tasks, which might have made the subjects feel at ease doing the tasks free from any time-limit stress. Perhaps if the reading tasks were limited in time, the subjects might have rushed the whole reading process, thereby resulting in poor concentration and lower scores, especially in reading with access to a PD which entails longer and stressful consultation time.

Though not fulfilling the assumption made in this study, the obtained results are in line with what previous research has found on the effects of different dictionary modalities on reading comprehension scores. Corresponding studies suggested that dictionary type has no effect on readers' comprehension performance.

5.3. Lookup Frequency

Question Three examined whether there was a substantial difference in the subjects' number of lookups across the two dictionary types, CD and PD, to accept the premise that one type of dictionary had an advantage over the other regarding encouraging frequent lookups while reading.

Table 8 reports and compares the participants' lookup frequencies in PD and CD conditions. The means and standard deviations related to the subjects' lookup frequencies are presented in Table 9. Parallel box plots for subjects lookup frequencies in PD and CD are set in Figure 22.

Table 8 Subjects' Number of Lookups in PD and CD Conditions

S	PDL	CDL	S	PDL	CDL
1	3	9	23	5	5
2	5	5	24	4	3
3	7	4	25	6	1
4	3	4	26	6	7
5	4	6	27	5	4
6	6	13	28	4	0
7	4	6	29	9	6
8	5	7	30	8	10
9	6	21	31	9	6
10	7	9	32	7	9
11	4	11	33	11	9
12	8	4	34	4	4
13	5	6	35	4	8
14	9	8	36	7	10
15	6	9	37	5	5
16	7	11	38	8	1
17	4	9	39	6	8
18	5	5	40	4	10
19	7	14	41	5	6
20	7	11	42	4	4
21	6	4	43	5	8
22	6	4	44	6	6

Note. S= Subjects, PDL= Number of lookups in PD condition, CDL= Number of lookups in CD condition.

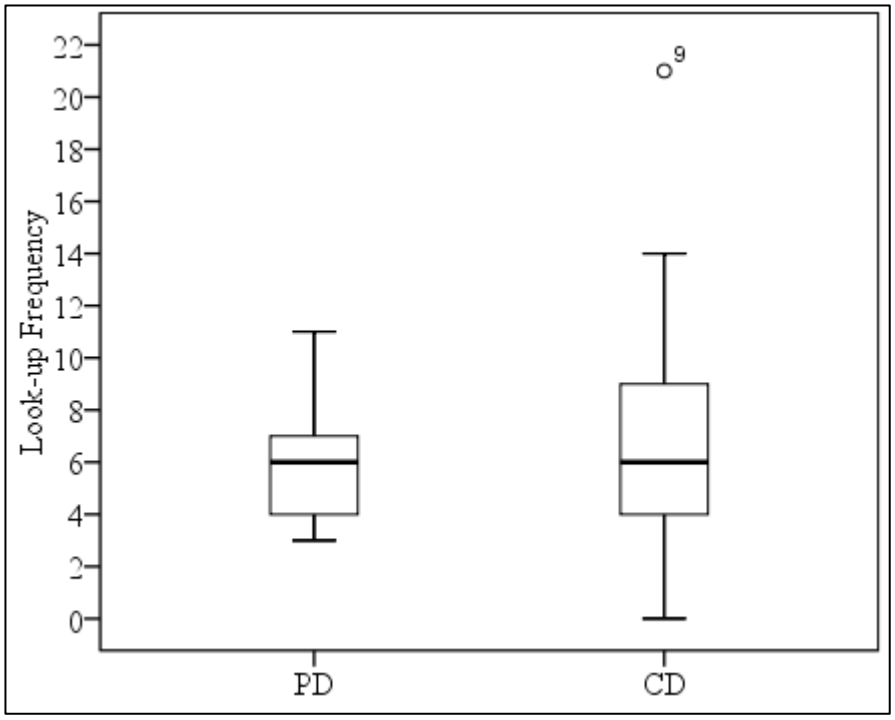

Figure 22. Parallel box plots for lookup frequencies in PD and CD conditions

The data presented in Table 2 on the previous page revealed that while 14 subjects looked up more words in the PD, 23 subjects opted for greater consultations during reading with access to a CD. However, the difference in the number of lookups between the CD and PD varied from one subject to another, with 12 subjects looking up far more words in the CD (3 more words and above), and 11 subjects looking up one to two more words only. The remaining 7 subjects looked up as many words in the CD as in the PD.

The parallel box plots in Figure 22 indicate that the middle-half of subjects looked up 4 and 7 words in the PD, whereas the middle-half of their lookup frequency in the CD fall in the range of 4 to 9 words, with a median of 6 points in each lookup

condition. In addition, the comparison of size between the PD and CD box plots indicates that the middle-half of the subjects' lookup frequencies were very similar and close to one another in the PD condition, as the box plot is relatively shorter than the CD one. However, the middle 50 % of the subjects' lookups in the CD condition seem to be scattered across a range of 6 lookup frequencies (4 to 9 words). Interestingly, there is an observation of an extreme value (outlier) in the CD box plot of subject 9 who looked up 21 words in the CD alone, and another observation of subject 28 who did not look up any words in the CD.

Moreover, the long upper whisker in the PD box plot means that subjects' lookup frequencies are scattered amongst the high lookup-frequency quartile group of subjects who looked up 7 to 11 words, and very similar for the low lookup-frequency quartile group of subjects whose lookup frequencies range from 3 to 4 words (short lower whisker). Descriptive statistics for the subjects' lookup frequencies in PD and CD are set in Table 9 below.

Table 9 Descriptive Statistics for Lookup Frequencies in PD and CD Conditions

Paired samples statistics						
Variable	Total observations	Mean	Std. deviation	Minimum	Median	Maximum
PD	44	5.82	1.781	3	6	11
CD	44	7.05	3.785	0	6	21

Statistical analysis of the data shows that the subjects looked up 5.82 words on average while reading in the PD condition and 7.05 words when reading with access to the CD, which might suggest the advantage of CD use in encouraging frequent lookups. However, such a premise is not clear-cut as we need a hypothesis test first. To examine the aforementioned assumption, a paired-samples t-test was conducted to find out whether or not the mean difference in lookups between the two dictionary conditions is significant (Table 10).

Table 10 T-test Results for Number of Lookups in PD and CD Conditions

Paired samples test								
Variable	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. deviation	Std. error mean	95% Confidence interval of the difference				
				Lower	Upper			
PD-CD	-1.227	3.911	.590	-2.416	-.038	-2.082	43	**.043**

The results indicate that there was a significant difference in the number of lookups for PD (M = 5.82, SD = 1.782) and CD (M = 7.5, SD = 3.785) conditions; t (43) = -2.082, p = **.043**, which is less than **0.05**. This indicates that the subjects looked up significantly more words in the CD than in PD while reading.

Due to the differences in the search effort associated with each type of dictionary, searching through the PD pages to find what a word means would

obviously require more effort than simply typing in the unknown word into the CD definition window. Therefore, the subjects might have been reluctant and unwilling to use their PDs so often while reading, unlike in the CD, in which the ease and speed of search encouraged them to look up as many words as they felt necessary for their understanding of the text.

Though the results from the present study did not yield a highly significant effect, the research hypothesis which suggested that the subjects would look up more words in the CD than in the PD is validated. These results were expected and are similar to what previous research has found on the effect of electronic dictionaries on increasing lookup frequency.

5.4. Lookup Frequencies-Reading Scores' Correlations

Question Four examined whether the subjects' lookup frequencies are correlated with their reading scores. In order to explore a possible relationship between the two variables, Pearson product-moment correlation coefficient was computed to assess the correlation between the subjects' dictionary-lookup frequencies and their reading scores in PD and CD conditions.

The value of Pearson's ***r*** measures how strong the relationship is between the subjects' lookup frequencies and their reading scores. If a Pearson's *r* value is close to 1, this means there is a strong relationship between our two variables. However, if a

Pearson's *r* value is close to 0, this means there is a weak or no correlation at all between our two variables.

In addition to computing Pearson's correlation coefficient, I used *Scatterplots* to display possible relationships between our two variables. A scatterplot is interpreted by looking for patterns in the data as we move from left to right. However, the pattern of interest to us is a *linear* pattern. A linear relationship between the look-up frequencies and reading scores exists when their values' pattern resembles a line, either uphill or downhill.

- If the data values show an uphill line as we move from left to right, this indicates a *positive relationship* between our two variables. That is, as the *lookup frequency* values increase (move right), the *reading scores* values tend to increase as well (move up).

- If the data values show a downhill line as we move from left to right, this indicates a *negative relationship* between our two variables. That is, as the *lookup frequency* values increase (move right), the *reading scores* values tend to decrease (move down).

- If the data values do not seem to resemble any kind of line, then no relationship exists between our two variables. That is, the lookup frequency and reading scores do not correlate whatsoever.

A Pearson product-moment correlation coefficient was computed to assess the relationship between the subjects' lookup frequencies and their reading scores in PD and CD conditions (Table 11).

Table 11 Pearson Correlation for Lookup Frequencies versus Reading Scores

Correlations		
		Reading scores
PD lookup frequency	Pearson correlation	**-.129**
	Sig. (2-tailed)	.405
CD lookup frequency	Pearson correlation	**-.338***
	Sig. (2-tailed)	.025

*. Correlation is significant at the 0.05 level (2-tailed)

As shown in Table 11, the Pearson's *r* for the correlation between the subjects' PD lookup frequencies and their reading scores is -.129, which is very close to **0**. This result means that no linear relationship exists between the two variables, lookup frequency and reading scores. Therefore, the subjects' PD lookup frequencies and their reading scores were not correlated, $r = \mathbf{-0.129}$.

Similarly, the Pearson's *r* value for the correlation between the subjects' CD lookup frequencies and their reading scores is -.338, which is also close to 0. This means that there is a weak relationship between the subjects' lookup frequencies and

their reading scores. Therefore, there is no correlation between the subjects' CD lookup frequencies and their reading scores, r = **- 0.338**.

The zero correlations between the subjects' lookup frequencies and their reading scores in PD and CD conditions are better illustrated and confirmed in the scatterplots in Figures 23 and 24 below.

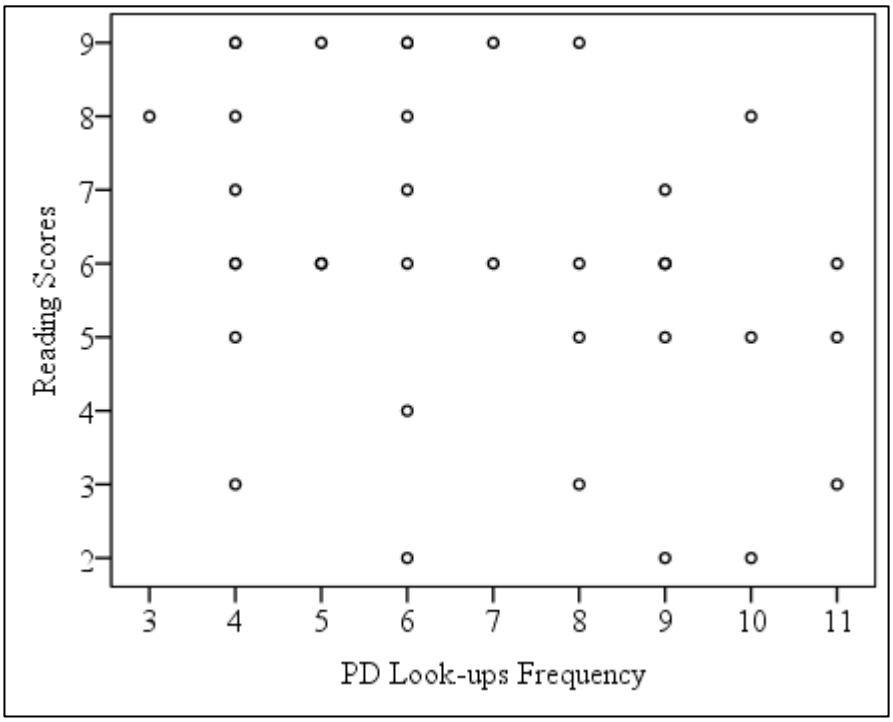

Figure 23. Scatterplot of PD lookup frequencies versus reading scores

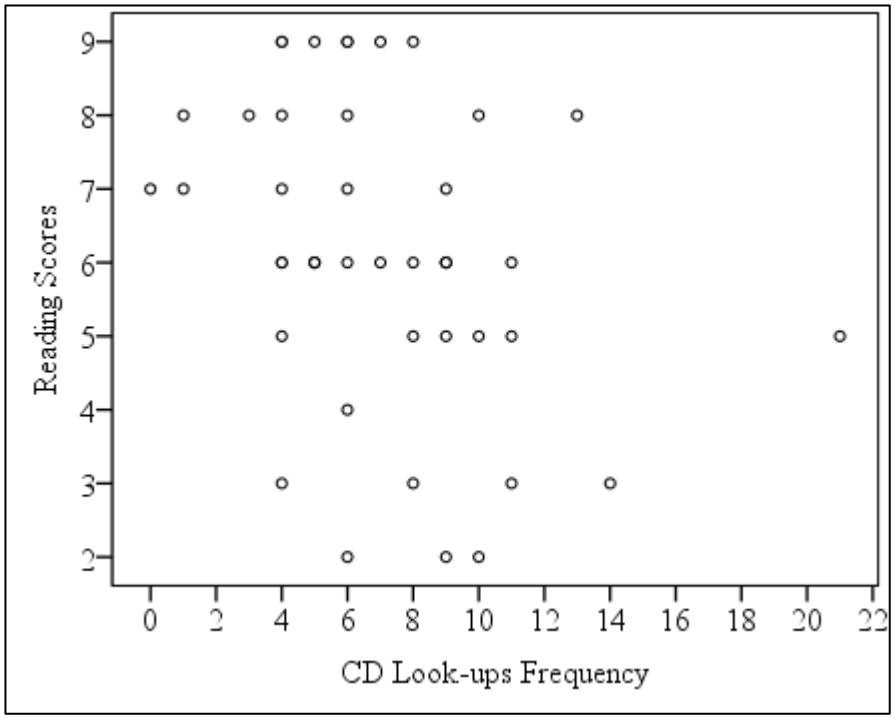

Figure 24. Scatterplot of CD lookup frequencies versus reading scores

According to the preceding figures (23 & 24), we notice that there is no linear relationship between the subjects' look-up frequencies and their reading scores as the data values in the graphs are scattered and do not seem to group together to form any kind of line. This means that no correlation exists between the subjects' lookup frequencies and their reading scores in PD and CD conditions and that the increase in the subjects' look-ups does not necessarily suggest an increase in their reading scores.

The research hypothesis which suggested that there would be a positive correlation between the subjects' look-up frequencies and their reading scores and that any increase or decrease in the subjects' lookups would affect their understanding of the reading passages is refuted.

Though not fulfilling the hypothesis made in this study, the obtained results are in line with what previous research has found on the effects of dictionary lookup frequency on reading comprehension scores.

5.5. Vocabulary Retention

Question Five examined whether there was any correlation between the type of the dictionary used and the degree of vocabulary retention. To examine if any dictionary type had an advantage over the other in endorsing the subjects' retention of consulted vocabulary during the pretest, the subjects' posttest retention scores in each type have been examined and compared against one another.

Table 12 reports on the scores of the subjects in the vocabulary retention posttests in PD and CD lookup conditions. Parallel box plots for the subjects' distribution of retention scores are illustrated in Figure 25. Descriptive statistics for the subjects' scores in vocabulary retention tests are set in Table 13.

Table 12 Subjects' Vocabulary Retention Posttest Scores

PD lookup group		**CD lookup group**	
Subjects	Retention scores	Subjects	Retention score
1	6	23	2
2	7	24	2
3	3	25	2
4	6	26	2
5	4	27	3
6	6	28	6
7	4	29	2
8	4	30	4
9	5	31	5
10	4	32	3
11	5	33	2
12	5	34	4
13	6	35	4
14	4	36	3
15	6	37	9
16	5	38	3
17	4	39	5
18	5	40	4
19	4	41	6
20	3	42	5
21	6	43	3
22	6	44	5

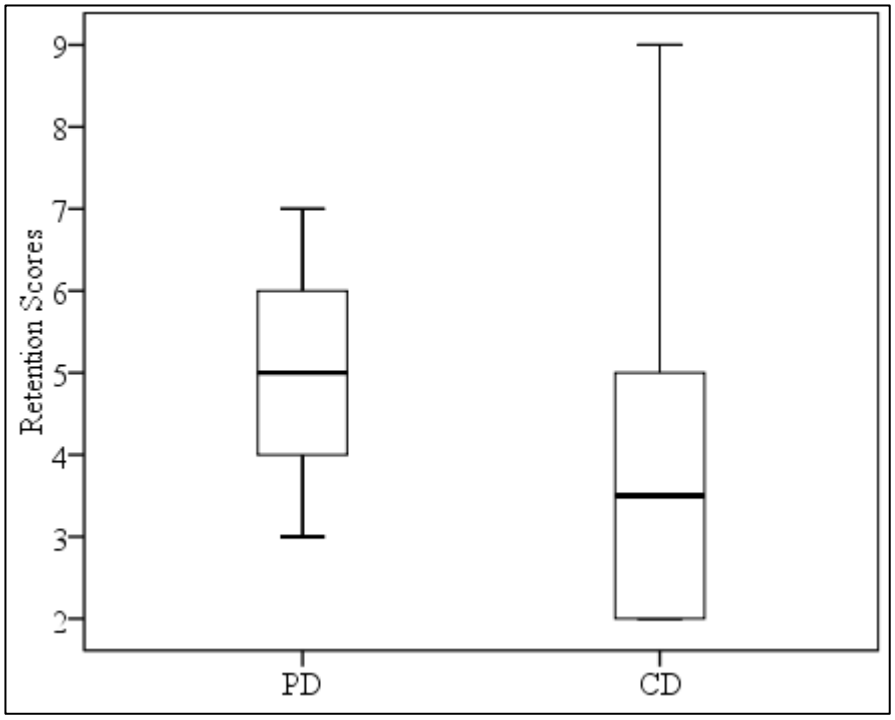

Figure 25. Parallel box plots for subjects' vocabulary retention scores

As shown in the parallel box plots in Figure 25, the subjects' vocabulary retention scores range from 2 all the way up to 9 points in the CD lookup condition. However, 75 % of these scores seem to fall in the lower part of the graph below 5 points, which means that there is a negative skew in the distribution of CD retention scores, as most of the scores seem to fall in the negative direction of scoring scale.

In addition, the whiskers in the CD box plot indicate that the subjects' retentions scores are highly dispersed amongst the high-performing quartile group of subjects who scored 5 to 9 points (long upper whisker), and are the same for the low-performing 25 % group of subjects who had the same retention score of 2 points each (hidden lower whisker).

Considering the information in the box plots, it may appear that the PD encouraged better retention than did the PD. However, the results are not exactly clear-cut as a portion of the two box plots overlap with each other. Therefore, we may not declare the PD the clear winner as we need a hypothesis test first to make that final determination.

Table 13 Descriptive Statistics for Subjects' Retention Scores

Descriptive statistics						
Variable	Total observations	Mean	Std. deviation	Minimum	Median	Maximum
PD	22	4.91	1.109	03	05	07
CD	22	3.82	1.763	02	03.5	09

As shown in Table 13, the subjects remembered 4.91 words on average in the PD condition and 3.82 words in the CD condition. Since each half of the subjects did only one test type, an independent-samples t-test was conducted to find out whether the difference in recall of words between the two test groups, CD and PD, is significant (See Table 14).

Table 14 Independent Samples T-test for Subjects' Retention Scores in PD and CD Conditions

Independent Samples Test										
		Levene's test for equality of variances		t-test for equality of means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
									Lower	Upper
Scores	Equal variances assumed	2.829	.100	2.457	42	**.018**	1.091	.444	.195	1.987
	Equal variances not assumed			2.457	35.365	.019	1.091	.444	.190	1.992

The results indicate that there was a significant difference in the vocabulary recall scores for PD (M=4.91, SD=1.109) and CD (M=3.82, SD=1.763) conditions; t (42) = 2.457, p = **0.018**, which is less than **0.05.** These results suggest that PD use really did have an effect on memory for words.

Specifically, our results suggest that when the subjects looked up words in a PD, their memory for words increased. The difference in word retention might be attributed to the effort and relatively longer search process involved in using the PD, which helps create deep memory traces of looked up vocabulary, unlike in the CD where the look up process is quick and effortless. The hypothesis which argued that the words looked up in the PD would be better retained than those looked up in the CD is validated. However, one question in regard to this is whether the subjects would have experienced differences in recall if the lookups had been performed during the reading in response to their self-directed attempts to comprehend the text.

5.6. Findings from Windows Title Operations Log Files

Analysis of the subjects' *Windows title operations* log files indicated that some of them exceeded the simple lookup activity while reading in the CD condition to use other search features and explore other functions embedded in the CD application (Figure 26). The log files in Figure 26 have been slightly edited to remove unnecessary information of the subjects' reading file activity and to keep only those Window title operation' records that are related to the subjects' CD activity.

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/28/2011 10:05:07

Smart thesaurus, 04/28/2011 10:05:18

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/28/2011 10:05:23

Extra Examples, 04/28/2011 10:05:28

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/28/2011 10:08:55

Smart thesaurus, 04/28/2011 10:09:07

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/28/2011 10:10:46

Verb Endings, 04/28/2011 10:10:53

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/28/2011 10:10:54

Extra Examples, 04/28/2011 10:10:55

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/28/2011 10:26:30

Smart thesaurus, 04/28/2011 10:26:39

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:12:29

Look Up | CALD3, 04/27/2011 13:13:45

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:13:51

Pictures | CALD3, 04/27/2011 13:16:26

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:16:51

Pictures | CALD3, 04/27/2011 13:17:59

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:19:41

Smart thesaurus, 04/27/2011 13:20:05

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:20:09

Smart thesaurus, 04/27/2011 13:20:58

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:21:03

Look Up | CALD3, 04/27/2011 13:21:05

Cambridge Advanced Learner's Dictionary - 3rd Edition, 04/27/2011 13:22:25

Pictures | CALD3, 04/27/2011 13:22:38

Figure 26. Sample log files of subjects' CD activity

As illustrated in the log files, it seems that some of the subjects were curious and could not resist the temptation not to explore other search functions and extra tools in the CD application like consulting the windows for *Pictures, Smart thesaurus, Extra Examples, Verb Endings,* and activating *the Look Up feature.* These CD features are briefly explained below.

The *Pictures* window contains an alphabetical list of all the pictures in the CD. The user may click a picture name in the panel on the left hand side to view the picture on the right (Figure 27). Once the picture is displayed, the user can do any of the following:

- Hover the mouse over the picture to see its name, and to see labels for parts of the picture, if appropriate.
- Click the name or one of the labels to view a dictionary definition in a separate window.
- Click *Show in main dictionary* to see the full entry in the Cambridge Advanced Learner's Dictionary window.

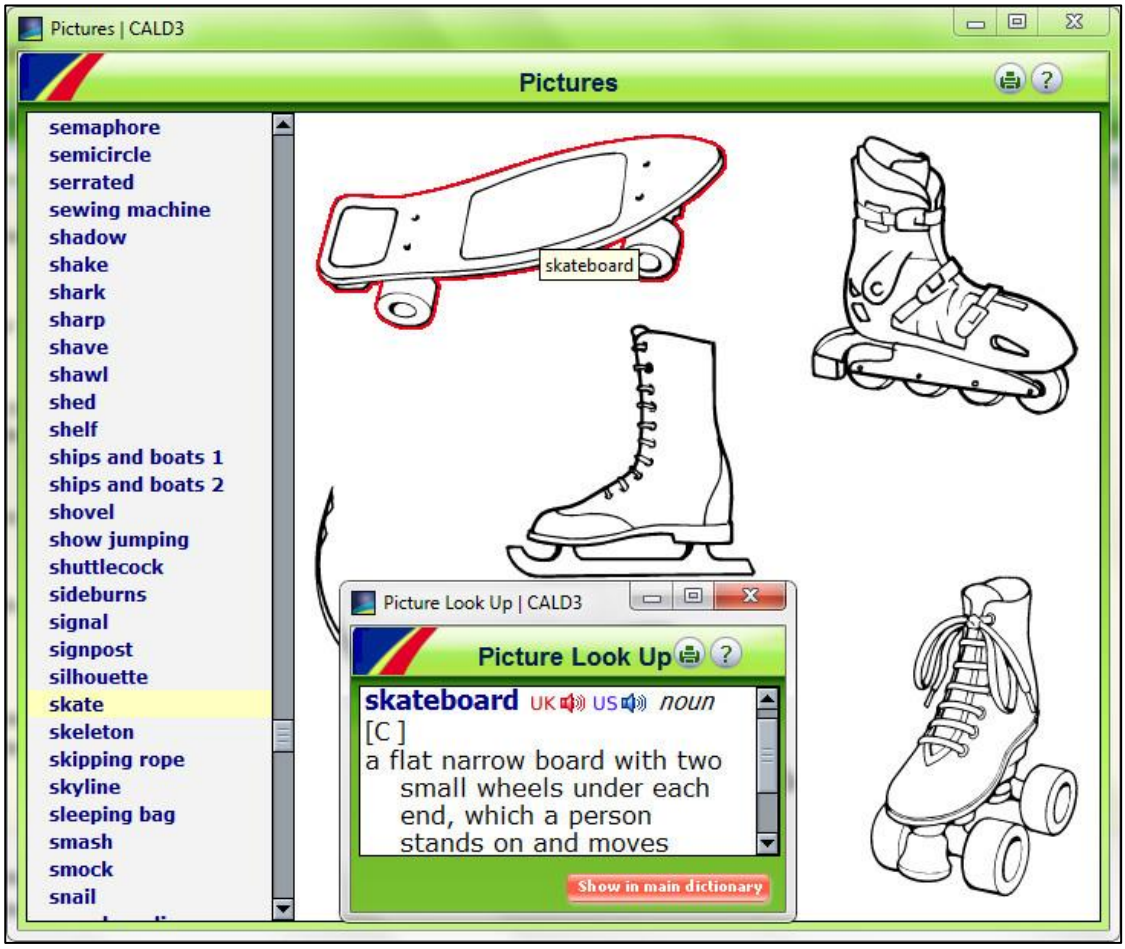

Figure 27. Pictures window in CD application

The *SMART thesaurus* contains synonyms and other related words for any entry in the CD. Using SMART thesaurus helps the user to understand more fully the meaning of the words he or she looked up, learn alternative words or phrases, and get to know more about a subject (Figure 28). The panel on the left shows all SMART thesaurus categories that contain or are related to the word the user looked up. For example, for the word ‘fast’ two categories are displayed, **Fast and rapid** and **Short in time**. The user should highlight a category to display all the words in that category on the right hand side of the window.

Figure 28. Smart thesaurus window in CD application

The user can choose to view just the words on the right hand side of the window, without their definitions, by clicking **View as list**. To display definitions again, the user should click **View full entries**.

The Extra Examples window provides further examples of entry use in context. The Verb Endings feature provides information about how to form any verb correctly in the present tense, past simple, and past participle (Figures 29 & 30).

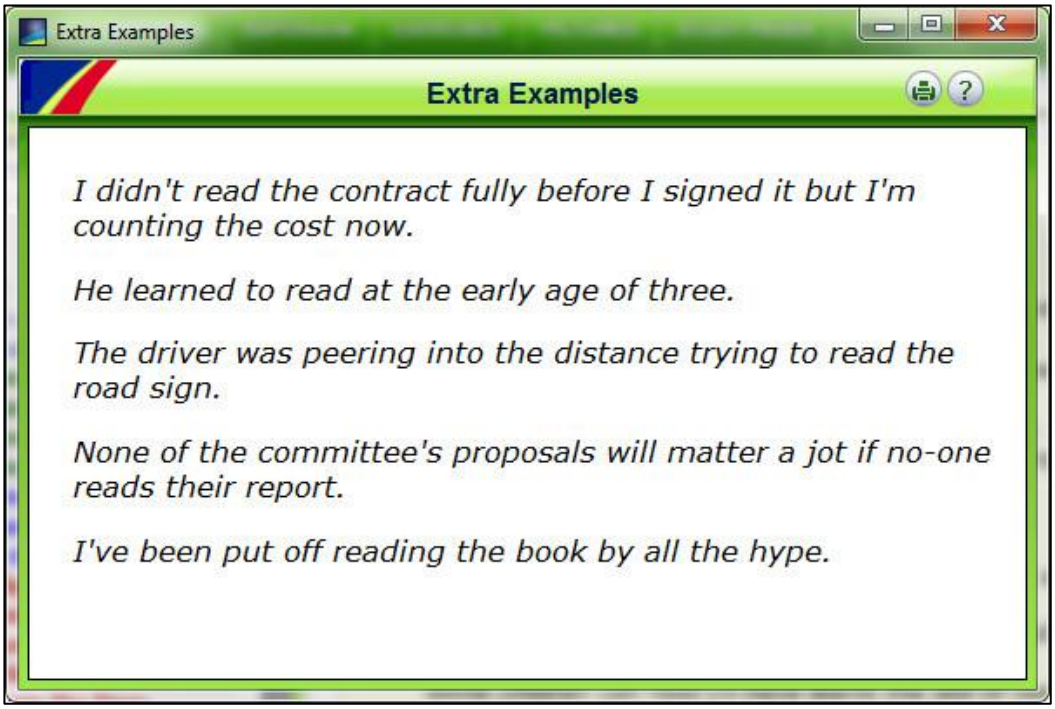

Figure 29. Extra Examples window in CD application

Figure 30. Verb Endings window in CD application

The *Look Up* feature recorded in the log file in Figure 26 means that the subject double-clicked on a word which is part of the definition of another word to learn about its meaning. The use of this feature has been recorded in a few log files of the subjects.

When using the CD, the subjects may not understand some words in the definitions. Thus, they may look up the meaning of the unknown word by double-clicking on it, which opens the Look Up window. The Look Up window provides a definition of the word, without the subjects having to close the window they were using. If they need more information about the word, they can see the full dictionary entry by clicking *Show in main dictionary* (Figure 31 on next page).

5.7. Findings from the CD Lookup History-List

Though I was hoping that the analysis of History-List information would reveal further lookup patterns, comparison of subjects' recorded lookups in the CD History-List with those recorded by the monitoring software did not yield any significant differences that should be mentioned. In addition, despite my clear instructions not to shut down the computers when finishing the reading tasks, a few subjects seem to have mistakenly switched their computers off, thereby closing the CD application and clearing its History-List.

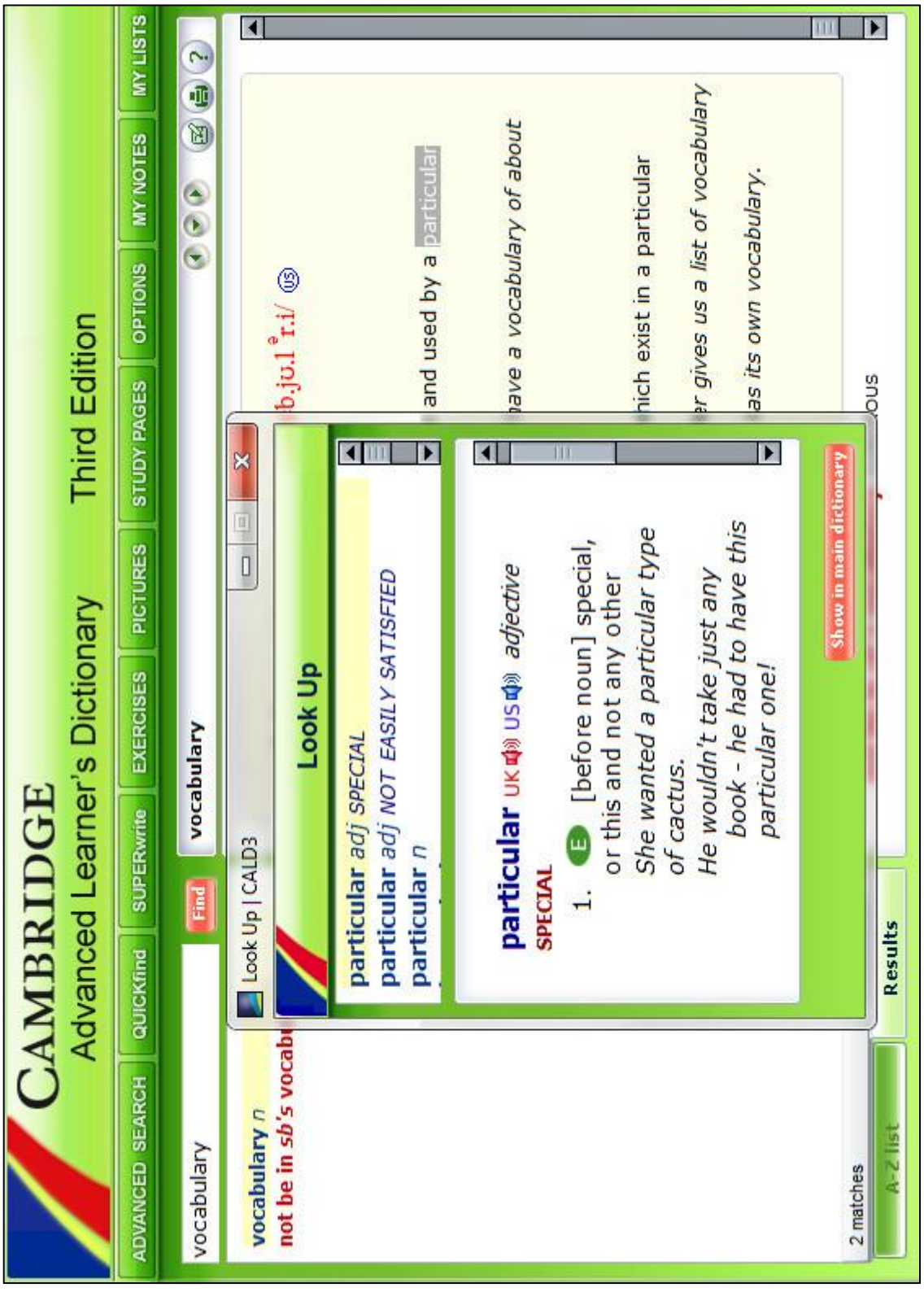

Figure 31. Look Up window in CD application

5.8. Pedagogical Implications

Although the findings from the present study arouse some concerns about CDs, as they appear to have influenced students' retention of looked up words negatively, this should not suggest that the use of CDs should be discouraged in L2 learning. Instead of discouraging CD use, teachers may advise their students to use a CD and a PD for different language skills, regarding each dictionary's pros and cons.

On the one hand, students could use CDs in reading, for instance, which may allow them to look up words and read more quickly and almost effortlessly. The speed of search in a CD may reduce interference as it helps students keep context in mind when they stop reading to look up a word. Similarly, the ease and speed involved in CD use may push students to develop a positive attitude towards electronic dictionary lookup and encourage them to have several CDs on their computers. Indeed, and based on my humble experience in using CDs of different titles, moving between several CDs on the computer screen to compare different definitions proved to be a good strategy to learn word meanings more precisely and effectively.

On the other hand, students could be encouraged to use a PD particularly in writing and vocabulary learning, as these tasks require students to deal with word spelling and grammatical or usage information more elaborately than they do while reading. In addition, findings from the present study and previous studies suggest that subjects tend to process information more carefully when they look up words in a PD,

which helps create deeper memory traces of looked up words. Therefore, PD use may help students learn meaning of words better, especially if they take notes, add annotations or highlight looked up vocabulary and information on PD pages. Indeed, frequent PD use should enhance spelling skills, writing, and vocabulary development.

Closely related to increasing students' motivation to read with access to a CD, and in view of the large number of subjects who expressed their satisfaction with the on-screen presentation of the reading passages employed in this study, another suggestion would be that teachers give their students reading material in computerized format rather than as handouts.

Teachers may survey their students' attitudes towards computerized reading material to see if they would feel comfortable and motivated to read them so often. In fact, this should not raise any objection as the vast majority of students tend to read through digital media more frequently nowadays. They browse the Internet on smartphones and tablets, and read electronic newspapers and interact with friends' comments and posts on social media for long hours. However, there may be students who would prefer to read texts on paper believing that it is more convenient especially when highlighting or underlying specific information in text. Interestingly, many text-processing and reading software allow readers to edit computerized text in a number of ways including adding annotations, highlighting and underlining relevant information (e.g. Microsoft Word, Adobe Acrobat XI Pro, Foxit Reader, etc.).

The advantage of getting students to read computerized texts with access to a CD is that it may encourage them to read so often especially if teachers recommend using the innovative lookup tools available in CDs like 'QUICKfind' in Cambridge Advanced Learner's Dictionary, and 'GENIE' in Oxford Advanced Learner's Dictionary.

QUICKfind and GENIE are special versions of their corresponding dictionaries which display as small windows and are designed to be used while reading on the computer screen, like when browsing the Internet, reading an email or Word and PDF documents. The most fascinating thing about these tools is that they have an automatic lookup feature that allows the user to simply point at a word with the cursor of the mouse to look it up in a dictionary. All that a user needs to do is to move the mouse cursor so that it is on the target word. If the word is available in the CD, the entry will automatically appear in the main window of QUICKfind or GENIE, and the user will even hear the pronunciation of the word if this option has been activated in the CD's Settings. For other programs, such as Mozilla Firefox or PDF readers, the user needs to double-click the target word and press the **Ctrl** key to look it up.

Indeed, QUICKfind and GENIE are highly convenient for on-screen reading as the user can drag their window to a corner of the computer screen where it will be out of their way while reading, but still available to use when needed (See Figure 32 on next page).

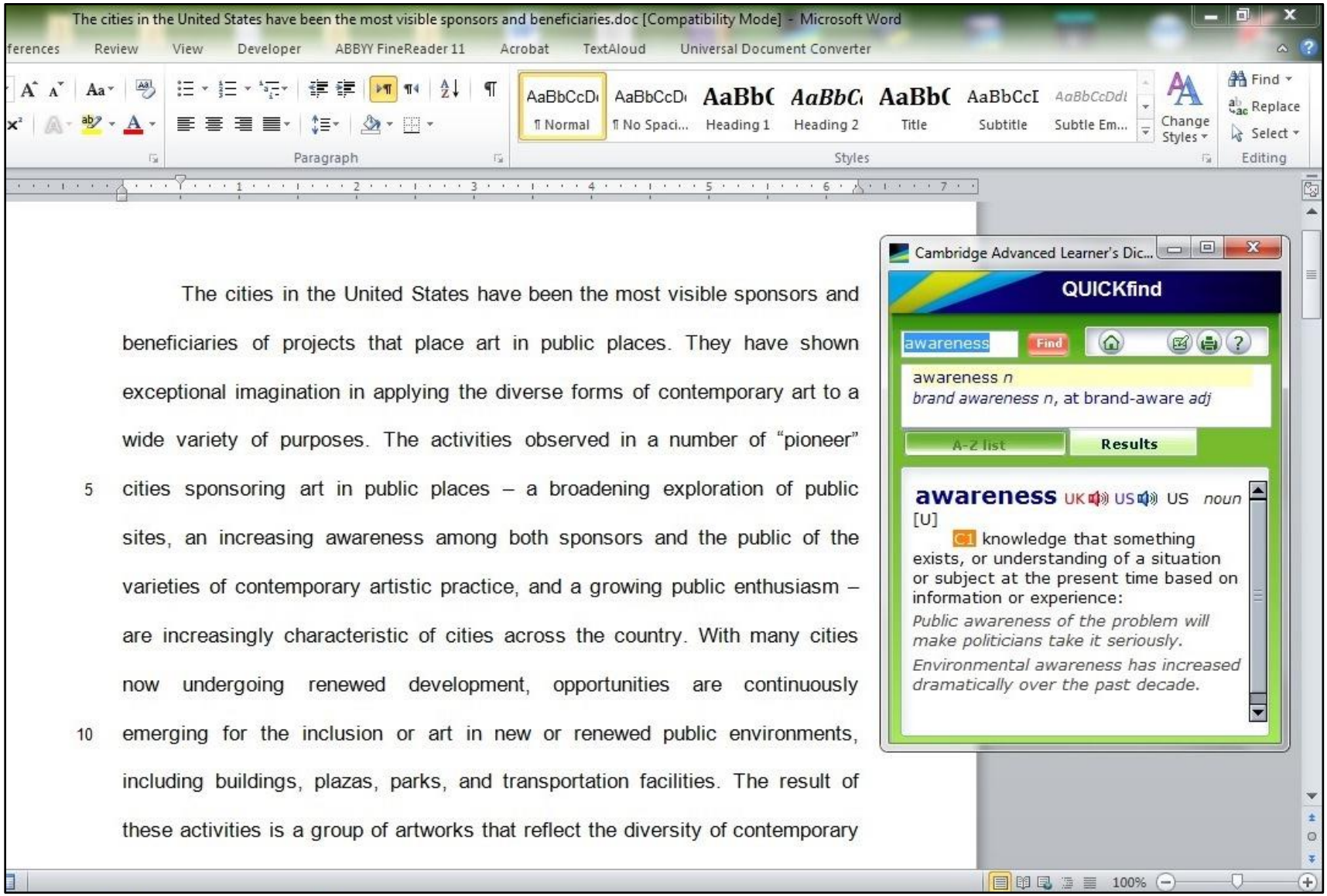

Figure 32. Using Quickfind feature while reading

This study also has implications on syllabus design. To the best of my knowledge, despite the fact that EFL students have become increasingly dependent on electronic reference materials, including CDs, dictionary use training that EFL students take as part of their 'Study Skills' module is still restricted to PD use only. Teachers and syllabus designers should refine the existing dictionary skills component so that it fits the new trends in language learning technologies and reference tools. In particular, CD use training should be incorporated into the 'Study Skills' module, whereas teachers and syllabus designers may devise the content of the CD training course using relevant information in the User's Guides or Help Files incorporated within the CDs themselves.

Indeed, there is a need that our students receive training in CD use, as having a CD installed on one's computer does not necessarily mean being able to use it effectively. However, such training should be more practical than theoretical in that students should be exposed to different titles and types of CDs so as to make them familiar with the different layout features and search specifications in each CD. Appropriate training would help students make the most of CDs.

Moreover, and bearing in mind the growing need of our students to use language learning technologies among them CDs, the department of English at Constantine University should equip its language laboratories with CDs of different titles and purposes like pronouncing dictionaries, collocations dictionaries and thesauri, etc. More importantly, once these laboratories have been equipped with CDs

and L2 learning software, they should be made accessible to students to help them boost their foreign language development.

In fact, the English Department at Mentouri Brothers University has four or five foreign language laboratories, of which two are really state-of-the-art. However, and to the best of my belief, these laboratories are rarely exploited as they should be, as most of teachers do not know how to make use of them, except a few IT-literate teachers. This is partially because teachers were not trained on how to use these facilities to improve their teaching, especially in classes that such laboratories should be used for like in oral communication and phonetics. As a result, the main purpose of these facilities has been altered to be used as ordinary classrooms where teachers give any class each now and then, and particularly when empty classrooms are not available.

Furthermore, as the use of smartphones and 3G networks has become very common in Algerian universities, teachers should encourage their students to have Android dictionary applications on their smartphones and use them in class whenever necessary, like when writing and reading, or in an oral communication class which usually calls for a lot of interaction and lively debates that may break and communication may fail if students could not express their views in good language as a result of not knowing the meaning of words or how to pronounce them and use them correctly.

Conclusion

This chapter outlined and discussed the findings of the present study as a result of the data analysis phase. On the basis of these findings, some interesting pedagogical implications for CD use in EFL teaching and learning were outlined and will hopefully benefit teachers and learners alike to make the most of L2 technology. The next final section will summarize the whole study and raise some methodological issues and limitations that impacted its design. A few recommendations and suggestions for future research will also be presented in this section. Finally, the testing instruments employed in the study as well as the subjects' detailed scores regarding the research variables will be given in the final appendices.

General Conclusion

General Conclusion

In the present study, I attempted to examine the effects of using printed dictionaries compared to CD-ROM ones on reading comprehension and vocabulary retention of a group of Algerian EFL students. In fact, although a large proportion of our students seem to heavily depend on electronic dictionaries of all kinds to deal with vocabulary, no empirical research investigating their potential effects on L2 learning could be found in the Algerian context. This perception, in addition to my keen interest in electronic dictionaries and language learning technologies in general, have been an inspiration that prompted me to conduct this research.

The subjects who took part in this study were 44 EFL sophomores studying at the English Department at Mentouri Brothers University- Constantine 1. They completed two reading tasks on computer screen: using a CD at one time and a PD at another. I used a piece of monitoring software installed on the subjects' computers to record their lookups in the CD reading condition and to take notes of the exact time they needed to finish the reading tasks in both conditions.

In the first reading session, the subjects read a text and answered comprehension questions with access to a CD, and without them being aware that their lookups were being recorded. A week later, they read another text and answered comprehension questions but using a PD. However, they were requested to enter their lookups during reading in a box included in the text itself. A series of paired-samples

t-tests were then conducted to examine if there were any statistically significant differences between the two conditions regarding reading time, reading scores, and lookup frequency. Pearson's correlation coefficient was also computed to examine whether there was any kind of correlation between the subjects' lookup frequencies and their reading scores.

As for the vocabulary retention variable, I administered a pretest and a posttest to the subjects in PD and CD lookup conditions. In the pretest, each half of the subjects (i.e. 22 subjects) read sentences and supplied definitions for ten supposedly-unknown words using either a PD or a CD. However, they were not informed that a vocabulary retention test would be given regarding the words looked up in the pretest. A week later, they were given a sudden posttest to measure their retention of the words they had looked up a week earlier. Yet, the subjects did not use any dictionary type but only relied on their memory. An independent-samples t-test was then conducted to compare the subjects' recall of words in the two conditions.

On the whole, the findings from this study are in line with the ones of previous similar studies investigating the effects of electronic dictionary use on L2 learning. These results suggest that CD use really did have an effect on reducing reading time, as the subjects managed to finish reading in significantly less time with access to the CD than with the PD ($p = \mathbf{.000}$). This reflects the longer time needed to read a passage using a PD, compared to the CD which seemed to have eased and accelerated the reading tasks considerably, thereby alleviating the effort needed to read long texts.

The findings also indicate that CD use was more motivating and exciting to the subjects and thus encouraged them to look up significantly more words while reading (p = **.043**). Indeed, searching through PD pages to look up a word would naturally require more time than simply keying the word in the CD search space and hitting the 'Find' button. Thus, the subjects might have been unwilling to use their PDs so often while reading. However in the CD, the ease and speed of search seemed to have stimulated them to look up as many words as they wanted.

However, the results from this study do not provide substantial evidence that dictionary type affects text comprehension, as the subjects' performance in reading was fairly the same regardless of the type of dictionary they used (p = **.390**). Similarly, the findings indicate that no correlation whatsoever exists between the subjects' lookup frequencies and their reading scores in PD and CD conditions, and that the increase in the subjects' look-ups does not necessarily suggest and increase in their reading scores (*r* = **- 0.129, - 0.338**).

With regard to vocabulary retention, the results suggest that PD use had a positive effect on the subjects' recall of words. On the other hand, significantly lower recalls were found on lookups performed with access to CD (p = **0.018**). This difference in word retention could be attributed to the relatively longer search process involved in using the PD which appears to have helped the subjects process lexical items more elaborately, thereby creating strong memory traces of looked up vocabulary which ultimately led to better retention; unlike the case with the CD, in

which the quick and almost effortless lookup process could have resulted in the looked up words being shallowly processed and thus not retained for a long time.

While readers of the present study might have suggested that post-questionnaires should have been administered to the participants to understand their background in reading and dictionary use, and to explore their attitudes towards the dictionaries they used throughout the tests, I did not consider using this investigative technique (i.e. questionnaire) because it was neither appealing nor suitable in view of the underlying research objectives. In addition, the reliability of questionnaire responses to elicit data could be questioned, especially if administered to students who are unaware of the importance and real value of giving truthful responses.

I adopted this premise based on my previous experience using questionnaires in a similar research work, as the majority of informants gave false impressions to appear somewhat better and ideal, on the contrary of their actual performance which proved otherwise; thereby revealing inverse correlations between the informants' perceptions and their real behavior and performance.

It was eventually evident that using questionnaires as an investigative technique does not yield very reliable results, particularly if administered to students. Seemingly, not using a questionnaire in this study is a reason why this dissertation is not voluminous, as incorporating a questionnaire would have entailed a lengthy qualitative analysis and in-depth discussion.

Limitations of the Study

I experienced a few research setbacks in the course of doing this study. Some were due to potential methodological shortcomings on my part, while others could be attributed to unwanted circumstances and stressful conditions surrounding the data collection process, which were beyond my control. However, any similar research work could have gone through such setbacks and limitations. The present study is limited in a number of ways:

1. While computer monitoring and experiments tend to produce accurate and objective data, these methods are not free from limitations. A major drawback of computer monitoring is its inability to record the learners' strategic dictionary lookup behavior. In addition, experiments create more or less artificial learning conditions. Therefore, the students' awareness of participating in a study may cause them to act differently, and in many cases perform better than they would actually do in ordinary situations.
2. This study examined only 44 Algerian students studying English as a foreign language at the same university. This sample size is not large enough to make the findings of this study applicable to other students in similar contexts. Therefore, the dictionary use behavior of the subjects may not have been typical of Algerian university students. Due to time constraints and bureaucratic hindrances in the department of English, I could not implement a systematic sampling method to

obtain a sample that is representative of sophomore students. The methodological decision of the sample size was motivated by pure pragmatic considerations since the students who took part in the study were regularly taking classes with me in the same computer laboratories where the present study took place.

3. This study did not assess the overall English proficiency level of participants before administering the reading and vocabulary tests. I assumed that the class study level could serve as a fairly reliable indicator to accept that the two groups participating in the study were equivalent in terms of language proficiency.
4. Due to the gender imbalance in the group of participants who took part in this study (14 males, 30 females), the issue of gender as a factor that may influence the study's results was not considered.
5. The vocabulary posttest was administered only a week after the pretest. Due to time limits, I could not administer another set of vocabulary tests a few weeks after the pretests in order to examine how words were retained over a longer period of time.
6. Unfortunately, I went through a few bureaucratic obstacles in the course of conducting this study, as at times I could not even have access to the language laboratories to set up the computers and get everything prepared. These unfair practices, though dampened my spirits and enthusiasm many times, have pushed me to move forward to complete this study.

Suggestions for Further Research

Since the current study is likely amongst the first of its kind in the Algerian context, similar studies are needed to generate more understanding in this interesting area of electronic dictionary use. Such studies may consider changing the setting, population, or data collection methods.

As the current study examined only a small sample of Algerian EFL students studying in the same department at the same university, conducting similar research with a bigger sample of learners of English with different backgrounds and from different departments, universities and even high schools across the country may exhibit patterns of dictionary use that are totally different from what the present study has found, thereby drawing a more typical and reliable profile of Algerian learners of English as users of CDs. In addition, instead of administering questionnaires to students while being suspicious of them giving misleading responses, similar studies may better consider surveying teachers' attitudes towards their students using electronic dictionaries in class, to find out whether they would have positive or negative views on their use and to explore the reasons for any potential objections. Teachers are in a better position to give accurate and insightful feedback as they are supposed to be more knowledgeable in pedagogy and L2 teaching and learning practices. Moreover, while the present study employed a simple piece of monitoring software and written log files to explore the subjects' reading and lookup behaviour, future studies may consider using specific screen-recording programs to video-tape

the subjects' behavior instantly as they interact with the reading passages and the CD on the computer screen, and without them even being aware that their activity on the computer screen is being recorded.

In fact, numerous desktop-recording programs have appeared on the Internet recently, such as Camstudio, FastStone Capture, Mirillis Action!, etc. (Figures 33 & 34). These computer programs make it possible to record all the activities performed on a computer screen including speech from microphone or sound from computer speakers, mouse movements and clicks; and save all the activities into high-quality video files in WMV, AVI, or MP4 formats for later playback and review.

Figure 33. 'FastStone Capture' screen-recorder

Figure 34. 'Mirillis Action!' screen-recorder

Indeed, analysis of subjects' video-taped CD lookup behaviour while reading may exhibit lookup strategies still uncovered in the present study. For instance, future studies may consider analyzing the patterns that subjects follow when they toggle between the CD and the reading passage' windows on the computer screen, which

may help explore any specific patterns of interaction between the two activities (i.e. reading and CD lookup).

Similarly, analysis of subjects' mouse cursor movement and activity over the reading passage and search results in the CD search window may also reveal hidden patterns of CD lookup strategies that the present study could not uncover, like how the subjects end up looking up a given word, what part of an entry they read in the search results, how long do they spend looking up a given word, and what extra features they consult in a CD, etc.

Unfortunately, I did not know that such screen-recording software would exist until more than one full year after the data for this study were collected; otherwise, I would have used a computer desktop-recorder instead to videotape my subjects' reading and CD lookup activity, which would have absolutely enriched the analysis and discussion in this thesis.

Moreover, future studies may replicate this study to investigate the effects of using some CD features on other aspects of L2 learning like writing and speaking. For instance, further studies may consider analyzing the quality of students' written production as a result of using specific CD tools like 'SUPERwrite' in Cambridge Advanced Learner's Dictionary, and 'iWriter' in Oxford Advanced Learner's Dictionary.

The Cambridge SUPERwrite is a small, specially-designed version of its dictionary which shows the user only the dictionary's most important information for writing such as Extra Examples, Common Learner Errors, Collocations, Verb Endings, and SMART thesaurus (Figure 35). As such, this tool is suggested to help students choose the right word and avoid the mistakes that many learners make while writing. Interestingly, the small size of the SUPERwrite window makes it so convenient and easy to move around while the user is writing on the computer.

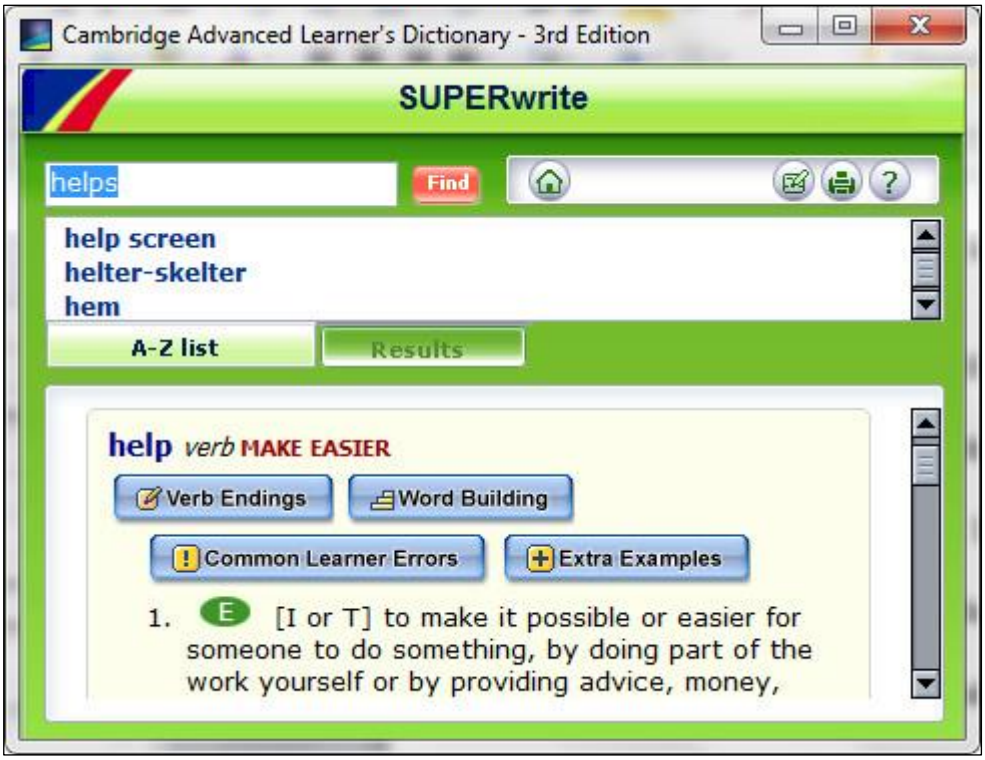

Figure 35. SUPERwrite tool in Cambridge Advanced Lerner's Dictionary

Likewise, the Oxford iWriter (Figure 36 on next page) is an interactive tool that is suggested to help students write more effectively in English. It provides models of fourteen different types of writing as well as the key features of each. This tool also

provides outline structures or frameworks for all the different types of writing, into which a student can add their own content. For comparison and argumentative essays, there are extra frameworks that allow the student to structure their own essay in a slightly different way from the model essays. As proposed in this tool's Guide File, iWriter helps students to plan, write, and check their own written production.

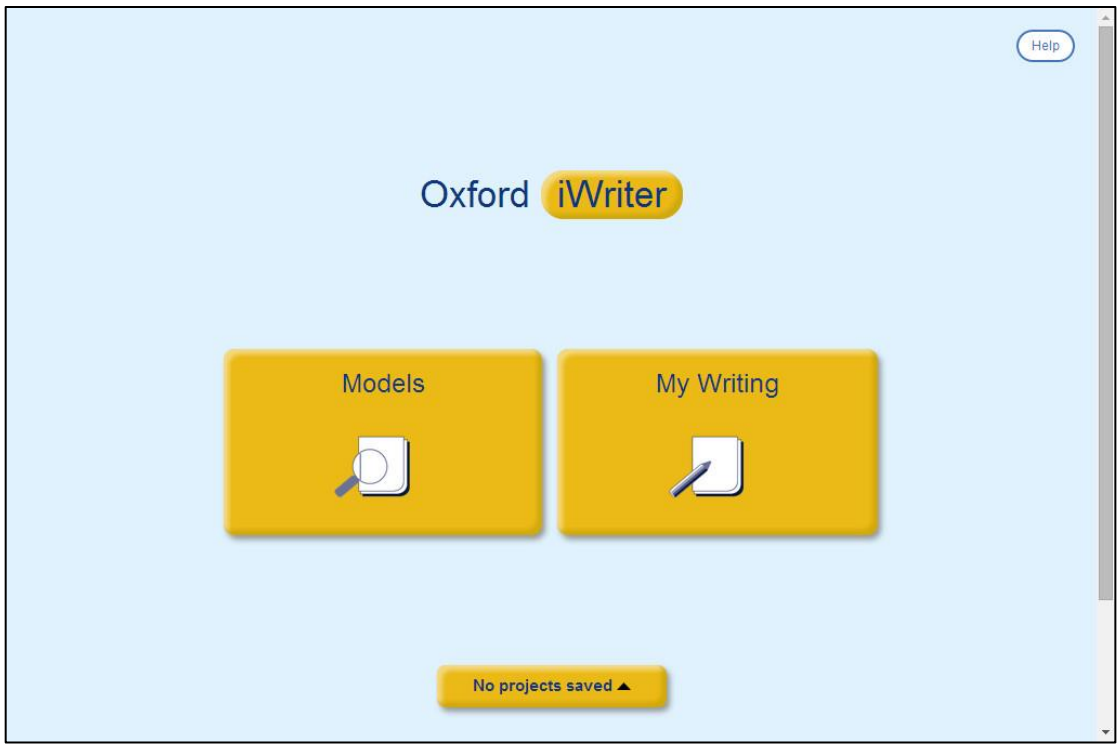

Figure 36. iWriter main window in Oxford Advanced Learner's Dictionary 9th ed

Moreover, another innovative tool that could help improve learners' speaking ability in English is the Oxford iSpeaker (Figure 37). It is a new interactive feature in Oxford Advanced Learner's Dictionary 9th Edition, specially designed for learners of English who want to speak more accurately and fluently in a variety of situations. It is divided into four sections, each with a focus on a different element of spoken English.

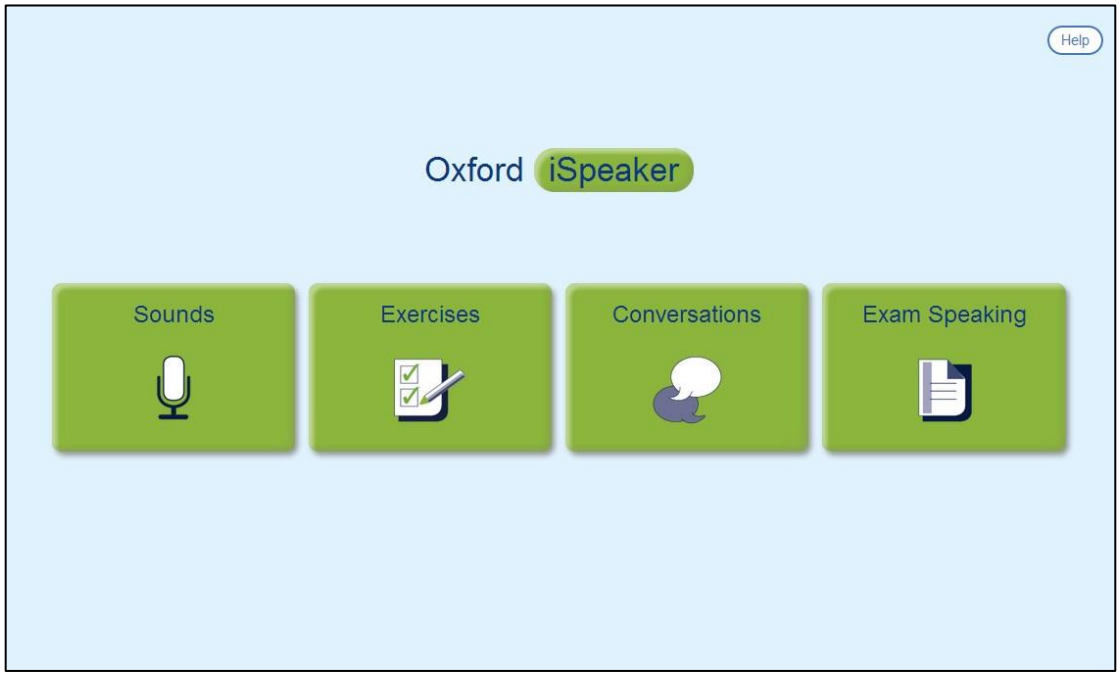

Figure 37. iSpeaker main window in Oxford Advanced Learner's Dictionary 9th ed

In *Sounds,* learners can learn and practice the vowel and consonant sounds of English words. The *Exercises* section allows practicing aspects of pronunciation, such as sounds and spelling, word stress and syllables. In *Conversations*, learners can learn and practice useful phrases that are often used in everyday English. The *Exam Speaking* section contains a variety of tasks which basically appear in English speaking exams. Another interesting thing about this tool is that learners are free to focus on British or American English.

Overall, further research needs to be conducted on the potential effects of these tools (SUPERwrite, iWriter & iSpeaker) on students' writing and speaking skills before we can make any final judgment about their usefulness. Researchers interested

in L2 innovations for language learners are highly advised to investigate the potentials that such media could have for developing L2 skills.

Finally, although the present study did not consider gender as an element that might have influenced the study's results, it is possible that gender is an influential factor. Therefore, it would be interesting if similar studies repeat the experiments on gender-balanced groups to examine similarities and differences between male and female students regarding performance in reading comprehension, recall of vocabulary, or in any other L2 related tasks.

List of References

List of References

Adams, J. A. (1980). Failures to comprehend and levels of processing in reading. In R. C. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), *Theoretical issues in reading comprehension* (pp. 11-31). Hillsdale, NJ: Erlbaum.

Akbulut, Y. (2007). Effects of multimedia annotations on incidental vocabulary learning and reading comprehension of advanced learners of English as a foreign language. *Instructional Science, 35*(6), 499-517.

Al-Hadlaq, M. (2003). *Retention of words learned incidentally by Saudi EFL learners through working on vocabulary learning tasks constructed to activate varying depths of processing. (Unpublished doctoral dissertation).* Ball State University: United States.

Al-Otaibi, G. (2011). *The effect of using computer-assisted semantic mapping on nursing students' reading comprehension of medical texts and vocabulary increase at King Saud university (Unpublished master's thesis).* King Saud University.

Al-Seghayer, K. (2001). The effects of multimedia annotation modes on L2 vocabulary acquisition: A comparative study. *Language Learning and Technology, 5*(1), 202-232.

American psychological association. (2010). *Publication manual of the American psychological association-6th ed.* Washington, DC: American psychological association.

Anderson, P., & Freebody, R. (1981). Vocabulary knowledge. In J. T. Guthrie (Ed.), *Comprehension and teaching: Research reviews* (pp. 77-117). Newark: International Reading Association.

Atkins, B., & Varantola, K. (1997). Monitoring dictionary use. *International Journal of Lexicography, 10*(1), 1-45.

Aust, R., Kelley, M. J., & Roby, W. (1993). The use of hyper-reference and conventional dictionaries. *Educational Technology Research and Development, 41*(4), 63-73.

Baalbaki, R. (1995). *AL-MAWRID: A modern Arabic-English dictionary.* Beirut: Dar El-Ilm Lilmalayin .

Baxter, J. (1980). The dictionary and vocabulary behavior: A single word or a handful? *TESOL Quarterly, 14*(3), 325-336.

Béjoint, H. (1981). The foreign students' use of monolingual English dictionaries: A study of language needs and reference skills. *Applied Linguistics, 2*(3), 202-222.

Bejoint, H. (2000). *Modern lexicography: An introduction.* Oxford: Oxford University Press.

Bensoussan, M. (1983). Dictionaries and tests of EFL reading comprehension. *ELT Journal, 37*(4), 341-345.

Bensoussan, M., Sim, D., & Weiss, R. (1984). The effect of dictionary usage on EFL test performance compared with student and teacher attitudes and expectations. *Reading in a Foreign Language, 2*(2), 262-276.

Bergenholtz, H., & Johnsen, M. (2005). Log files as a tool for improving internet dictionaries. *Hermes, Journal of Linguistics, 34*, 117-141.

Bogaards, P. (1996). Dictionaries for Learners of English. *International Journal of Lexicography, 9*(4), 277-320.

Carrell, P. L. (1983). Some issues in studying the role of schemata, or background knowledge, in second language comprehension. *Reading in a Foreign Language, 1*(2), 81-92.

Chan , A. Y. (2005). Tactics employed and problems encountered by university English majors in Hong Kong in using a dictionary. *Applied Language Learning, 15*(1-2), 1-27.

Chen, Y. (2010). Dictionary use and EFL learning: A contrastive study of pocket electronic dictionaries and paper dictionaries. *International Journal of Lexicography, 23*(3), 275-306.

Chen, Y. (2011). Studies on bilingualized dictionaries: The user perspective. *International Journal of Lexicography, 24*(2), 161-197. doi:10.1093/ijl/ecr002

Chon, Y. V. (2008). The electronic dictionary for writing: A solution or a problem? *International Journal of Lexicography, 22*(1), 23-54. doi:10.1093/ijl/ecn034

Cohen, L., & Manion, L. (1994). *Research methods in education.* London & New York: Routledge.

Cowie, A. P. (1999). *English dictionaries for foreign learners: A history.* Oxford: Oxford University Press.

Crystal, D. (1986). The ideal dictionary, lexicographer and user. In R. Ilson (Ed.), *Lexicography: An emerging international profession* (pp. 72-81). Manchester: Manchester University Press.

De Schryver, G.-M. (2003). Lexicographers' dreams in the electronic-dictionary age. *International Journal of Lexicography, 16*(2), 143-199.

Diab, T. A., & Hamdan, J. M. (1999). Interacting with words and dictionaries: The case of Jordanian EFL learners. *International Journal of Lexicography, 12*(4), 281-305.

Fan, M. Y. (2000). The dictionary look-up behavior of Hong Kong students: A large-scale survey. *Educational Journal, 28*(1), 123-138.

Fan, M. Y. (2003). Frequency of use, perceived usefulness, and actual usefulness of second language vocabulary strategies: A study of Hong Kong learners. *The Modern Language Journal, 87*(2), 222-241.

Flynn, M. H. (2007). *Electronic dictionaries, printed dictionaries and no dictionaries: The effects on vocabulary knowledge and reading comprehension (Unpublished Master Thesis).* Edgbaston, Birmingham.

Fraser, C. A. (1999a). Lexical processing strategy use and vocabulary learning through reading. *Studies in Second Language Acquisition, 21*, 225-241.

Fraser, C. A. (1999b). The role of consulting a dictionary in reading and vocabulary learning. *Canadian Journal of Applied Linguistics, 2*(1-2), 73-89.

Garcia, A. F. (2011). Beyond L1-L2 equivalents: Where do users of English as a foreign language turn for help? *International Journal of Lexicography, 24*(1), 97-123. doi:10.1093/ijl/ecq038

Golden eye (version 4.50) Computer software. (n.d.). Retrieved from http://www.monitoring-spy-software.com

Goyette, E. S. (1995). *The effects of dictionary usage on text comprehension. (Unpublished doctoral thesis).* Montreal: McGill University.

Gu, Y., & Johnson, R. K. (1996). Vocabulary learning strategies and language learning outcomes. *The Modern Language Learning, 46*(4), 643-679.

Hanks, P. (1987). Definitions and explanations. In J. Sinclair (Ed.), *Looking up: An account of the COBUILD Project in lexical computing and the development of the Collins COBUILD English language dictionary* (pp. 116-136). London: Collins ELT.

Harmer, J. (1991). *The practice of English language teaching.* Longman.

Hartmann, R. K. (n.d.). Four perspectives on dictionary use: A critical review of research methods. In A. Cowie (Ed.), *The dictionary and the language learner* (pp. 11-28). Tübingen: Max Niemeyer Verlag.

Hartmann, R. R. (1999a). What is 'dictionary research?' [Review of the book Worterbuchforschung, by H. E. Wiegand]. *International Journal of Lexicography, 12*(2), 155-161.

Hartmann, R. R. (1999b). [Thematic report 2] Case study: The Exeter University survey of dictionary use. In R. K. Hartmann (Ed.), *Dictionaries in language learning. recommendations, national reports and thematic reports from the TNP Sub-Project 9: Dictionaries* (pp. 36-52). Retrieved from www.fu-berlin.de/elc/TNPproducts/SP9dossier.doc

Hartmann, R. R. (2001). *Teaching and researching lexicography.* Harlow: Pearson Education.

Hartmann, R. R. (Ed.). (2003). *Lexicography- Critical concepts: dictionaries, compilers, critics and users.* London: Routledge.

Hartmann, R. R. (Ed.). (2003). *Lexicography: Critical concepts.* Routledge.

Hartmann, R. R., & James, G. (1998). *Dictionary of lexicography.* London and New York: Routledge.

Harvey, K., & Yuill, D. (1997). A study of the useof a monolingual pedagogical dictionary by learners of English engaged in writing. *Applied Linguistics, 18*(3), 253-278.

Hayati, M., & Fattahzadeh, A. (2006). The effect of monolingual and bilingual dictionaries on vocabulary recall and retention of EFL learners. *The Reading Matrix, 6*(2), 125-134.

Hazenberg, S., & Hulstijn, H. J. (1996). Defining a minimal receptive second language vocabulary for non-native university students: An empirical investigation. *Applied Linguistics, 17*(2), 145-163.

Heaton. , J. B. (1975). *Writing English Language Tests.* London and New York: Longman.

Hughes, A. (1989). *Testing for Language Teachers.* Cambridge: CUP.

Hulstijn, J. H. (1993). When do foreign-language readers look up the meaning of unfamiliar words?: The influence of task and learner variables. *The Modern Language Journal, 77*(2), 139-147.

Hulstijn, J. H. (2001). Intentional and incidental second-language vocabulary learning: A reappraisal of elaboration, rehearsal, and automaticity. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 258-286). Cambridge: Cambridge University Press.

Hulstijn, J. H., & Atkins, B. S. (1998). Empirical research on dictionary use in foreign-language learning: Survey and discussion. In B. S. Atkins (Ed.), *Using dictionaries. Studies of dictionary use by language learners and translators* (pp. 7-19). Tübingen: Niemeyer.

Hulstijn, J., Holl, M., & Greidanus, T. (1996). Incidental vocabulary learning by advanced foreign language students: The influence of marginal glosses, dictionary use, and reoccurrence of unknown words. *The Modern Language Journal, 80*, 327-339.

Jakubowski, M. (2001). *The use of dictionaries by high school learners: The place of the monolingual and bilingual dictionary in the learning process (Unpublished master's thesis).* Adam Mickiewicz University.

Jones, F. (1995). Learning an alien lexicon: A teach yourself case study. *Second Language Research, 11*(2), 95-111.

Karp, A. (2002). *Modification of glosses and its effect on incidental L2 vocabulary learning in Spanish (Unpublished doctoral dissertation).* University of California.

Kirkness, A. (2004). Lexicography. In A. Davis , & C. Elder (Eds.), *The handbook of applied linguistics* (pp. 54-81). Malden, MA: Blackwell.

Kisito, F. (2007, June 25). *Electronic dictionaries in ESL/EFL learning*. Retrieved from www.eslHQ.com.

Knight, S. (1994). Dictionary use while reading: The effects on comprehension and vocabulary acquisition for students of different verbal abilities. *The Modern Language Journal, 78*, 285-299.

Koga, Y. (1995). The effectiveness of using an electronic dictionary in second language reading. *Bulletin of the Liberal Arts of Hiroshima University, 44*, 239-244.

Koren, S. (1997). Quality versus convenience: Comparison of modern dictionaries from the researcher's, teacher's and learner's points of view. *TESL-EJ2, 3*(2), 1-16. Retrieved from http://www-writing.berkley.edu/TESL-EJ/ej07/a2.html.

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. (2007). Does look-up frequency help reading comprehension of EFL learners? Two empirical studies of electronic dictionaries. *CALICO Journal, 25*(1), 110-125.

Koyama, T., & Takeuchi, O. (2004a). Comparing electronic and printed dictionaries: How the difference affected EFL learning. *JACET Bulletin, 38*, 33-46.

Koyama, T., & Takeuchi, O. (2004b). How look-up frequency affects EFL learning? An empirical study on the use of hand-held electronic dictionaries. *Proceedings of CLaSIC 2004*, (pp. 1018-1024). Retrieved from http://kuir.jm.kansai-u.ac.jp/dspace/bitstream/10112/5189/1/KU-1100-200400.pdf

Laufer, B. (1992). How much lexis is necessary for reading comprehension? In H. Bejoint, & P. Arnaud (Eds.), *Vocabulary and applied linguistics* (pp. 126-132). london: Macmillan.

Laufer, B. (2011). The contribution of dictionary use to the production and retention of collocations in a second language. *International Journal of Lexicography, 24*(1), 29-49. doi:10.1093/ijl/ecq039

Laufer, B. (2013). Lexical thresholds for reading comprehension:What they are and how they can be used for teaching puroposes. *TESOL Quarterly, 47*(4), 867-872.

Laufer, B., & Hill, M. (2000). What lexical information do L2 learners select in a CALL dictionary and how does it affect word retention? *Language Learning & Technology, 3*(2), 58-76.

Laufer, B., & Kalovski, G. C. (2010). Lexical threshold revisited: Lexical text coverage, learners' vocabulary size and reading comprehension. *Reading in a Foreign Language, 22*(1), 15-30.

Laufer, B., & Kimmel, M. (1997). Bilingualised dictionaries: How learners really use them. *System, 25*(3), 361-369.

Laufer, B., & Melamed, L. (1994). Monolingual, bilingual and 'bilingualised' dictionaries: which are more effective, for what and for whom? *EURALEX 1994 Proceedings* , (pp. 565-576).

Law, W.-o. (2009). *Translation students' use of dictionaries: A Hong Kong case study for Chinese to English translation (unpublished doctoral thesis).* University of Durham.

Leffa, J. V. (1992). Reading with an electronic glossary. *Computers and Education, 19*(3), 285-290.

Lew, R. (2000). Questionnaires in dictionary use research: A reexamination. In A. Braasch, & C. Povlsen (Ed.), *Proceedings of the 10th EURALEX International Congress. 1*, pp. 267-271. Copenhagen: Center for Sprogteknologi, Copenhagen University.

Lew, R. (2004). *Which Dictionary for Whom? receptive use of bilingual, monolingual, and semi-bilingual dictionaries by Polish learners of English.* Poland: Motivex.

Lew, R. (2011). Studies in dictionary use: Recent developments. *International Journal of Lexicography, 24*(1), 1-4. doi:10.1093/ijl/ecq044

Luppescu, S., & Day, R. R. (1993). Reading, dictionaries, and vocabulary learning. *Language Learning, 43*(2), 263-287.

McCarthy, M. (1990). *Vocabulary.* Oxford: Oxford University Press.

McCreary, D. R., & Dolezal, F. T. (1999). A study of dictionary use by ESL students in an American university. *International journal of lexicography, 12*(2), 107-175.

McKay, P. (2006). *Assessing young language learners.* Cambridge: Cambridge University Press.

Midlane, V. (2005). *Students' use of portable electronic dictionaries in the EFL/ESL classroom; a survey of teacher attitudes (Unpublished master thesis).* University of Manchester.

Nation, I. S., & Coady, J. (1988). Vocabulary and reading. In R. Carter , & M. McCarthy (Eds.), *Vocabulary and language teaching.* London: Longman.

Nesi, H. (1996). Review article: For future reference? Current English learners' dictionaries in electronic form. *System, 24*(4), 537-546. Retrieved from http://dx.doi.org/10.1016/S0346-251X(97)88214-0

Nesi, H. (1998). *Dictionaries on computer: How different markets have created different products. Paper presented at the Language Learning and Computers*. Retrieved from http://www.tu-chemnitz.de/phil/english/chairs/linguist/real/independent/llc/Conference1998/Papers/Nesi.htm

Nesi, H. (1999). A user's guide to electronic dictionaries for language learners. *International Journal of Lexicography, 12*(1), 55-66.

Nesi, H. (2000a). Electronic dictionaries in second language vocabulary comprehension and acquisition: The state of the art. In U. Heid, S. Evert, E. Lehmann, & C. Rohrer (Ed.), *Proceedings of the Ninth EURALEX International Congress, EURALEX 2000. 2*, pp. 839-847. Stuttgart: Euralex.

Nesi, H. (2000b). *The use and abuse of EFL dictionaries: How learners of English as a foreign language read and interpret dictionary entries.* Tübingen: Max Niemeyer Verlag.

Nesi, H. (2002). A study of dictionary use by international students at a British university. *International Journal of Lexicography, 15*(4), 277-305.

Nesi, H. (2003). The specification of dictionary reference skills in higher education. In R. R. Hartmann (Ed.), *Lexicography—Critical concepts: Volume 1 Dictionaries, compilers, critics and users* (pp. 370–393). London and New York: Routledge.

Neubach, A., & Cohen, A. D. (1988). Processing strategies and problems encountered in the use of dictionaries. *Dictionaries: The Journal of the Dictionary Society of North America, 10,* 1-19.

Osaki, S., Ochiai, N., Iso, T., & Aizawa, K. (2003). Electronic dictionary vs. printed dictionary: Accessing the appropriate meaning, reading comprehension, and retention. In M. S. Yamada, & Y. Tono (Eds.), *Dictionaries and language learning: How can dictionaries help human and machine learning.* (pp. 205-2012).

Pasfield-Neofitou, S. (2009). Paper, electronic or online? Different dictionaries for different activities. *Babel*, *43*(2), 12-18.

Perfetti, C. A. (1985). *Reading ability.* New York : Oxford University Press.

Peters, E. (2007). Manipulating L2 learners' online dictionary use and its effect on L2 word retention. *Language Learning and Technology, 11*(2), 36-58.

Piotrowski, T. (1989). Monolingual and bilingual dictionaries: fundamental differences. In M. Tickoo (Ed.), *Learners' dictionaries: State of the art* (pp. 72-83). Singapore: SEAMEO Regional Language Centre.

Prichard, C. (2008). Evaluating L2 readers' vocabulary strategies and dictionary use. *Reading in a Foreign Language*, *20*(2), 216–231.

Prichard, C., & Matsumoto, Y. (2011). The effect of lexical coverage and dictionary use on L2 reading comprehension. *The Reading Matrix, 11*(3), 207-225.

Reinking, D., & Rickman, S. (1990). The effects of computer-mediated texts on the vocabulary learning and comprehension of intermediate-grade readers. *Journal of Reading Behavior, 22*, 395-411.

Rhoder, C., & Huerster, P. (2002). Use dictionaries for word learning with caution. *Journal of Adolescent and Adult Literacy, 45*(8), 730-735.

Roby, W. B. (1999). What's in a gloss? *Language Learning & Technology, 2*(2), 94-101.

Rundell, M. (1998). Recent trends in English pedagogical lexicography. *International Journal of Lexicography, 11*(4), 315-342.

Rundell, M. (1999). Dictionary use in production. *International Journal of Lexicography, 12*(1), 35-53.

Schmitt, N. (1997). Vocabulary learning strategies. In N. Schmitt, & M. McCarthy (Eds.), *Vocabulary description, acquisition and pedagogy* (pp. 199-227). Cambridge: Cambridge University Press.

Schofield, P. (1999). Dictionary use in reception. *International Journal of Lexicography, 12*(1), 13 – 34.

Scholfield, P. J. (1982). Using the English dictionary for comprehension. *TESOL Quarterly, 16*(2), 185-194.

Shimizu, T. (2003). Efficiency of information retrieval from the electronic and the printed versions of a bilingual dictionary. *Language Education & Technology, 40*, 15-33.

Songhao, L. (1997). Dictionary use as a way of learning vocabulary in SLA: A preliminary study. *Journal of Educational Studies, 19*(1), 82-99.

Spiro, R. C., Bruce, B. C., & Brewer, W. F. (Eds.). (1980). *Theoretical issues in reading comprehension.* Hillsdale, NJ: Erlbaum.

Stein, G. (1984). *The English dictionary: past, present and future. Special lecture given on the occasion of the inauguration of the Dictionary Research Centre.* Exeter: University of Exeter.

Stein, G. (1990). From the bilingual to the monolingual dictionary. In T. Magay, & J. Zigany (Ed.), *BudaLEX '88 Proceedings: Papers from the 3rd EURALEX International Congress* (pp. 401-407). Budapest: Akademiai Kiado.

Stirling, J. (2003). *The portable electronic dictionary: Faithful friend or faceless foe?* Retrieved from http://www.elgweb.net/ped-article.html

Summers, D. (1988). The role of dictionaries inlanguage learning. In R. Carter , & M. McCarthy (Eds.), *Vocabulary andlanguage teaching* (pp. 111-125). London: Longman.

Tang, G. M. (1997). EDs for second language learning: Help or hindrance? *TESOL Canada Journal, 15*(1), 39-57.

Tarp, S. (2009). Reflections on lexicographical user research. *Lexikos, 19*, 275-296.

Taylor, A., & Chan, A. (1994). EDs and their use. *Euralex 1994 Proceedings*, (pp. 598-605).

Thorndike, E. (1991). The psychology of the school dictionary. *International Journal of Lexicography, 4*(1), 15-22.

Thumb, J. Y.-f. (2002). *Dictionary look-up strategies and the bilingualised learners' dictionary: A think-aloud study (Unpublished doctoral thesis).* Hong Kong: The University of Hong Kong.

Tomaszczyk, J. (1979). Dictionaries: Users and uses. *Glottodidactica, 12*, 103-119.

Tomaszczyk, J. (1983). On bilingual dictionaries: The case for bilingual dictionaries for foreign language learners. In R. Hartmann (Ed.), *Lexicography: Principles and practice* (pp. 41-51). London: Academic Press.

Tono, Y. (2001). *Research on dictionary use in the context of foreign language learning.* Tübingen: Max Niemeyer Verlag.

Torres, I., & Ramos , M. (2003). Fostering vocabulary acquisition through self-learning tools and electronic dictionaries. *The GRETA Magazine, 10*(2).

Wang, D. (2014). The impact of the use of an electronic dictionary on verbal reasoning on adult native Chinese international students in the United States (Unpublished doctoral dissertation). Long Beach , California: California state university.

Wang, M. (2007). *The effects of dictionary skills instruction on reading comprehension of junior high EFL students in Taiwan (Unpublished master's thesis).* National Sun Yat-sen University.

Welker, H. A. (2010). *Dictonary use: A general survey of empirical studies* . Brasília: Author's Edition.

Weschler, R., & Pitts, C. (2000). An experiment using electronic dictionaries with EFL students. *The Internet TESL Journal, 6*(8). Retrieved from The Internet TESL Journal: http://iteslj.org/Articles/Weschler-ElectroDict.html

White, B. K. (2012). *Understanding reading comprehension performance in high school students. (Unpublished doctoral dissertation).* Ontario, Canada: Queen's University.

Wingate, U. (2002). *The effectiveness of different learner dictionaries. An investigation into the use of dictionaries for reading comprehension by intermediate learners of German.* Tübingen: Niemeyer.

Winkler, B. (2001). Students working with an English learners' dictionary on CD-ROM. *In ELT perspectives on information technology & multimedia-Selected papers from the ITMELT 2001 Conference 1st & 2 June, 2001* (pp. 227-254). Hong Kong: The English Language Centre, The Hong Kong Polytechnic University.

Yorio, C. (1971). Some sources of reading problems for foreign language learners. *Language Learning, 21*, 107-115.

APPENDICES

Appendix A: Reading task in CD condition

By far the most important United States export product in the eighteenth and nineteenth centuries was cotton, favored by the European textile industry over flax or wool because it was easy to process and soft to tile touch. Mechanization of spinning and weaving allowed significant centralization and expansion in the textile industry during this period, and at the same time the demand for cotton increased dramatically. American producers were able to meet this demand largely because of tile invention of the cotton gin by Eli Whitney in 1793. Cotton could be grown throughout the South, but separating the fiber – or lint – from the seed was a laborious process. Sea Island cotton was relatively easy to process by hand, because its fibers were long and seeds were concentrated at the base of the flower, but it demanded a long growing season, available only along the nation's eastern seacoast. Short-staple cotton required a much shorter growing season, but the shortness of the fibers and their mixture with seeds meant that a worker could hand-process only about one pound per day. Whitney's gin was a hand-powered machine with revolving drums and metal teeth to pull cotton fibers away from seeds. Using the gin, a worker could produce up to 50 pounds of lint a day. The later development of larger gins, powered by horses, water, or steam, multiplied productivity further.

The interaction of improved processing and high demand led to the rapid spread of the cultivation of cotton and to a surge in production. It became the main American export, dwarfing all others. In 1802, cotton composed 14 percent of total American exports by value. Cotton had a 36 percent share by 1810 and over a 50 percent share in 1830. In 1860, 61 percent of the value of American exports was represented by cotton. In contrast, wheat and wheat flour composed only 6 percent of the value of American exports in that year. Clearly, cotton was king in the trade of the young republic. The growing market for cotton and other American agricultural products led to an unprecedented expansion of agricultural settlement,

mostly in the eastern half of the United States, west of the Appalachian Mountains and east of the Mississippi River.

1. The main point of the passage is that the eighteenth and nineteenth centuries were a time when

(A) the European textile industry increased its demand for American export products

(B) mechanization of spinning and weaving dramatically changed the textile industry

(C) cotton became a profitable crop but was still time-consuming to process

(D) cotton became the most important American export product

2. The word "favored" in line 2 is closest in meaning to

(A) preferred

(B) recommended

(C) imported

(D) included

3. All of the following are mentioned in the passage as reasons for the increased demand for cotton EXCEPT

(A) cotton's softness

(B) cotton's ease of processing

(C) a shortage of flax and wool

(D) the growth that occurred in the textile industry.

4. The word "laborious" in line 8 is closest in meaning to

(A) unfamiliar

(B) primitive

(C) skilled

(D) difficult

5. According to the passage, one advantage of sea island cotton was its

(A) abundance of seeds

(B) long fibers

(C) long growing season

(D) adaptability to different climates

6. Which of the following can be inferred from the passage about cotton production in the United States after the introduction of Whitney's cotton gin?

(A) More cotton came from sea island cotton plants than before.

(B) More cotton came from short-staple cotton plants than before.

(C) Most cotton produced was sold domestically.

(D) Most cotton produced was exported to England.

7. The word "surge" in line 18 is closest in meaning to

(A) sharp increase

(B) sudden stop

(C) important change

(D) excess amount

8. The author mentions "wheat and wheat flour" in line 22 in order to

(A) show that Americans exported more agricultural products than they imported.

(B) show the increase in the amount of wheat products exported.

(C) demonstrate the importance of cotton among American export products.

(D) demonstrate that wheat farming was becoming more profitable.

9. The word "unprecedented" in line 25 is closest in meaning to

(A) slow

(B) profitable

(C) not seen before

(D) never explained

10. According to the passage, the Mississippi River was

(A) one of the boundaries of a region where new agricultural settlement took place

(B) a major source of water for agricultural crops

(C) the primary route by which agricultural crops were transported

(D) a main source of power for most agricultural machinery

Appendix B: Reading task in PD condition

The first peoples to inhabit what today is the southeastern United States sustained themselves as hunters and gathers. Sometimes early in the first millennium A.D., however, they began to cultivate corn and other crops. Gradually, as they became more skilled at gardening, they settled into permanent villages and developed a rich culture, characterized by the great earthen mounds they erected as monuments to their gods and as tombs for their distinguished dead. Most of these early mound builders were part of the Adena-Hopewell culture, which had its beginnings near the Ohio River and takes its name from sites in Ohio. The culture spread southward into the present-day states of Louisiana, Alabama, Georgia, and Florida. Its peoples became great traders, bartering jewellery, pottery, animal pelts, tools, and other goods along extensive trading networks that stretched up and down eastern North America and as far west as the Rocky Mountains.

Please write the words that you have looked up in the dictionary.

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About A.D. 400, the Hopewell culture fell into decay. Over the next centuries, it was supplanted by another culture, the Mississippian, named after the river along which many of its earliest villages were located. This complex civilization dominated the Southeast from about A.D. 700 until shortly before the Europeans began arriving in the sixteenth century. At the peak of its strength, about the year 1200, it was the most advanced culture in North America. Like their Hopewell predecessors, the Mississippians became highly skilled at growing food, although on a grander scale. They developed an improved strain of corn, which could survive in wet soil and a relatively cool climate, and also learned to cultivate

beans. Indeed, agriculture became so important to the Mississippians that it became closely associated with the Sun – the guarantor of good crops. Many tribes called themselves "children of the Sun" and believed their omnipotent priest-chiefs were descendants of the great sun god.

Although most Mississippians lived in small villages, many others inhabited large towns. Most of these towns boasted at least one major flat-topped mound on which stood a temple that contained a sacred flame. Only priests and those charged with guarding the flame could enter the temples. The mounds also served as ceremonial and trading sites, and at times they were used as burial grounds.

01. What does the passage mainly discuss?

(A) The development of agriculture

(B) The locations of towns and villages

(C) The early people and cultures of the United States

(D) The construction of burial mounds

02. Which of the following resulted from the rise of agriculture in the southeastern United States?

(A) The development of trade in North America

(B) The establishment of permanent settlements

(C) Conflicts with other Native American groups over land

(D) A migration of these peoples to the Rocky Mountains

03. What does the term "Adena-Hopewell" (line 9) designate?

(A) The early locations of the Adena-Hopewell culture

(B) The two most important nations of the Adena-Hopewell culture

(C) Two former leaders who were honored with large burial mounds

(D) Two important trade routes in eastern North America

04. The word "bartering" in line 13 is closest in meaning to

(A) producing

(B) exchanging

(C) transporting

(D) loading

05. The word "supplanted" in line 18 is closest in meaning to

(A) conquered

(B) preceded

(C) replaced

(D) imitated

06. According to the passage, when did the Mississippian culture reach its highest point of development?

(A) About A.D. 400

(B) Between A.D. 400 and A.D. 700

(C) About A.D. 1200

(D) In the sixteenth century

07. According to the passage, how did the agriculture of the Mississippians differ from that of their Hopewell predecessors?

(A) The Mississippians produced more durable and larger crops of food.

(B) The Mississippians sold their food to other groups.

(C) The Mississippians could only grow plants in warm, dry climates.

(D) The Mississippians produced special foods for their religious leaders.

08. Why does the author mention that many Mississippians tribes called themselves "children of the Sun" (line 27)?

(A) To explain why they were obedient to their priest-chiefs.

(B) To argue about the importance of religion in their culture.

(C) To illustrate the great importance they placed on agriculture.

(D) To provide an example of their religious rituals.

09. The phrase "charged with" in line 31 is closest in meaning to

(A) passed on

(B) experienced at

(C) interested in

(D) assigned to

10. According to the passage, the flat-topped mounds in Mississippian towns were used for all of the following purposes EXCEPT

(A) religious ceremonies

(B) meeting places for the entire community

(C) sites for commerce

(D) burial sites

Appendix C: Time spent by participants in reading (CD condition).

Participants	Starting time	End time	**Duration**
1	11:11:04	12:03:15	**0:52:11**
2	11:11:59	12:04:18	**0:52:19**
3	11:13:13	11:46:48	**0:33:35**
4	11:13:59	11:54:20	**0:40:21**
5	11:14:02	11:59:05	**0:45:03**
6	11:17:36	11:58:22	**0:40:46**
7	11:22:28	12:02:39	**0:40:11**
8	12:34:40	13:23:42	**0:49:02**
9	11:34:58	12:26:26	**0:51:28**
10	11:36:00	12:18:26	**0:42:26**
11	11:34:44	12:26:41	**0:51:57**
12	11:16:51	12:21:21	**1:04:30**
13	11:20:00	12:04:23	**0:44:23**
14	12:24:35	13:24:37	**1:00:02**
15	11:25:58	12:24:24	**0:58:26**
16	11:28:40	12:23:24	**0:54:44**
17	11:26:53	12:25:53	**0:59:00**
18	11:31:22	12:08:45	**0:37:23**
19	11:30:59	12:16:19	**0:45:20**
20	11:32:29	12:20:12	**0:47:43**
21	11:32:44	12:06:14	**0:33:30**
22	11:33:44	12:30:08	**0:56:24**

Participants	Starting time	End time	**Duration**
23	9:45:12	10:11:15	**0:26:03**
24	9:45:19	10:16:44	**0:31:25**
25	9:46:29	10:18:51	**0:32:22**
26	9:48:51	10:26:10	**0:37:19**
27	9:49:05	10:35:50	**0:46:45**
28	9:52:57	10:23:37	**0:30:40**
29	9:55:48	10:34:19	**0:38:31**
30	9:56:28	10:56:02	**0:59:34**
31	9:59:59	10:35:34	**0:35:35**
32	10:00:28	10:40:55	**0:40:27**
33	9:59:41	10:24:04	**0:24:23**
34	10:01:12	10:39:11	**0:37:59**
35	10:03:42	11:01:47	**0:58:05**
36	11:06:49	11:41:46	**0:34:57**
37	10:07:52	10:58:29	**0:50:37**
38	10:10:38	10:51:33	**0:40:55**
39	10:08:37	10:41:17	**0:32:40**
40	10:12:01	10:44:48	**0:32:47**
41	10:13:42	10:43:20	**0:29:38**
42	10:13:40	10:49:45	**0:36:05**
43	10:16:47	11:04:08	**0:47:21**
44	10:15:33	11:04:35	**0:49:02**

Appendix D: Time spent by participants in reading (PD condition).

Participants	Starting time	End time	**Duration**
1	11:27:26	12:12:39	**0:45:13**
2	11:27:30	12:13:31	**0:46:01**
3	11:27:18	12:10:48	**0:43:30**
4	11:26:41	12:09:08	**0:42:27**
5	11:25:36	12:23:28	**0:57:52**
6	11:27:51	12:25:39	**0:57:48**
7	11:28:19	12:26:01	**0:57:42**
8	12:27:34	13:23:11	**0:55:37**
9	11:28:31	12:25:12	**0:56:41**
10	11:27:47	12:20:19	**0:52:32**
11	11:25:55	12:24:56	**0:59:01**
12	11:24:54	12:26:20	**1:01:26**
13	11:27:14	12:22:23	**0:55:09**
14	12:29:19	13:29:24	**1:00:05**
15	11:29:59	12:21:38	**0:51:39**
16	11:30:54	12:24:42	**0:53:48**
17	11:28:04	12:25:22	**0:57:18**
18	11:30:12	12:13:23	**0:43:11**
19	11:29:24	12:17:17	**0:47:53**
20	11:29:03	12:25:06	**0:56:03**
21	11:28:57	12:24:39	**0:55:42**
22	11:28:31	12:26:06	**0:57:35**

Participants	Starting time	End time	**Duration**
23	9:37:15	10:34:46	**0:57:31**
24	9:37:57	10:39:43	**1:01:46**
25	9:38:00	10:32:57	**0:54:57**
26	9:38:41	10:35:55	**0:57:14**
27	9:39:01	10:33:46	**0:54:45**
28	9:40:12	10:32:49	**0:52:37**
29	9:42:57	10:38:00	**0:55:03**
30	10:42:40	11:57:28	**1:14:48**
31	9:43:34	10:32:42	**0:49:08**
32	9:43:57	10:41:14	**0:57:17**
33	9:43:02	10:30:16	**0:47:14**
34	9:42:51	10:30:17	**0:47:26**
35	9:45:46	10:45:38	**0:59:52**
36	10:48:21	11:40:43	**0:52:22**
37	9:49:12	10:47:51	**0:58:39**
38	9:51:00	10:54:50	**1:03:50**
39	9:49:21	10:37:04	**0:47:43**
40	9:51:53	10:35:29	**0:43:36**
41	9:52:10	10:32:18	**0:40:08**
42	9:56:38	10:48:05	**0:51:27**
43	9:52:53	10:57:36	**1:04:43**
44	9:54:25	10:55:50	**1:01:25**

Appendix E: Detailed reading scores of subjects in CD condition.

Participants	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	**Score /10**
1	0	0	1	1	1	0	1	0	1	1	**6**
2	0	0	1	1	1	0	1	0	1	1	**6**
3	1	1	1	1	1	1	1	0	1	1	**9**
4	1	1	1	1	1	1	1	0	1	1	**9**
5	0	0	0	0	0	0	0	0	1	1	**2**
6	1	1	0	0	1	1	1	1	1	1	**8**
7	0	1	0	1	1	0	0	1	0	0	**4**
8	1	1	1	1	1	0	1	1	1	1	**9**
9	1	0	0	1	1	0	0	0	1	1	**5**
10	1	1	0	1	1	0	0	0	1	1	**6**
11	0	0	0	1	1	0	0	0	1	0	**3**
12	1	1	0	0	0	0	1	0	1	1	**5**
13	1	0	0	1	1	0	1	1	1	1	**7**
14	1	0	0	1	1	0	0	0	1	1	**5**
15	0	1	0	1	0	0	0	0	0	0	**2**
16	1	1	0	1	1	0	1	0	1	0	**6**
17	1	1	0	1	1	0	0	0	1	0	**5**
18	0	1	0	1	1	0	1	0	1	1	**6**
19	0	0	0	1	1	0	0	0	1	0	**3**
20	0	1	0	0	1	1	0	0	1	1	**5**
21	1	0	0	1	1	0	1	1	1	1	**7**
22	0	0	0	1	0	0	0	0	1	1	**3**

Participants	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	**Score /10**
23	1	1	1	1	1	0	1	1	1	1	**9**
24	1	1	1	1	1	0	1	1	0	1	**8**
25	0	1	1	1	1	0	1	1	1	1	**8**
26	0	1	1	1	1	0	1	0	1	0	**6**
27	0	1	1	1	1	0	1	0	1	0	**6**
28	0	1	0	1	1	0	1	1	1	1	**7**
29	1	1	1	1	1	0	1	1	1	1	**9**
30	0	0	0	0	0	0	1	0	1	0	**2**
31	1	1	1	1	1	0	1	1	1	1	**9**
32	1	1	0	1	0	0	1	0	1	1	**6**
33	1	1	0	1	1	0	1	1	1	0	**7**
34	1	1	1	1	1	0	1	1	1	0	**8**
35	0	1	1	1	1	0	0	0	1	1	**6**
36	0	1	1	1	1	0	1	1	1	1	**8**
37	1	1	0	1	1	1	0	0	1	0	**6**
38	1	1	0	1	1	0	0	1	1	1	**7**
39	0	0	0	1	1	0	1	0	0	0	**3**
40	0	1	0	0	1	0	1	0	1	1	**5**
41	1	0	0	1	1	0	0	1	1	1	**6**
42	1	1	0	1	1	0	0	1	1	0	**6**
43	1	1	1	1	1	0	1	1	1	1	**9**
44	1	1	0	1	1	0	1	1	1	1	**8**

Appendix F: **Detailed scores of subjects in PD reading condition.**

Participants	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	**Score /10**
1	0	0	1	1	1	1	1	0	0	1	**6**
2	0	0	1	1	1	1	1	0	0	1	**6**
3	0	0	1	1	1	1	1	0	0	1	**6**
4	0	0	1	1	1	1	1	0	0	1	**6**
5	1	0	1	1	1	1	1	0	0	0	**6**
6	1	0	1	1	1	1	1	0	0	0	**6**
7	1	0	0	1	0	1	0	0	0	0	**3**
8	0	1	0	1	1	1	0	1	0	1	**6**
9	1	0	1	1	1	1	1	1	0	0	**7**
10	0	0	0	1	1	1	1	0	0	0	**4**
11	1	1	0	1	1	1	1	0	0	0	**6**
12	1	1	0	1	0	1	0	0	0	0	**4**
13	1	1	1	1	1	0	1	1	0	1	**8**
14	1	0	1	1	1	0	1	0	0	0	**5**
15	0	0	1	1	1	0	1	1	0	0	**5**
16	0	1	0	1	1	0	0	0	0	0	**3**
17	0	0	0	1	0	1	0	0	0	0	**2**
18	1	1	1	1	1	1	1	0	1	1	**9**
19	1	1	1	1	1	1	0	0	0	0	**6**
20	1	1	1	1	1	1	0	0	1	1	**8**
21	1	0	1	1	0	1	1	0	0	1	**6**
22	1	0	1	1	1	0	1	0	0	0	**5**

Participants	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	**Score /10**
23	1	0	1	1	1	1	1	0	1	1	**8**
24	1	1	1	1	1	1	1	1	1	0	**9**
25	1	1	1	0	0	1	1	1	1	1	**8**
26	1	0	1	1	1	1	0	1	0	0	**6**
27	1	0	1	1	1	1	0	1	0	0	**6**
28	1	0	1	1	0	1	1	1	1	1	**8**
29	1	1	1	1	1	1	1	1	0	1	**9**
30	1	0	1	1	0	1	0	0	0	0	**4**
31	1	1	0	1	1	1	1	0	1	0	**7**
32	0	1	1	1	1	1	1	0	0	0	**6**
33	0	0	0	1	0	0	1	0	0	1	**3**
34	1	0	1	0	0	0	1	0	1	0	**4**
35	1	1	1	1	0	0	0	0	0	0	**4**
36	1	0	1	1	0	1	0	0	0	0	**4**
37	1	0	1	0	1	0	0	0	0	1	**4**
38	1	0	1	1	0	1	1	0	0	1	**6**
39	1	1	1	1	1	0	1	0	0	0	**6**
40	1	1	0	1	1	1	1	1	0	1	**8**
41	1	1	0	0	0	1	1	1	0	1	**6**
42	0	0	1	1	1	1	0	0	1	0	**5**
43	1	1	0	1	1	1	1	1	1	0	**8**
44	0	0	1	1	0	1	1	0	1	0	**5**

Appendix G: Vocabulary pretest for PD and CD lookup conditions.

*Using your dictionary, write the definition for each of the words in **bold** bellow*

I have decided to **abstain** from drinking alcohol.

The local authorities issued an **approbation** to close the street for a festival on St. Patrick's Day.

This **craven** act of violence will not go unpunished," remarked the police chief.

Sandra is **personable** and well-liked by her peers.

Emily received a **surly** greeting from the normally cheerful receptionist.

Members of the opposing team were trying to **daunt** the home team by yelling loudly and beating their chests.

Steve, the "Crocodile Hunter," is constantly placing himself in very **precarious** positions.

Evan **toiled** for hours before solving the problem.

Stop **malingering** and give me a hand with this job.

We should have known that splashing salt water on Dan's wound would **exacerbate** his pain.

Appendix H: Vocabulary posttest for PD and CD lookup conditions.

Task One:

Read sentences 1- 5carefully. Choose a word from the list below that best fills the blank in each sentence.

malinger / exacerbate / precarious/ toil/ daunt/gregarious/

1) At first I felt _____(ed) by the assignment, but then I realized that the problem wasn't as complex as it first seemed.

2) The CIA agent put herself in a very _____ situation by sneaking into the embassy.

3) With 11 children to care for, Mrs. Higgins had to _____ for many hours just to keep up with the laundry.

4) Suzanne's boss suspected that she was _____ (ing) when she called in sick on Monday morning.

5) His aggressive reaction only _____(ed) the situation.

Task Two:

Read the following sentences carefully. Decide which answer best describes the italicized vocabulary word in the prompt. Circle the letter of the correct answer.

Which character trait would you *least* like to see in a soldier?

a. craven

b. overweening

c. pretentious

d. surly

Which of the following traits is *most* desirable in a roommate?

a. bumptious

b. personable

c. pretentious

d. craven

If you *abstain* from something, you

a. run from it.

b. choose not to do it.

c. come from it.

d. have an allergic reaction to it.

Which of the following traits is *least* desirable in a roommate?

a. diffident

b. gregarious

c. sanguine

d. surly

If you give someone your *approbation*, you give them

a. your support.

b. your permission.

c. your love.

d. your notice of resignation.

ملخص

دراسة مقارنة لأثر استخدام القواميس الإلكترونية و الورقية على القراءة و تذكر المفردات لدى طلبة اللغة الإنجليزية بجامعة الإخوة منتوري بقسنطينة

تعتبر القواميس من أهم الوسائل التعليمية المحبذة لدى طلبة اللغات الأجنبية، حيث أنهم يستخدمونها على اختلاف أنواعها قصد تحسين قدراتهم اللغوية. و مع هذا فإن أثر استخدام القواميس، ورقية كانت أو إلكترونية، لم يكن موضوعا لأي بحث أكاديمي في الجزائر من قبل، على حد علمنا، ما استدعانا للقيام بهذا البحث الذي يهدف أساسا إلى تقصي أثر استخدام القواميس الورقية و الإلكترونية بوجه خاص على قراءة الطلبة و مدى تذكرهم لمعاني المفردات الأجنبية.

شملت الدراسة أربعا و أربعين طالبا من المستوى الثاني في قسم اللغة الإنجليزية و آدابها بكلية الآداب و اللغات بجامعة الإخوة منتوري بقسنطينة، حيث قام الطلبة بقراءة نصين على شاشة الحاسوب في ظرفين مختلفين: تارة باستعمال القواميس الإلكترونية، و تارة أخرى باستعمال القواميس الورقية، تم خلالها إعطاء الطلبة الحرية المطلقة في استخدام القاموس عند الحاجة. و لقد تم الاستعانة ببرنامج مراقبة حاسوبي قام بحفظ كافة المفردات الأجنبية المبحوث عنها أثناء القراءة في ظرف استعمال القواميس الإلكترونية، فضلا عن تسجيله المدة التي قضاها كل طالب في القراءة في كلا الظرفين، و تم استخدام اختبار T للعينات المرتبطة (Paired-samples t-test) بغية دراسة الفرضيات الموضوعة من طرف الباحث، و التي تتعلق أساسا بمدة قراءة النصوص، مدى فهمها، و تردد عمليات البحث عن معاني المفردات أثناء قراءتها. كما تم حساب معامل ارتباط بيرسون (Pearson's correlation coefficient) لتقصي ما إذا كان لوتيرة بحث الطلبة عن المفردات أثناء القراءة أي أثر على درجة استيعابهم للنصوص.

أما فيما يتعلق بأثر نوع القاموس على مدى تذكر معاني المفردات الأجنبية، فقد تم تقسيم الطلبة إلى مجموعتين متكافئتين، حيث قامت المجموعة الأولى بقراءة جمل محددة و البحث عن معاني مفردات صعبة تم تعيينها سلفا من طرف

الباحث، مستعملة في ذلك القواميس الورقية، فيما أنجزت المجموعة الثانية نفس الإختبار غير أنها استعملت القواميس الإلكترونية. و بعد أسبوع من المرحلة الأولى من التجربة، تم توزيع اختبار فجائي للطلبة تضمن انتقاء المعنى الصحيح للمفردات التي تم البحث عنها من قبل، و هذا دون أي استعمال للقاموس، و تم استخدام اختبار T للعينات المستقلة (Independent-samples t-test) بغية مقارنة مدى تذكر الطلبة لمعاني المفردات المبحوث عنها في كلا ظرفي البحث.

كشف تحليل النتائج أن لاستخدام القواميس الإلكترونية إسهاما كبيرا في تقليص مدة القراءة بالمقارنة مع القواميس الورقية، كما أظهرت الدراسة أن الطلبة قاموا بالبحث عن معاني الكلمات في القواميس الإلكترونية على نحو أكثر منه في القواميس الورقية، غير أنه لم يلحظ أي أثر ذي دلالة إحصائية لنوع القاموس المستخدم أثناء القراءة على مدى استيعاب الطلبة للنصوص. و فضلا عن ذلك، لم تلحظ أي صلة بين وتيرة بحث الطلبة عن المفردات في القاموس و مدى استيعابهم للنصوص في كلا ظرفي القراءة. ما معناه أن وتيرة بحث الطلبة عن معاني المفردات، تصاعدية كانت أو تنازلية، لم تؤثر بأي شكل من الأشكال على درجة استيعابهم للنصوص. ناهيك على أن النتائج المستقاة تدعم أفضلية البحث في القاموس الورقي في تعزيز القدرة على تذكر معاني المفردات، عكس عملية البحث في القاموس الإلكتروني التي ثبتت حيلولتها دون التذكر الأمثل لمعاني تلك المفردات.

و في الأخير، فقد خلصت الدراسة إلى ضرورة النظر في إمكانية اعتماد القواميس الإلكترونية كوسائط بحث تحفيزية لطلبة اللغات الأجنبية لما تتيحه من خواص البحث الآني و السلس عن معاني المفردات من دون كلل أو ملل، ما من شأنه أن ينعكس بالإيجاب على تحفيز الطلبة و تعزيز مهاراتهم في القراءة. و على النقيض من ذلك، تجدر الإشارة إلى احتمال أن القواميس الإلكترونية لا تحفز على تذكر المفردات بشكل جيد، و منه وجب التمحيص في جدوى استعمالها في تعلم مفردات جديدة.

الكلمات المفتاحية: القاموس الإلكتروني، القاموس الورقي، القراءة الإستيعابية، تذكر المفردات.

Résumé

Le dictionnaire est l'un des outils d'apprentissage les plus utilisés par les apprenants de langue seconde ou étrangère pour améliorer leur performance dans la langue. À notre connaissance, les effets résultant de l'utilisation des dictionnaires (soit imprimés ou électroniques) n'ont pas été étudiés de façon systématique dans le contexte algérien. Par conséquent, afin de déterminer l'utilité des dictionnaires, cette étude compare la compréhension de l'écrit et l'apprentissage du vocabulaire chez des lecteurs de langue étrangère dans deux conditions: en utilisant un dictionnaire électronique et un autre conventionnel. Les variables dépendantes sont : le temps de lecture, l'utilisation du dictionnaire (fréquences de consultation), le degré de compréhension et le rappel des mots consultés.

Les sujets d'étude étaient 44 étudiants en deuxième année au département d'anglais à l'Université Frères Mentouri-Constantine 1. Ils ont été affectés aux deux tâches de lecture sous deux conditions : une fois à l'aide d'un dictionnaire en papier, et une autre fois en utilisant un dictionnaire CD-ROM. Le mode de présentation des tests de lecture était sur l'écran de l'ordinateur seulement. Nous avons utilisé un logiciel de surveillance pour enregistrer les mots recherchés par les sujets utilisant le dictionnaire CD-ROM. Le logiciel de surveillance a également enregistré le temps nécessaire par chaque étudiant pour terminer la lecture dans les deux conditions ; l'information a été automatiquement enregistrée dans les fichiers journaux cachés dans les ordinateurs des sujets. Le t-test pour échantillons appariés est utilisé pour tester les hypothèses proposées. En outre, le coefficient de corrélation de Pearson a été mesuré pour examiner s'il y a eu une corrélation entre les fréquences de consultation des mots et les notes de lecture obtenues dans les deux conditions. En ce qui concerne les tests d'apprentissage de vocabulaire, nous avons administré un pré-test et un

post-test aux sujets d'étude dans les deux conditions (dictionnaire en papier et CD-ROM), et le t-test pour échantillons indépendants a été effectué pour comparer l'acquisition des mots.

L'analyse des informations extraites des fichiers journaux a révélé que le dictionnaire CD-ROM a permis aux sujets de lire les passages en moins de temps que le dictionnaire imprimé. On a également constaté que les sujets ont cherché plus de mots dans le dictionnaire CD-ROM que dans le dictionnaire imprimé. Cependant, les résultats indiquent que le type de dictionnaire consulté n'influence pas la compréhension de l'écrit d'une façon significative, et qu'il n'existe aucune corrélation entre les fréquences de consultation et les notes de lecture. En ce qui concerne l'acquisition du vocabulaire, les résultats ont révélé que la consultation des dictionnaires imprimés favorise un meilleur rappel de vocabulaire. Il a été conclu que les dictionnaires CD-ROM seraient efficaces et motivants à la compréhension de l'écrit mais pourraient être défavorables à l'acquisition du vocabulaire.

Mots Clés : Dictionnaire CD-ROM, dictionnaire imprimé, la compréhension de l'écrit, l'apprentissage du vocabulaire.