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List of Acronyms Used in the Research

Acronym	What it stands for
CEPA	Common educational proficiency assessment
DVK	Depth of vocabulary knowledge test
EFL/ESL	English as a foreign/second language
EVST	Eurocentres vocabulary size test
HPS	High-proficiency students
L1/L2	First/second language
Ln	The language used by the learner other than his L1 and L2
LPS	Low-proficiency students
RC	Reading comprehension test
TOEFL	Test of English as a foreign language
VKS	Vocabulary knowledge scale
VLT	Vocabulary levels test
VS	Vocabulary size
WAT	Word associates test

Chapter One

Introduction

This chapter begins with a background to the current study. It discusses the association between vocabulary knowledge and reading comprehension as well as the definitions of the terms *breadth* and *depth*. It also describes the importance of the study and the practical need motivating it. Furthermore, it presents the research questions that will guide this inquiry. Finally, it gives an outline of the scope of the study and the organization of this dissertation.

1.1 Background of the study

Vocabulary knowledge is key to reading comprehension for both first language (L1) and second language (L2) learners (Alderson 2000; Anderson & Freebody 1981; Laufer & Kalovski 2010; Qian 1999, 2002; Read 1993; Stahl 2003). Vocabulary knowledge and reading comprehension are closely related to each other (Graves 1986), yet '[t]his relationship is not one directional' (Nation 2001, p.144). It is a mutual relationship in the sense that vocabulary knowledge affects the success of reading in the same way as reading leads to knowledge of more words. However, vocabulary knowledge might not be the only direct causal factor in reading comprehension growth. This is probably because other factors such as grammatical competence, world knowledge and training seem to equally play fundamental roles in reading. Thus, assuming that knowledge of more words determines better text comprehension could be a reductionist view of reading.

Sometimes L2 learners need limited vocabulary knowledge in order to understand an English text. Yet, this knowledge might not be sufficient to comprehend various texts in many situations. It seems important to understand what this vocabulary knowledge is and how much knowledge is considered adequate. At school, students need to learn many new words in order to increase their vocabulary size (breadth). At the same time, they need to know other new meanings and meaning relations relevant to these new words, which leads to enriching the students' use of known words (depth). Therefore, L2 learners extend their vocabulary knowledge in two ways: breadth and depth. They do not

only need to know the words with their superficial meanings (breadth), but they also need to know the words with their synonyms, derivations and collocations (depth). For example, learners may know the primary meaning of the word ‘active’ (breadth), but they might not know its various synonyms like ‘lively’, ‘hard-working’ and ‘operating’, its derivations like ‘activate’, ‘activation’, ‘activity’ and ‘activist’ as well as its collocations like ‘active participation’ and ‘active support’ (depth). Learners are required to know the meaning of the word and its associates (words associated with the particular word) to help them comprehend written texts without any hurdles. Based on this, not only vocabulary breadth but also vocabulary depth might help learners to better understand a written text.

Research has recently focused on at least two dimensions of vocabulary knowledge in reading comprehension: breadth (vocabulary size) and depth (quality of vocabulary knowledge) (Read 2004). *Breadth* is defined as how many words a language user knows, whereas *depth* is described as how well a language user knows these words (Qian 1999). As far as examining breadth in L1 and L2 reading comprehension is concerned, there has been extensive literature (Qian 2002). Moreover, the role of depth in L1 reading has been recognized in spite of the relative lack of empirical studies (Mezynski 1983).

1.2 Significance of the study

Although L2 researchers have developed instruments to assess depth of vocabulary knowledge (e.g., Paribakht & Wesche 1997; Read 1998), the importance of depth has been minimally recognized (Qian & Schedl 2004). Very few studies (e.g., Qian 1998, 1999, 2002; Quелlette 2006) have analyzed the role of vocabulary depth in reading comprehension. This implies that there is a theoretical concern over the importance of the current research. To my knowledge, no study has been conducted on such a topic in the Arab world in general, and in the Emirati context in particular.

Additionally, there is a practical need motivating the current research. In the UAE, grade 12 students take the Common Educational Proficiency Assessment (CEPA), along with the official ministry test, as entry tests to join three federal institutions: Zayed University, UAE University and the Higher Colleges of Technology. In CEPA, students are assessed

on some language skills such as reading and writing and on linguistic areas or knowledge such as grammar and vocabulary (NAPO n.d.). Like most standardized tests all over the world, in CEPA vocabulary component, a multiple-choice format is employed. Although this format has some advantages, one of the main shortcomings is that it primarily tests sight recognition and therefore it restricts learners' ability to this knowledge only (Coombe, Folse & Hubley 2007). As such Meara (1996a) cautions that making generalizations about learners' knowledge of lexical items based on only this format is dangerous. This format has been routinely used for a long time and therefore ESL/EFL researchers have been investigating alternative means of assessing learners' lexical knowledge. As Read (2009, p. 149) puts it:

...new forms of assessment are needed to replace the multiple-choice, matching and blank-filling items that have been the standard formats for testing vocabulary knowledge over a long period in tests and examinations around the world. It is useful, then, to consider what underlying basis should be for designing good vocabulary tests.

Given that students will read a lot of academic texts in their universities, they need to be tested at least on the 2000 (required for daily conversation) and 3000-5000 (required for reading authentic texts) word levels (Schmitt 2000). This is the minimum for them to comprehend general academic texts in English without being hampered by new lexical items. Thus, Vocabulary Levels Test (VLT), which was developed by Nation (1983, 1990) and revised by Schmitt, Schmitt and Clapham (2001), can be an alternative means of assessing learners' vocabulary size. It is useful for both diagnostic and placement purposes (Nation 2001) and therefore it might be needed to measure the vocabulary knowledge of Emirati grade 12 students who are preparing to join university.

Vocabulary size tests might not be the only alternative way of testing learners. For this reason, Schmitt (2010) argues that multiple measures of vocabulary are required as vocabulary knowledge is complex and multidimensional. Another feasible alternative is the depth of vocabulary knowledge test (Read 1998) which measures the quality rather than the size of word knowledge. Based on this, it may seem necessary to revise and modify the current vocabulary section in CEPA. By employing breadth and depth of vocabulary knowledge tests, universities could properly place students into the right programmes.

1.3 Research questions

The current study focuses on examining the roles of two aspects of vocabulary knowledge, breadth and depth, in reading written texts at high-school level in an EFL context, which is different from earlier research. Previous studies (e.g., Huang 2006; Qian 1998, 1999, 2002) have investigated this topic but at the university level in an ESL context. Thus, in the context of high-school EFL classrooms, the present study aims to answer the following research questions:

- 1- How do scores on vocabulary size, depth of vocabulary knowledge, and reading comprehension correlate with one another?
- 2- Which aspect of vocabulary knowledge, breadth or depth, is a stronger predictor of reading comprehension scores?
- 3- How do EFL learners use their depth of vocabulary knowledge when trying to guess the meaning of unknown words in a written text?

1.4 Scope of the study

The current research is confined to grade 12 male and female students (17-18 years old) in 3 public and 2 private secondary schools in three emirates: Abu Dhabi, Sharjah and Fujairah. Grade 12 students are specifically selected for the study because they are the only ones in the secondary stage who take CEPA, which directly addresses the practical need for the present study as stated above in [1.2]. The study is carried out through two phases: the first quantitative phase includes three language tests (vocabulary size, depth of vocabulary knowledge and reading comprehension); and the second qualitative phase involves semi-structured interviews. The aim of employing the three language tests is to explore the value as well as the importance of vocabulary knowledge in EFL learners' reading comprehension. On the other hand, the aim of conducting the interviews is to obtain more insights into the impact of vocabulary depth on lexical inferencing/guessing ability, and hence, on reading comprehension. A detailed description about the adopted method and sampling strategy will be provided later in Chapter Three.

1.5 Structure of the dissertation

This dissertation comprises six chapters. The next chapter explores the conceptual framework as a background to the literature and surveys the pertinent literature on the relationship between the two aspects of vocabulary knowledge and reading comprehension. It also reviews L1 and L2 research on this relationship and then lexical inferencing is presented to demonstrate how learners' vocabulary depth affects their understanding of a written text. Chapter 3 describes the adopted methodology, the sample and the instruments. In addition, it presents how data is collected and analyzed. Chapter 4 reports the results of the two phases of the study. Chapter 5 discusses the findings and compares them with other studies. It also considers the implications and limitations of the study. Moreover, it outlines new research directions and the impact of implementing this study on the researcher. Chapter 6 discusses the research summary: the purpose, the method and the most relevant findings of the present study.

Chapter Two

Literature Review

The current study aims to assess the roles of breadth and depth of vocabulary knowledge in EFL learners' reading comprehension. The second chapter reviews the literature relevant to this topic. It first explores the conceptual framework which provides background to the literature. It highlights the nature of vocabulary through examining a number of definitions of both *a word* and vocabulary knowledge. It also discusses vocabulary breadth and depth from an assessment point of view. Moreover, it reviews studies on the roles of breadth and depth in reading comprehension. Finally, it investigates the role of depth in L2 lexical inferencing.

2.1 Conceptual framework

To devise a conceptual framework for the current study and to understand the link between vocabulary knowledge and reading, it appears necessary to have an overview of the different conceptual frameworks of vocabulary knowledge. Many decades ago, Cronbach (1942) identified two main categories for vocabulary knowledge: knowledge of word meaning and accessibility to this knowledge. Under the former category, he recognized the term *breadth*. Richards (1976) proposed new characteristics to this framework such as register and word frequency, while Henriksen (1999) suggested that vocabulary knowledge involves three dimensions: breadth, depth and receptive and productive knowledge. Later, Nation's (2001) framework recognized other types of vocabulary knowledge such as meaning, form and use. More recently, Daller, Milton and Treffers-Daller (2007) built on Nation's framework proposing three components of word knowledge: breadth, depth and fluency. Although the previous frameworks were different, and provided various types of vocabulary knowledge, they complemented each other. They will be discussed in detail in [2.2.2] and [2.3.2].

However, other researchers (Qian 1998, 1999, 2002; Qian & Schedl 2004; Read 1989, 2000; Wesche & Paribakht 1996) devised conceptual frameworks through which they explicitly distinguished depth from breadth. In these frameworks, they considered the collective strength of the previous frameworks. More specifically, Qian's conceptual

frameworks were based on Nation's (2001) and Richards' (1976) frameworks which identified different key components comprising depth of vocabulary knowledge for reading. They did not only focus on breadth and depth, but they also tackled these two dimensions in the context of one of the language skills, reading comprehension, and therefore Qian's research provided a conceptual framework for the current study.

As has been noticed, different conceptual frameworks of vocabulary knowledge have been devised in different contexts providing various components of vocabulary knowledge. However, it should be noted that the conceptual framework of vocabulary knowledge for the current study is mostly based on Qian (1998, 1999, 2002) and Qian and Schedl (2004). The next section will address a key question: what the nature of vocabulary is. This question needs to be answered in order to understand what vocabulary knowledge is before exploring its main aspects, breadth and depth.

2.2 The nature of vocabulary

2.2.1 Definition of a word

Different researchers have provided different definitions of *a word* according to their contexts and testing purposes (Schmitt 2010). A simple definition of *words* might be as follows: '[w]ords are the black marks you are reading on this page' (Daller, Milton & Treffers-Daller 2007, p.2). Going beyond this simplistic perspective, defining *a word* seems difficult. Read (2000) attributed this difficulty to the fact that different definitions are used according to different methods of counting words.

Accordingly, various methods of counting such as tokens, types, word forms, lemmas and word families are used in lexical studies to denote different definitions of *a word* (Daller, Milton & Treffers-Daller 2007). For example, when counting the number of words in a learner's essay, words are here defined as tokens. These tokens are used as a basis for counting according to context and need. The number of running words in a text is known as tokens, whereas the number of different words is called types (Schmitt 2010). For instance, in the sentence: 'The boy ate the cake', there are five tokens but only four types, as the word 'the' appears twice. These terms are particularly used in corpus research, which is beyond the scope of the current study. Moving to word forms, it is noted that

English language constitutes various word forms. For example, the word 'enjoy' can have different forms such as 'enjoys', 'enjoyed', 'enjoyable', 'enjoyably' and 'enjoyment'. The problem here is that the word 'enjoy' has various forms. In other words, the question arises as to whether these words are regarded as six different words or different forms of the word 'enjoy'. Lexical researchers would consider them as different forms of the same word and focus on the knowledge of these content words when testing vocabulary (Read 2000).

However, in many vocabulary studies, researchers use either lemmas or word families as units or bases of counting. Lemmas refer to the root form and its inflected forms whereas the root form and its related inflected and derived forms are called a word family (Daller, Milton & Treffers-Daller 2007). The question arises as to whether researchers are consistent in using these terms. Some used lemmatized word lists (Meara & Milton 2003) while others used word families in their vocabulary size tests (Goulden, Nation & Read 1990). When assessing learners' word knowledge, another question arises as to whether the single word form or the whole word family is being assessed. For example, if learners provide the right response concerning their knowledge of the word 'equal', another question is posed : whether they know only the word 'equal' or whether they know other words such as 'equalize', 'equate', 'equation', 'equality' and 'inequality'.

The upshot is that there are many problems in defining *a word* and deciding the unit of counting words. However, it depends on lexical researchers who determine their use of terminology which fits into their testing contexts and purposes.

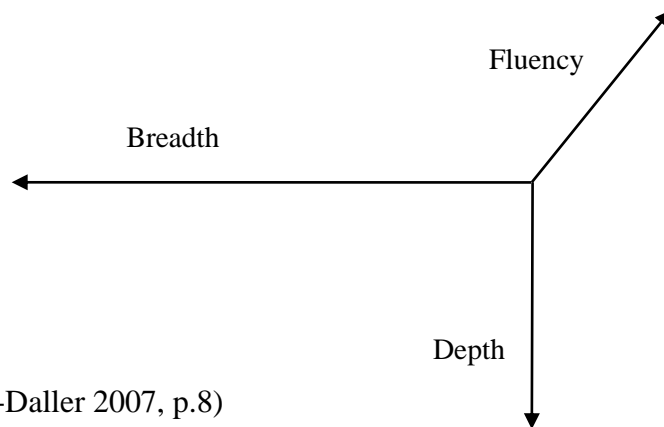
2.2.2 Definition of vocabulary knowledge

L2 Lexical researchers have introduced different definitions of *knowing a word* as they have different concepts of what learners' word knowledge comprises, and of statistical counts of their vocabulary size (Daller, Milton & Treffers-Daller 2007). According to Nation (2001), 'Knowing a word' is simply described as recognizing the form of a word. Yet, vocabulary knowledge might push beyond this basic notion.

Cronbach (1942), for instance, created a framework for presenting five components of vocabulary knowledge: generalization, breadth of meaning, precision of meaning (word

meaning), application and availability (use). Nevertheless, this framework was criticized as it focuses mainly on word meaning and minimally on other aspects of word knowledge such as collocational and morphological properties (Qian 2002). In response to this shortcoming, Richards (1976) added more components of vocabulary knowledge to this framework such as associations, morpho-syntactic properties, register and frequency level. Richards' framework emphasized the complex nature of lexical knowledge (Read 2000), as it included more than just recognizing the form of a word considering new characteristics such as register and word frequency. Building on this framework of vocabulary knowledge, Nation (1990) incorporated a number of aspects such as collocations and pronunciation to make it more comprehensive. Nation also highlighted the fact that receptive vs. productive distinction is required to fully know a word, which means that using a word (production) needs extended knowledge beyond understanding it (reception). In search of improving his earlier classification of what is involved in word knowledge, Nation (2001) took a further step by using a process model which entailed three distinct types of vocabulary knowledge: form, meaning and use. 'Form' includes spoken and written forms as well as word parts; 'meaning' involves form and meaning, concept and referents as well as associations; and 'use' entails grammatical functions, collocations and constraints on use (register and frequency).

Figure 2.1 The lexical space of word knowledge and ability



(Daller, Milton & Treffers-Daller 2007, p.8)

Based on Nation's (2001) analytical framework of vocabulary knowledge, Daller, Milton and Treffers-Daller (2007) proposed an idea of *lexical space* (see Figure 2.1) which describes a learner's knowledge of vocabulary as a three-dimensional space. Each

dimension describes a component or an aspect of word knowledge. At the horizontal axis lies lexical breadth and at the vertical axis lies lexical depth. The final axis is fluency which describes a learner's automaticity and readiness to use the known words in writing or speaking. Breadth can be represented by some elements of Nation's framework, i.e. 'form' as well as 'form and meaning', whereas depth can be represented by such elements as concept and referents, associations, grammatical functions, collocations and constraints on use. The issue of fluency will not be addressed here as it is not related to the dissertation topic. According to the concept of *lexical space*, defining a learner's vocabulary knowledge easily might be one of its advantages; however, the potential difficulty in testing vocabulary might be one of its drawbacks.

As has been seen, the previous section has discussed definitions of a *word* and *knowing a word*. The following sections will highlight the assessment of the two measures of vocabulary knowledge, breadth and depth, in reading comprehension in L1 and L2 research, as these measures are examined by the current study.

2.3 Assessing breadth and depth of vocabulary knowledge

2.3.1 Assessing breadth of vocabulary knowledge

Breadth of vocabulary knowledge is often referred to as vocabulary size as illustrated earlier in [1.1]. It has been the core measure of a learner's knowledge of vocabulary in numerous research studies (e.g., Laufer & Paribakht 1998; Meara & Jones 1988). It contributes to all language skills and proficiency. As such Meara (1996b, p.37) stresses the importance of vocabulary size in the following quotation:

[a]ll other things being equal, learners with big vocabularies are more proficient in a wide range of language skills than learners with smaller vocabularies, and there is some evidence to support the view that vocabulary skills make a significant contribution to almost all aspects of L2 proficiency.

In order to measure how many words a person knows, there are two major and widely known formats recently utilized in L2 lexical research: the Eurocentres Vocabulary Size Test (EVST) (Meara & Buxton 1987) and the Vocabulary Levels Test (VLT) (Nation 1983, 1990). Both tests are frequency-based but have different test formats. The EVST, which was designed by Meara and his associates, used the yes/no checklist test. It is the

simplest format of any vocabulary test for estimating L2 learners' vocabulary size where learners are presented with lists of lexical items and decide whether they know each item by selecting 'yes' for a positive response and 'no' for a negative one (Schmitt 2010). It is comprised of a set of real lexical items grounded on Thorndike and Lorge's (1944) list, and some non-words to adjust the scores of learners who overestimate their vocabulary knowledge (Read 2009). Claiming to know a number of non-words will result in reducing their final scores. The EVST is developed in two modes, paper-and-pencil and computer-based test. It is a reliable and valid test (Meara & Jones 1988). Below is an extract from the EVST webbed by Cobb (n.d.):

Test 1,

Level 2:

- | | | | |
|-------------------------------------|---------------------------------------|-------------------------------------|------------------------------------|
| 1 <input type="checkbox"/> galpin | 2 <input type="checkbox"/> impulse | 3 <input type="checkbox"/> suggest | 4 <input type="checkbox"/> advance |
| 5 <input type="checkbox"/> peculiar | 6 <input type="checkbox"/> benevolate | 7 <input type="checkbox"/> indicate | 8 <input type="checkbox"/> needle |

Although for placement purposes, the test has some promising features, Schmitt (2010) has challenged its simplicity and rubrics, noting that learners can achieve relatively higher scores with these types of tests. Besides, it provides no explicit demonstration of knowledge as very often learners overestimate their knowledge of vocabulary. Even Meara and his colleagues themselves proved that the test produced unsatisfactory results with certain learners whose L1 is cognate with English. In their study of a group of L2 learners, Meara and Buxton (1987) found that French and Italian learners found more difficulty in rejecting pseudo-words than Germanic ones because of the cognate effect.

The second test format, the Vocabulary Levels Test (VLT), developed by Nation (1983, 1990) and modified by Schmitt, Schmitt and Clapham (2001), is probably the most widely used vocabulary size test for L2 learners. It is 'the nearest thing we have to a standard test in vocabulary' (Meara 1996b, p. 38). It is a paper-and-pencil test which consists of lexical items distributed at five levels, 2000, 3000, 5000, 10000 and academic vocabulary, and utilizes a word-definition matching format. A complete description of the test will be provided in [3.3.1.1]. The test was employed as a reliable and valid vocabulary size measure in a number of studies (e.g., Huang 2006; Laufer 1992, 1996;

Qian 1999, 2002). For this reason, VLT was used as an instrument measuring breadth of vocabulary knowledge in the current research.

Comparing the EVST and VLT, it can be noted that the former focuses on word recognition while the latter focuses on meaning. Despite the great value of these tests to measure size, they were criticized for indicating shallow and superficial rather than deeper knowledge of individual words (Read 2000). However, in response to these tests, Schmitt (2010) argued that since the tests are both frequency-based, they will not provide an accurate estimate of learners' overall vocabulary size. They also measure only a single meaning of each word rather than multiple meanings, and do not assess any of the richer notions of knowing words as shown in [2.2.2]. Thus, using another measure to include these notions of word knowledge seemed necessary. This measure is called the depth of vocabulary knowledge test.

2.3.2 Assessing depth of vocabulary knowledge

As it is the second aspect investigated by the current research, depth of vocabulary knowledge plays a role equivalent to vocabulary size in reading comprehension. Many researchers have provided different perspectives on depth of vocabulary knowledge. Henriksen (1999), for example, provided a better basis for what is involved in measuring vocabulary depth. Three different dimensions were recognized in his research: partial-precise knowledge (vocabulary size tests), depth of knowledge and receptive-productive knowledge. Likewise, Qian (1999) conceptualized depth in another way, incorporating knowledge of word characteristics such as syntactic, semantic, morphemic and graphemic features. Yet, Read (2000) proposed that the quality of knowledge of particular words can be measured in two main methods. The first is termed the developmental approach while the second is called the dimensions approach. Table 2.1 below illustrates these approaches and a number of L2 lexical studies employing them.

Table 2.1 Approaches to conceptualizing depth of vocabulary knowledge

Approach	Focus	Researcher
Developmental (Scales)	<ul style="list-style-type: none"> ◆ Devising a workable scale to measure depth 	<ul style="list-style-type: none"> ◆ Dale’s (1965) scale ◆ Paribakht and Wesche’s (1997) scale ◆ Schmitt & Zimmerman’s (2002) scale
Dimensions (Components)	<ul style="list-style-type: none"> ◆ Measuring a number of vocabulary knowledge aspects by using dimension tests 	<ul style="list-style-type: none"> ◆ Schmitt & Meara’s (1997) study on knowledge of word associations and derivations ◆ Read’s (1998) study on knowledge of word meanings and collocations ◆ Schmitt’s (1998) study on knowledge of spelling and collocations

2.3.2.1 Developmental approach (developmental scales)

Vocabulary learning is an incremental process and therefore adopting a developmental scale would be practical and useful in learning contexts (Schmitt 2010). However, as Table 2.1 shows, to create a workable and valid scale is somewhat tentative as little is known about the process in which vocabulary development progresses. For instance, Dale (1965, p.898) devised a developmental scale on word knowledge used in L1 research as follows:

- Stage1: ‘I never saw it before.’
- Stage2: ‘I have heard of it, but I don't know what it means.’
- Stage3: ‘I recognize it in context - it has something to do with...’
- Stage4: ‘I know it.’

Nonetheless, as stated earlier in [2.2.2], the main problem with this scale is the fact that knowing the meaning of a word in a certain context does not demonstrate the learner's full knowledge of this word. As a result, L2 lexical researchers have attempted to develop similar scales which should address this issue.

Building on this scale, Paribakht and Wesche (1997) created the *Vocabulary Knowledge Scale* (VKS), which is perhaps the most widely accepted measure of vocabulary depth. Like Dale's (1965) scale, the VKS is a developmental scale used to assess ESL learners' 'incidental' acquisition of meanings of target words. While Dale's is criticized for measuring learners' superficial knowledge of target words, the VKS combines both receptive (categories I-II) and productive knowledge (categories III-V) of particular target words. In other words, test takers are required to compose a potential sentence with the target word and therefore the VKS is a deeper and more multi-faceted scale than Dale's. The upshot is that the VKS is a generic and practical instrument which allows for testing learners' knowledge of any lexical item (Schmitt 2010). The format of the VKS is shown below:

- I. I don't remember having seen this word before.
- II. I have seen this word before, but I don't know what it means.
- III. I have seen this word before, and I think it means _____. (synonym or translation)
- IV. I know this word. It means _____. (synonym or translation)
- V. I can use this word in a sentence: _____. (Write a sentence). (If you do this section, please do section IV.)

In spite of its practicality, the VKS received some criticism. Paribakht and Wesche (1997) themselves criticized it for being inappropriate to measure vocabulary knowledge in general as it provides inaccurate information about a learner's knowledge of a specific target word. Schmitt (2010) has also mentioned some limitations about the VKS, the first of which is that eliciting verification of knowledge is unclear in the initial two categories compared to the relatively obvious way of the indication of knowledge in Categories III-V. Second, there is inconsistency of the knowledge constructs between the different categories, as categories I-IV deal with the form-meaning connection in comparison with category V which is a quick jump to the full productive output. A third limitation is the problem with the amount of contextualization as categories I-IV deal with the target word

in isolation. Another practical problem with category V is that learners might compose sentences which do not show evidence of their knowledge of the word (Read 2000).

Recognizing the limitations of the VKS, other lexical scholars have utilized refined versions of the VKS in their research (e.g., Joe 1998; Qian 1998). Recently, Schmitt and Zimmerman (2002) devised another less complex developmental scale but it also received criticism. As Schmitt (2010, p.223) puts it '[n]o current scale gives a full account of the incremental path to mastery of a lexical item, and perhaps lexical acquisition is too complex to be so described'.

2.3.2.2 Dimensions (components) approach

The second approach to assessing depth is quantifying learners' mastery of specific lexical items (Schmitt 2010), and it was described by Schmitt (1998) as a valuable approach with some potential advantages. First, the dimensions approach is probably comprehensive as it measures various kinds of word knowledge creating a detailed account of vocabulary knowledge. As the name indicates, the approach has also the potential to break vocabulary acquisition into some components that can be analyzed separately. This analysis would assist lexical researchers in exploring relationships between some of the components of word knowledge such as the relationship between word associations and derivational suffixes (Schmitt & Meara 1997) as shown in Table 2.1. Moreover, such an approach might be well worth the effort because it enables researchers to examine the complex nature of word knowledge and to understand how vocabulary moves from receptive to productive mastery with different levels (Read 2000).

Nevertheless, Schmitt (2010) has offered some limitations of the dimensions approach. First, measuring all components or aspects of word knowledge in an individual test battery is practically impossible, but lexical researchers need to use multiple measures of word knowledge aspects. Second, some aspects can be tested while others cannot. For instance, there is no existence of a test which taps into stylistic appropriacy of vocabulary. Read (2000) also challenged the idea that dimensions tests assess learners'

knowledge of fewer and fewer words, which means that it is dangerous to make generalizations about learners' overall lexical knowledge only on the basis of these tests.

A salient measure of depth that has been most utilized is Read's (1993, 1998) *Word Associates Test* (WAT). It is one of the dimensions tests which assess word associations or associates linked to each target word. For each target word, there are eight options from which test-takers are required to choose four words that are semantically and collocationally related to it. However, some scholars (e.g., Greidanus & Nienhuis 2001; Schoonen & Verhallen 2008) have revised WAT to accommodate their learners' needs using six-option versions (three distractors and three responses) instead of eight-option ones. Designing a simple type of item meaningfully was the main aim of this depth of vocabulary knowledge test (Read 2007). Some vocabulary studies (e.g., Nassaji 2006; Qian 1998, 1999, 2002) have used WAT to measure vocabulary depth. Based on these studies, WAT was adopted as an instrument for measuring depth in the present dissertation research. Further information about the test will be provided in [3.3.1.2].

2.3.3 Empirical studies on the relationship between breadth and depth

Both breadth and depth of vocabulary knowledge are interrelated (Read 2004) in the sense that learners' knowledge of vocabulary deepens so long as their vocabulary is large and therefore depth cannot occur without some breadth. A number of research studies have shown evidence of this relationship (e.g., Nurweni & Read 1999; Vermeer 2001). In a study of secondary and post-secondary Japanese students, Schmitt and Meara (1997) found moderate positive correlations of .62 between vocabulary size and word associates.

Likewise, administering both breadth and depth tests to Indonesian university students, Nurweni and Read (1999) reported high correlations between the scores on these measures ($r = .81$). However, when students were grouped according to their proficiency levels, correlations of .81, .43 and .18 were found between both tests for high, middle and low proficiency groups respectively. Later, using a network building approach, Vermeer (2001) studied the relationship between receptive vocabulary (a breadth measure) and association task (a depth measure) in Dutch monolingual (DL1) and bilingual (DL2) primary learners. The correlations between breadth and depth measures for both groups

were all over .80. Based on these findings, Vermeer contends that breadth and depth are not opposites and that there is no dichotomy between both dimensions.

2.4 The role of vocabulary knowledge in reading comprehension

As the main objective of this dissertation is to assess the roles of both breadth and depth in reading comprehension, this section discusses L1 and L2 research pertinent to this topic. A large body of research has focused on the role of vocabulary breadth in reading comprehension (e.g., Laufer 1989; Laufer & Kalovski 2010; Stahl 2003). As for the role of depth of knowledge in reading comprehension, it seems that L1 research has stressed the importance of this principle though it lacks some empirical evidence (Anderson & Freebody 1981; Stahl 1986). Nonetheless, L2 research has made rather less contributions to investigating the role of vocabulary depth in reading comprehension (Read 2007).

2.4.1 Vocabulary knowledge and reading comprehension in L1 research

Examining the relationship between vocabulary knowledge and reading comprehension in L1 research, Anderson and Freebody (1981) suggested three main hypotheses: the instrumentalist, aptitude and knowledge. According to the instrumentalist hypothesis, knowledge of words is the direct cause of text comprehension, i.e. lexical knowledge facilitates students' reading ability. The aptitude hypothesis views learners' scores on a vocabulary test as an indicator of their verbal aptitude. Their success in reading comprehension is attributed to their agility rather than big vocabulary. The knowledge hypothesis sees background knowledge as the major factor in successful reading, and a large vocabulary is regarded as a peripheral rather than central element of background knowledge. Challenging the aptitude hypothesis, which is based on a limited amount of vocabulary training, Mezynski (1983) proposed access hypothesis. According to this view, a number of trainable skills such as utilizing some meta-cognitive strategies and accessing word meaning will result in learners' vocabulary development. This training will probably lead to an important change in learners' reading scores.

A number of L1 lexical studies (e.g., Biemiller 2005; Stanovich 2000; Yap 1979) stressed the causal relations between vocabulary and text comprehension. Other studies (e.g.,

Kameenui, Carnine & Freschi 1982) showed evidence that comprehending a text can be developed by the positive effect of vocabulary training, while other studies (e.g., Jenkins, Pany & Schreck 1978) found that training does not necessarily facilitate comprehension. Thus, it can be inferred that vocabulary might not be the only factor which affects reading and that the possible effect of other factors on reading such as training should not be reduced.

2.4.2 Empirical studies on the link between vocabulary knowledge and reading comprehension in L2 research

This section aims at presenting empirical studies to show the relationship between breadth and depth of vocabulary knowledge and reading comprehension in L2 research, which is the topic of the current dissertation. Examining the strong link between the percentage of words known in a text (vocabulary size) and comprehending the same text, Laufer (1989) reported that nearly 95% coverage was adequate for understanding general academic texts, which equalizes knowledge of approximately 3000 word families. This coverage is a vocabulary 'threshold' above which the level of comprehension increases and below which the level of comprehension decreases. However, Hu and Nation (2000) found that knowing 98% of the words in texts was necessary to understand texts, which means that more coverage can determine better text comprehension. More recently, in their study of 661 ESL/EFL subjects from a variety of L1 backgrounds, Schmitt, Jiang and Grabe (2011) came to the conclusion that around 98% coverage (corresponding to 8000-9000 word families) was sufficient for comprehending academic texts. These findings supported Hu and Nation's results. They also suggested that this coverage is not deemed as an indication of a lexical 'threshold', as vocabulary is not the only factor that determines understanding texts.

Likewise, after reviewing some vocabulary studies, Laufer (2000) found that the vocabulary size for high school and university ESL/EFL learners was 1000-4000, while 8000-9000 word families seemed unattainable for both learners and teachers. In another study conducted by Laufer and Kalovski (2010), two lexical thresholds for success in reading comprehension were suggested: 4000-5000 word families (minimal one) and

8000 word families (optimal one). These results corroborated her earlier findings (e.g., Laufer 1989, 2000). From this, it can be concluded that lexical threshold for reading ability varies and different researchers have provided different lexical thresholds according to their contexts, which implies that the threshold of vocabulary size may be a pedagogical problem.

In contrast, when it comes to investigating the depth of vocabulary knowledge in reading comprehension, literature has minimally contributed to such an area presumably because it is easier to measure vocabulary size than vocabulary depth (Qian 1999) and because there is a lack of depth measures in L2 research (Read 1998). The first attempts to look implicitly at vocabulary depth were made by de Bot, Paribakht and Wesche (1997) who employed think-aloud protocols to investigate lexical processing in reading. Their study did not conceptualize the term 'depth' but purported to explore some aspects of depth such as word associations, homonymy and word morphology.

In response to de Bot, Paribakht and Wesche (1997), Qian (1998, 1999) took a step further conceptualizing and focusing on vocabulary depth. In a sample of Korean and Chinese adult learners, Qian employed VLT, WAT and TOEFL (Test of English as a Foreign Language) reading and found that the scores on the three tests were highly intercorrelated within the range of .78-.82. He concluded that vocabulary depth was a stronger predictor of learners' reading scores than vocabulary breadth and that depth was as important as breadth in predicting reading outcomes.

Likewise, in a sample of 217 subjects from a variety of L1 backgrounds, Qian (2002) examined the relationship between vocabulary breadth and depth and reading comprehension at university level. Results showed that correlations from $r=.68$ to $r=.82$ were found between TOEFL reading and vocabulary tests (VLT & WAT). The study obviously supported Qian's (1998, 1999) findings that vocabulary depth scores uniquely contributed to predicting test-takers' reading scores and that the vocabulary depth measure was as important as the vocabulary size measure. Later, Qian and Schedl (2004) conducted another study with 207 international students to assess the utility and practicality of the depth of vocabulary knowledge test. Employing three measures, a

depth measure, TOEFL vocabulary measure and TOEFL reading measure, they concluded that the depth measure could be included in assessing TOEFL vocabulary. Moreover, this finding is congruent with Qian's (1998, 1999, 2002) results indicating that vocabulary depth uniquely contributed to predicting learners' reading performance. In a recent study, Quellette (2006) came to the same conclusion that vocabulary depth predicted reading comprehension of grade four learners' reading comprehension. More recently, Mehrpour, Razmjoo and Kian (2011) investigated the same topic but in an EFL context. They found that depth had a greater impact on Iranian university students' academic reading comprehension than breadth and that both breadth and depth were interrelated.

Nevertheless, Huang (2006) found that vocabulary breadth made more contribution to predicting reading comprehension of Chinese university students than vocabulary depth. While vocabulary breadth alone explained 50% of the variance in students' reading comprehension, vocabulary depth alone explained 44.3% of the variance. These findings seem to contradict Qian's (1998, 1999, 2002) research findings.

2.5 Depth of vocabulary knowledge and lexical inferencing (guessing)

Relevant to the dissertation topic is examining the association between students' depth of vocabulary knowledge and their lexical inferencing ability during reading written texts. As Schmitt, Jiang and Grabe (2011) mention that depth of vocabulary knowledge provides the basis for language proficiency and inferencing ability. These abilities contribute to text comprehension. This directly addresses the third research question of the current study stated earlier in [1.3]. The following sections will examine some definitions of lexical inferencing, L2 reading models, knowledge sources used in lexical inferencing and some empirical studies on the relationship between vocabulary depth and lexical inferencing success.

2.5.1 Defining lexical inferencing

Lexical inferencing is defined as the identification of unknown word meanings (Carton 1971). Later, Haastrup (1991) defined lexical inferencing as making 'informed guesses' of

the meanings of unfamiliar words. Obviously, Haastrup's definition is more precise than Carton's and offers the term 'informed guesses' that is equivalent to 'inferencing'. More recently, Schmitt (2010, p.32) describes lexical inferencing as 'qualified guessing of the meaning of lexical items *in* context, rather than guessing *from* context'. Based on Haastrup's and Schmitt's definitions, lexical guessing is interchangeable with lexical inferencing.

2.5.2 L2 Reading models

This section discusses the relationship between three distinct L2 reading models and lexical guessing: the bottom-up model, the top-down model and the interactive model. In bottom-up, readers depend on letter combinations and words to derive meanings from a text (Gough 1972). Yet, this model recognizes little lexical guessing. Later, the top-down proposed by Goodman (1981) surpassed the previous model because in his model readers use semantics and syntax rather than print and text's phonics to guess the meanings. According to the top-down, the reader is likely to activate his prior and high-level knowledge (knowledge of the world) when dealing with the text. As the third model name suggests, a lot of emphasis is placed on the interaction of processing levels and knowledge sources (Rumelhart 1977). In other words, in the interactive model, readers produce the best guess if they activate not only low-level processes such as letter clusters and the word shape, but also high-level processes such as knowledge of syntax, semantics and knowledge of the world.

2.5.3 Frameworks for lexical inferencing

Literature has provided a number of frameworks that highlight the multiple knowledge sources used in guessing word meanings from context (Nassaji 2006). For example, Haastrup (1991) developed a framework of knowledge sources that L2 learners employ during lexical guessing. Later, de Bot, Paribakht and Wesche (1997) proposed another framework that was relatively similar to Haastrup's. Table 2.2 below compares the two frameworks showing the knowledge sources L2 learners use in guessing the meaning of unfamiliar words.

Table 2.2 Comparing the frameworks for lexical inferencing

Knowledge source	Haastrup (1991)	de Bot, Paribakht and Wesche (1997)
1-Contextual knowledge	1.1 Knowledge of co-text: a- clues within the test word b- clues within the sentence c- clues beyond the sentence d- overall use of the context 1.2 Knowledge of the world	♦ Discourse and text ♦ World knowledge
2-Intralingual knowledge	2.1 The word itself a- phono./orthography b- morphology c- lexis d- word class e- semantics f- collocations 2.2 Syntax of the sentence a- adjectives b- prepositions c- definite articles d- number	♦ punctuation ♦ word morphology ♦ cognates ♦ homonym ♦ word associations ♦ Sentence level grammar
3-Interlingual knowledge	a- L1 b- Ln	–

Ln denotes the language used by the learner other than his L1 and L2.

According to Table 2.2, de Bot, Paribakht and Wesche's (1997) framework is simpler than Haastrup's (1991) as the latter is organized in three-level structure, which makes this framework difficult to use. However, Haastrup's framework identifies 'co-text knowledge' which is not clearly expressed in the other framework, and which is useful in showing positions of clues during the inferencing process. In addition, it uses the intralingual knowledge category which represents vocabulary depth. On the other hand, de Bot, Paribakht and Wesche's framework uses straightforward terms such as word morphology and word associations instead of the over-refined subcategories of intralingual knowledge; accordingly, their framework is more flexible and easier to use.

Later, Qian (2005) devised an analytical framework on the basis of the above mentioned frameworks. His framework was employed in the current study to analyze the interview data. The complete description of this framework will be provided in [4.2.1.1].

2.5.4 Empirical studies on the relationship between vocabulary depth and lexical inferencing

L2 lexical scholars contend that guessing is a difficult ability for L2 learners, particularly for less proficient learners (Bensoussan & Laufer 1984; Haastrup 1991; Haynes 1993). In her study on lexical guessing of French university learners in Canada, Morrison (1996) found that high proficiency learners (HPL) made successful guesses at a rate of 74%, while the low proficiency learners (LPL) were capable of achieving a success rate of 34%. Recently, Qian (2005) obtained similar findings indicating that HPL were successful in guessing 67% of the unknown words, whereas LPL were successful in guessing 29%. In another study conducted by Nassaji (2006), HPL were successful in guessing 68.6% while LPL were successful in guessing only 31.4%. Moreover, Liu and Nation (1985) came to a relatively similar conclusion that 85% of the unfamiliar words were successfully guessed by the HPL, whereas 30% was successfully guessed by the LPL.

From these studies, it can be inferred that the success rate in lexical guessing appears to be uneven. This proposes that training L2 learners in this ability is particularly needed

(Schmitt 2010). More importantly, L2 learners should have an adequate knowledge base before being asked to infer word meanings from context (Nassaji 2006).

2.6 Summary

According to the reviewed literature, the nature of vocabulary knowledge is both complex and multi-dimensional. Although some definitions of *a word* were offered, they were inconsistent as each definition relied on a separate unit of counting. Moreover, definitions of vocabulary knowledge were different but complementary. Nation's (2001) definition of vocabulary knowledge, for example, built on Richards' (1976). The proposed definitions contained various aspects of vocabulary knowledge. L2 lexical researchers have focused on breadth and depth as the main aspects of vocabulary knowledge. For measuring breadth, Eurocentres Vocabulary Size Test (EVST) (Meara & Buxton 1987) and Vocabulary Levels Test (VLT) (Nation 1983, 1990) have been widely accepted in L2 research and the latter was employed as one of the quantitative instruments in the current study. To assess depth, two main approaches, developmental approach (scales) and dimensions approach (components), were investigated. Word Associates Test (WAT) (Read 1998), one of the dimensions tests, was used as another quantitative instrument in the study. Nation's VLT, Read's WAT and CEPA reading test (NAPO n.d) provided the basis for gathering the quantitative data for the current study with the aim of answering the first and second research questions specified in [1.3]. Empirical studies on the connection between two aspects of vocabulary knowledge and reading comprehension have been reviewed.

The relationship between vocabulary depth and lexical inferencing was investigated. To achieve this purpose, a number of definitions of inferencing were made by Haastrup (1991) and Schmitt (2010) who indicated that lexical inferencing was interchangeable with lexical guessing. Three reading models, top-down, bottom-up and interactive, were then examined. Some empirical studies on the association between vocabulary depth and lexical inferencing have been reviewed. Among these studies was Qian's (2005) study which devised an analytical framework for presenting knowledge sources used in

inferencing tasks. This framework formed the basis for analyzing the qualitative data for the current study in order to answer the third research question mentioned earlier in [1.3].

As stated earlier, the aim of the current study is to measure the roles of breadth and depth of vocabulary knowledge in reading comprehension in EFL classes. The next chapter will discuss the research design, sample selection, instrumentation, data collection procedures as well as data analysis.

Chapter Three

Methodology

This chapter discusses the design of the current study which includes two phases, quantitative and qualitative. It highlights the sample selection for each phase of the study. It also describes both quantitative and qualitative instruments with the aim of collecting the data and answering the research questions mentioned earlier: how scores on vocabulary size, depth of vocabulary knowledge and reading comprehension correlate with one another, whether breadth or depth is a more powerful predictor of learners' reading comprehension, and how EFL learners use their vocabulary depth to guess the meaning of unknown words in a written text. Furthermore, it presents data collection and data analysis procedures. Finally, it outlines the ethical aspects of the research.

3.1 Research design

The current study employs both quantitative and qualitative methods (mixed methods). A quantitative method refers to collecting and analyzing numeric data to explain and predict an outcome, whereas a qualitative method refers to collecting, analyzing and interpreting non numeric data (words or text) to obtain insights into a research area (Gay, Mills & Airasian 2009). On the other hand, Creswell (2008, p.62) defines mixed methods designs as 'procedures for collecting, analyzing, and mixing both quantitative and qualitative data in a single study or a multiphase series of studies'. The purpose of this design is to provide more insights and understanding of a research area than does a single method (Tashakkori & Teddlie 2003). The design was selected for three reasons. First, the topic of the role of vocabulary knowledge in reading comprehension best suits a combined design that requires both explanation (quantitative) and exploration (qualitative) (Creswell 2003). Explanation, here, refers to examining the impact of predictors (breadth and depth of vocabulary knowledge) as independent variables on reading comprehension as a dependent variable, whereas exploration refers to further examining depth of vocabulary knowledge in reading comprehension. Second, the mixed methods design was specifically chosen to answer the research questions of the current study, as a single approach would not be sufficient to do that. Third, the role of vocabulary knowledge in

reading comprehension might be complex in nature. This complexity might have created the logic of the overall design of the current research.

In the current study, the adopted type of mixed methods design was explanatory (a two-phase model) (Creswell & Plano Clark 2007). In other words, this design comprises two phases, quantitative and qualitative. The phases of the study are conducted sequentially and the findings of the qualitative phase are mixed to inform the quantitative phase (Johnson & Onwuegbuzie 2004). As is the case with the current study, in the first phase, three language tests (a quantitative component) were employed to determine how scores on vocabulary size (breadth), depth of vocabulary knowledge and reading comprehension were intercorrelated, and to determine which aspect of vocabulary knowledge, breadth or depth, was a more powerful predictor of reading comprehension. Following this quantitative component, the second phase used semi-structured interviews (a qualitative component) to better understand how the subjects utilized their depth of vocabulary knowledge in order to guess the meanings of unknown words in a written text.

3.2 Background to the sample

The focus of this section is to discuss how the sample was selected for the two phases of the study. In the first phase of the study, the sample included 110 male and female grade 12 students selected from 3 public and 2 private secondary schools in three emirates: Abu Dhabi, Sharjah and Fujairah. The actual number of students who voluntarily participated in the study was 93, as 17 students absented themselves from one or two tests and therefore they were excluded. The participant students' age ranged from 17 to 18 years. Their native language was Arabic and they used English as a foreign language. It should be noted that Arabic is not cognate with English as both languages are linguistically and orthographically different (Randall 2009). Consequently, it was almost impossible for the participants to guess the meaning of unknown English words by using their L1 in the three language tests of the study.

The 93 participants attended different schools (see Table 3.1) which followed the UAE Ministry of Education curriculum and which used traditional methods of teaching rather than interactive, student-centered activities. In public schools, most students came from

the UAE and a few of them came from other countries, whereas in private schools, students were mostly expatriates belonging to different nationalities: Egyptian, Syrian, Iraqi, Jordanian and others. Students' level of English in private schools is higher than their peers' in public schools. This is probably due to the fact that expatriates are more interested in taking some English courses to improve their communication skills than Emirati students.

Table 3.1 Distribution of the participants' schools (N= 93)

Emirate	School type	No.of participants	
		Males	Females
Sharjah	Public	-	15
	Private	32	-
Fujairah	Public	14	-
	Public	-	20
Abu Dhabi	Private	12	-

In the second phase of the study, the *stratified purposeful sampling* was adopted in order to select participants for interviews. About this sampling strategy, Mertens (2010) states that participants are selected according to specific criteria which determine the classification of subgroups (strata). As is the case with the current study, four male participants, who were part of the sample of the first phase, were recruited according to their scores on the depth of vocabulary knowledge test (DVK) as illustrated in Table 3.2 below: two high-proficiency and two low- proficiency participants.

Table 3.2 Ranking participants according to their depth of vocabulary knowledge scores (N=4)

Participants' ranking	DVK scores (max.score: 160)
1	133
2	125
3	90
4	88

3.3 Instrumentation

The current research employed three quantitative instruments and one qualitative instrument. In the first phase of the study, vocabulary size test (VS), depth of vocabulary knowledge test (DVK) and reading comprehension test (RC) were employed to collect the data, whereas in the second phase, semi-structured interviews were used to enrich the study with qualitative data. Below is a detailed description of both the three language tests with their piloting and the interviews.

3.3.1 Quantitative instruments

3.3.1.1 Vocabulary size test (VS)

The test was originally named Vocabulary Levels Test (VLT) devised by Nation (1983, 1990) to assess L2 learners' vocabulary size. It was initially validated by Read (1998). Later, it was modified and revised by Schmitt, Schmitt and Clapham (2001) for two reasons: to present validity evidence and to provide a better reliability of the test items. Their revision of the VLT proved that 30 items per level was more reliable than 18 items in Nation's original Levels test. The test reached a reliability of .92 (Qian 1999). It was accepted by some L2 lexical scholars (e.g. Laufer & Paribakht 1998; Qian 1998, 2002). Therefore, the test adopted in the current study was the modified VLT (version 2) as a breadth of vocabulary knowledge test or a vocabulary size test.

This vocabulary size test (VS) comprises five sections: 2000, 3000, 5000, 10000 frequency levels and an academic vocabulary section (see Appendix B). The four frequency levels were based on Thorndike and Lorge's (1944) list, the General Service List (GSL) (West 1953) and Kučera and Francis (1967), whereas the academic section was based on Xue and Nation's (1984) University Word List. According to Nation (1990), each level is associated with a particular vocabulary learning objective. For example, for an effective use of English, students should know the words at 2000 and 3000 levels. The words at 5000 deserve working on in class as they comprise the upper limit of the most frequent words. Finally, the 10000 word level contains low-frequency words, while the academic vocabulary helps students in reading textbooks and academic texts.

The VS involves 60 words and 30 definitions at each level. In groups of six words and three synonyms or definitions, testees are required to match three words to three definitions. Below is an example taken from the 2000 word level:

- | | | | |
|---|-------------|---------------|-------------------|
| 1 | blame | | |
| 2 | elect | _____ 4 _____ | make |
| 3 | jump | _____ 2 _____ | choose by voting |
| 4 | manufacture | _____ 5 _____ | become like water |
| 5 | melt | | |
| 6 | threaten | | |

Unlike a standard multiple choice test, the VS reduces the chances of guessing to one response in six distractors. It covers all the words in each group that represents the same type of word, so as not to provide any syntactic clues for the accurate matches. In addition, it requires the test-takers not to differentiate between words that are related in meaning as it measures knowledge of word. As for scoring the VS, a correct match of each word is given a score of 1 and therefore the highest score is 150 points.

3.3.1.2 Depth of vocabulary knowledge test (DVK)

The test was originally known as the Word Associates Test (WAT) to measure L2 learners' vocabulary depth. It was created by Read (1998) who carried out little validation on it. Recently, Schmitt, Ng and Garras (2011) have presented the validation evidence of the WAT. Read (1995) obtained a reliability of .93 for the test. The WAT enables investigators to test not only word meanings, like the VLT, but also their uses. This has induced a number of L2 scholars to use it in their research (e.g. Greidanus & Nienhuis 2001; Nassaji 2006; Qian & Schedl 2004). For these reasons, version 4 of the WAT was used as a depth measure in the current study.

The test contains 40 items (see Appendix C) intended to assess two components of vocabulary depth: paradigmatic (meaning) and syntagmatic (collocation) associates. Testees are required to identify the 4 words that are associated with the target word or the stimulus adjective as shown in the extract below:

domestic

home	national	regular	smooth	animal	movement	policy	speed
------	----------	---------	--------	--------	----------	--------	-------

The first box is comprised of two synonyms (or part of the meaning) of the stimulus adjective (domestic-home, national), while the second box consists of two collocations (domestic-animal, policy). Testees can choose the 4 correct associates by applying one of the following three situations: they can choose two associates from the left box and two associates from the right box (2-2) as shown in the above extract; they can choose three associates from the left box and one associate from the right box (3-1); or they can choose one associate from the left box and three associates from the right box (1-3). This was done to make guessing more difficult. In scoring the DVK, one point was awarded for each correct answer. The highest score for the test was 160.

3.3.1.3 Reading comprehension test (RC)

The test is a reading comprehension section of CEPA. It was a nationwide multiple-choice test which was created by a group of highly-trained and highly-experienced language teaching professionals in 2003 (NAPO n.d.). It has two formats, paper-and-pencil and computer-based. Recently, Brown and Jaquith (2011) have provided evidence for the validity of CEPA. It was employed in some research studies (e.g. Fitze & Glasgow 2009; Rumsey 2012). Accordingly, the CEPA reading test was chosen to measure comprehension levels in the current study (see Appendix D).

The CEPA reading section originally consists of three texts with 25 multiple-choice items which are taken from NAPO (n.d.). CEPA text 1 is considered a non-academic text which contains graphics, posters, brochures and the like. CEPA texts 2 and 3 are general academic texts (400 words each) whose topics do not focus on any specific field of study. Regarding the reading comprehension questions, test-takers are tested on the following six reading skills: (1) finding the meaning of unfamiliar words; (2) identifying pronoun reference; (3) identifying main ideas; (4) understanding implications; (5) comprehending the sequence of events; and (6) comprehending the text coherence. As for scoring, 1 point was given to each correct answer and therefore the maximum score for the test was 25 points.

3.3.1.4 Piloting

Piloting took place before commencing the study and it was conducted for two reasons: to test the validity and reliability of the RC, VS and DVK in the context of EFL classrooms and to find out other practical matters such as the appropriateness of the test materials and the amount of time required to complete the tests. The three tests were administered to 13 participants who had a similar proficiency level to the whole sample.

All the items of the measuring instruments need to be adequate and representative of the intended content area (Alderson, Clapham & Wall 1995) in order to ensure the validity of the three tests of the current study. To achieve this purpose, four linguistic experts, including two Arab supervisors and two English advisors, were asked to provide their input on these tests. According to their feedback, the 10000 word level in the VS was beyond the proficiency level of EFL learners and this induced me to exclude it from testing procedures. The highest score for this test was therefore 120. The experts also agreed that only CEPA texts 2 and 3 were adopted to suit the purpose of the study. This led to shortening the RC to 17 multiple-choice comprehension questions in total; accordingly, the highest score for the RC was 17. Moreover, they asserted that all the test items were clear and well-designed and therefore the tests could measure the content it was intended to cover. Based on this, it was important and useful to ensure this content validity of the tests (Cohen, Manion & Morrison 2000; Creswell 2008) before administering them in an EFL context.

Table 3.3 Descriptive statistics and reliability of the RC, VS and DVK for the subsample (N=13)

Test	MS	M	SD	Spearman-Brown reliabilities
RC	17	14.15	2.93	.81
VS	120	97.69	14.36	.75
DVK	160	107.23	14.52	.87

MS = maximum score

Table 3.3 reports the results of piloting the RC, VS and DVK. Means and standard deviations of the scores on the three tests are summarized in order to find out how the

scores were distributed. Spearman-Brown formula was computed for the scores on the three tests to check the internal consistency of these tests. It can be observed that reliability values revealed an acceptable level of reliability for the tests. However, the reliability value for the VS (0.75) was relatively lower than that of the RC and DVK (0.81 and 0.87 respectively). Thus, no changes were made to the tests after piloting, and the 13 participants' scores were included in the study. Based on piloting the tests, the test taking time was 25 minutes for the RC and 30 minutes for both the VS and the DVK.

3.3.2 Qualitative instruments

3.3.2.1 Interviews

Interviews can be a good qualitative tool to explore a research area in more depth. They 'are focused on drawing from the speaker the richest and fullest account possible' (Richards 2003, p.50). There are three types of interviews in terms of structure: structured, semi-structured and unstructured. It seems that semi-structured interviews suit the purpose of the study as they provide the researcher with a great deal of flexibility for elaborating on questions and changing their order (Nunan 1992). This type of interview comprises pre-phrased questions that allow the investigator to elicit the desired responses from the informants (Creswell 2008).

One-to-one interviews were grounded on two experimental sentences selected from the RC passages in the first phase of the study and an experimental text. In the experimental sentences, there were two highlighted words that were expected to be unknown to some participants. The experimental text was entitled 'The History of the Internet', taken from *Reading for the Real World* (Malarcher & Janzen 2004, pp.22-23). This text was particularly chosen as it involved 10 highlighted words that were likely to be unfamiliar to some interviewees (see Appendix E). These words are: 'mechanism', 'distribution', 'regardless', 'concept', 'decentralized', 'application', 'version', 'established', 'advances' and 'diverse'. These words, along with those included in the experimental sentences, were regarded as stimulus words to probe learners' responses. They were chosen for deciding whether they were familiar to the learners, and how the meanings of the words were guessed.

To obtain native speaker norms for the material, two experienced native speakers of English were asked to choose and assess the appropriateness of the experimental sentences and the text. They had to make sure that the word meanings were inferable from the context and that there were clues for helping learners guess the meanings.

3.4 Data collection procedures

All ethical considerations were followed before conducting the study, which will be dealt with in [3.6]. Principals' approval was obtained via emails before accessing schools. The students who voluntarily participated in paper-and-pencil testing sessions signed an informed consent form (see Appendix A). Participants took these tests during their daily schedules for assessing their vocabulary levels. Because I was not one of the teaching staff at the participant schools, my colleagues took the responsibility of administering the three language tests (VS, DVK and RC). According to their reports, colleagues strictly controlled the time in each session, and ensured that all test instructions and explanations were clear to all participant students.

The three tests were administered on three different days in different orders: the reading test was administered on the first day and the two vocabulary tests were administered on the other days. To reduce the potential influence of learning effects, the reading test was separated on the first day since some stimulus words in the DVK appeared in the reading test. Consequently, I had to make sure the test items did not repeat in the two vocabulary tests (VS and DVK) so that the result of the second vocabulary test would not be influenced by the first vocabulary test. Based on these considerations, the orders were:

1-RC-DVK-VS 2- RC-VS-DVK

After collecting the quantitative data from the three language tests in the first phase of the study, the second phase commenced. This phase took the form of in-depth semi-structured interviews as a qualitative technique to enrich the study qualitatively. Four participants were chosen from one of the boys' schools as it was difficult to conduct any interviews with girls for cultural reasons. The four interviews were carried out to further examine how the participants, who were part of the first phase of the study, used their vocabulary knowledge in trying to guess the word meanings while reading. Before being

interviewed, each participant signed an informed consent form and was reminded that the interview would not affect his academic achievement as it was only conducted for research purposes.

I conducted all the interviews. Each interviewee was initially introduced with the experimental sentences to underline the unknown words in them. These underlined words became the focus of questions the interviewer had pre-formulated (see Appendix F). After that, the interviewee was given a few minutes to explain the sentences and guess the meanings of the unknown words.

Regarding the experimental text (see Appendix E), each interviewee was asked to read it silently in order to underline all the unknown words. Subsequently, he was asked to explain the main idea of the text and answer questions about the underlined words to guess their meanings. When the interviewee was unfamiliar with some of the 10 highlighted test words in the text as illustrated in [3.3.2.1], these words became the focus of interview questions. In case the interviewee was unable to describe the main idea of the text, I would use other words in conjunction with the 10 highlighted test words. This is because he probably misunderstood some words that were not underlined.

Each interview lasted nearly 20 minutes. The interviews were conducted in English, but interviewees could use Arabic if they could not express themselves properly in English. The questions and responses were audio recorded and transcribed later (see Appendix H). The format of the transcript was based on Richards (2003) (see Appendix G). Basic transcription symbols were provided in order to keep the interviews readable.

3.5 Data analysis

In the first quantitative phase of the current study, the main aim of analyzing the data collected from the three language tests (VS, DVK and RC) was to answer the first and the second research questions stated earlier in [1.3]. Students' scores on the three tests were used to calculate the intercorrelations among these tests. Their scores were also used to determine whether VS or DVK was a stronger predictor of RC.

Statistical Package for Social Sciences (SPSS) Version 20 was chosen to run the statistical analyses in the current study. As the name indicates, it was developed for performing statistical data analyses in the social sciences. Two main statistical techniques were chosen to meet the purpose of the study: two-tailed Pearson correlation and multiple regression. Brace, Kemp and Snelgar (2009, p. 265) define multiple regression as ‘a statistical technique that allows us to predict someone’s score on one variable on the basis of their scores on several other variables’. To calculate the intercorrelations among scores on the three language tests, two-tailed Pearson correlations were conducted. For determining the stronger predictor of RC from the two variables, VS and DVK, multiple regression analysis was performed. In this case, the major use of multiple regression is the prediction of RC (dependent /criterion variable) scores on the basis of VS and DVK (independent/predictor variables) scores. The statistical significance of the predictor variables and the amount of their explained variance need to be indicated through the regression analyses (Greene & D’Oliveira 2003).

In the second qualitative phase, two types of interview data analyses were used: qualitative and quantitative. These analyses aimed to find an answer to the third research question mentioned earlier: how EFL learners use their vocabulary depth to guess the meaning of unfamiliar words in written texts. Initially, the data collected from interviews were analyzed qualitatively according to an analytical framework developed by Qian (2005). After coding and quantifying the qualitative data, some quantitative analyses were used. To achieve the inter-coder reliability of the data, a second coder, a colleague of the researcher was asked to select and code an interview protocol in order to reach an agreement on it.

3.6 Research ethics considerations

Before implementing the research, the researcher had to attend to the ethical considerations in the current study. Accordingly, advice was sought from the supervisor of this research project to observe human research ethics. The supervisor provided the required ethical guidelines which were followed. As the first step in gaining the principals’ approval for conducting the study, emails were sent to the chosen schools. In these emails, some information about title, purpose and significance of the study was

given. Moreover, school principals were informed that the three language tests would benefit both students and teachers academically, as these tests might be a good tool of assessing the students' vocabulary and reading comprehension levels. Similarly, participants' informed consent (see Appendix A), which was adapted from the one developed by Oxford Brookes University, had to be obtained before being tested or interviewed. According to this consent, all participants had the right to withdraw at any time and they were assured of their confidentiality. Accordingly, neither their real names nor information about them had been disclosed in the study. Furthermore, school principals were given a promise that they would receive the participants' results of the tests and the study by email.

As specified in the introduction, the focal objective of this study is to explore the association between two aspects of vocabulary knowledge, breadth and depth, and EFL learners' reading comprehension. In the following chapter, both quantitative data gained from the three language tests and qualitative data obtained from interviews will be analyzed in order to provide answers to the research questions posed earlier in [1.3].

Chapter Four

Results

This chapter focuses on presenting the analyses and results of both quantitative and qualitative data. It reports the statistical analyses of students' scores on the three language tests for the first quantitative phase of the study in order to answer the first and second research questions: how scores on vocabulary size (VS), depth of vocabulary knowledge (DVK) and reading comprehension (RC) are intercorrelated, and whether breadth or depth is a more powerful predictor of learners' reading comprehension. Furthermore, it discusses the analyses and results of the semi-structured interviews for the second qualitative phase in order to answer the third research question: how EFL learners use their depth of vocabulary to guess the meaning of unfamiliar words in written texts.

4.1 The first quantitative phase of the study

4.1.1 Intercorrelations among scores on the three language tests (RC, VS and DVK)

This section discusses the results of the correlational analysis of the quantitative data collected from the three language tests (RC, VS and DVK) to determine the intercorrelations among these tests. As shown earlier in [3.5], to calculate the intercorrelations among students' scores on the three tests, statistical analyses were run in some phases. Initially, some descriptive statistics (e.g., means and standard deviations) and Spearman-Brown reliabilities were calculated (see Table 4.1). The next phase used two-tailed Pearson correlations to calculate the intercorrelations among the three tests. The results obtained from this correlational analysis have answered the first research question:

Q1: How do scores on vocabulary size, depth of vocabulary knowledge, and reading comprehension correlate with one another?

Table 4.1 summarizes means and standard deviations of students' scores on the RC, VS and DVK in order to indicate how these scores were distributed. In addition, it shows how Spearman-Brown formula was used to calculate the reliability coefficients of the

tests. Reliability values of .81, .95 and .90 were obtained for the RC, VS and DVK respectively. The results of Spearman-Brown formula for the whole sample were higher than those for the subsample in piloting as indicated in [3.3.1.4]. These results were all satisfactory.

Table 4.1 Descriptive statistics and Spearman-Brown reliabilities of the RC, VS and DVK for the full sample (N=93)

Test	MS	M	SD	Spearman- Brown reliabilities
RC	17	13.54	2.88	.81
VS	120	78.66	23.80	.95
DVK	160	103.43	17.11	.90

MS= maximum score

Table 4.2 reports the results of two-tailed Pearson correlation analyses which illustrate positive intercorrelations among students' scores on the RC, VS and DVK. It was observed that statistically significant correlations were found among the scores of the three tests. The correlation coefficient between the RC and VS was .63, the value that was higher than that between VS and DVK ($r = .59$). However, the correlation between the RC and DVK ($r = .56$) was the lowest one. Based on this, correlational analyses reveal moderate positive intercorrelations among the three language tests. This has answered the first research question.

Table 4.2 Pearson correlation coefficients among scores on the RC, VS and DVK for the full sample (N=93)

Test	RC	VS	DVK
RC	–	.63**	.56**
VS	.63**	–	.59**
DVK	.56**	.59**	–

** $p < .01$

4.1.2 VS and DVK as predictors of RC

This section discusses the results of multiple regression analyses to determine the stronger predictor of RC from students' scores on VS and DVK. As stated earlier in [3.5], RC is the dependent/criterion variable whereas VS and DVK are the independent/predictor variables. The procedures of multiple regression analyses are illustrated in Table 4.3. The results produced through these analyses have answered the second research question:

RQ2: Which aspect of vocabulary knowledge, breadth or depth, is a stronger predictor of reading comprehension scores?

Table 4.3 presents both procedures and results of multiple regression analyses. It comprises five columns. The first column of the table (labeled Step) indicates the procedures of the variable entry at different steps. The third column (labeled R²/R-square) shows the proportion of variance in the dependent variable (the RC) contributed by the predictors (the VS and DVK). The adjusted R² value in the fourth column is a corrective measure as R² is expected to be high (Greene & D'Oliveira 2003). The R² change in the last column represents the amount of the contribution or the additional proportion of the explained variance of each variable when that variable is entered into the regression equation.

Table 4.3 Multiple regression results using scores on the VS and DVK as predictor variables for the whole sample (N=93)

Step	Predictor(s)	R ²	Adjusted R ²	R ² Change
A)				
1	VS	.400*	.393*	-
2	VS, DVK	.454	.442	.054
B)				
1	DVK	.319*	.312*	-
2	DVK, VS	.454	.442	.135

* $p < .05$

Table 4.3 provides information for the predictors (VS and DVK) entered into the analysis, as the ‘enter’ method was used in the regression equation. Since the predictor VS had a higher correlation with the dependent variable RC ($r = .63$) than the other predictor DVK ($r = .56$) as indicated above in Table 4.2, it was decided that VS was entered into the analysis on the first step, and then DVK was entered on the second step. As shown in the first section of Table 4.3 (marked A), when VS was entered on the first step, the R^2 and the adjusted R^2 were .400 and .393 respectively. VS indicated 40% ($R^2 = 400$) of the explained variance in RC. As a predictor, VS alone showed a significant amount of RC ($F(1, 91) = 60.61, p < .05$). Subsequently, when adding DVK on the second step, only 5.4% of change in the size of the R^2 was observed. However, this proportion was statistically insignificant.

The next series of regression analyses, as indicated in the second section of Table 4.3 (marked B), was conducted by reversing the order of entry of the predictors into the equation. When DVK was entered on the first step, the R^2 and the adjusted R^2 were .319 and .312 respectively. In this case, DVK indicated 31.9% ($R^2 = 319$) of the explained variance in RC. As a predictor, DVK alone showed a significant amount of RC ($F(1, 91) = 42.65, p < .05$). Subsequently, when adding VS on the second step, 13.5% of change in the size of the R^2 was noticed. Nevertheless, this proportion was statistically insignificant.

To sum up, the results of multiple regression analyses indicate that VS and DVK were individually good predictors of RC. While VS alone accounted significantly for 40% of the explained variance in RC, DVK alone accounted significantly for 31.9% of the variance. In other words, VS was a more powerful predictor of RC than DVK and this has answered the second research question.

4.2 The second qualitative phase of the study

4.2.1 Interview data analysis

This section discusses the analysis of the semi-structured interviews conducted with the four participants to explore how students use their vocabulary depth to guess the meanings of unfamiliar words in a written text. The analysis of the interview data is

based on the following points: the adopted framework for analyzing interviews, the valid attempts and successful guessing rate, some examples (mini-cases) of the use of vocabulary depth in lexical inferencing, and the inter-coder reliability of the data. The results gained from this analysis have answered the third research question:

RQ3: How do EFL learners use their depth of vocabulary knowledge when trying to guess the meaning of unknown words in a written text?

4.2.1.1 Framework for analyzing interviews

As Table 4.4 indicates, Qian’s (2005) analytical framework involves four categories of knowledge sources for lexical inferencing. Of these knowledge sources, the *intralingual knowledge* section displays depth as it focuses on some aspects such as morphology, syntax and meaning. These aspects show how depth is used in lexical inferencing.

Table 4.4 Knowledge sources for lexical inferencing

Code	Category
1	Location of clues
a	clues within the test word
b	clues from the context
c	clues beyond the context
2	Knowledge of the world (e.g., beliefs, attitudes or factual knowledge)
3	Intralingual vocabulary knowledge
a	Phono./orthographic forms (comparing the test word with other words)
b	Morphology (the use of morphological clues such as stems and suffixes)
c	Syntax (the use of syntactic clues such as collocations)
d	Meaning (the use of semantic clues such as synonyms and antonyms)
4	Interlingual knowledge (the use of L1 in guessing the meaning)

(Qian 2005, p.41)

4.2.1.2 Valid attempt and lexical inferencing success

According to Haastrup (1991), an attempt at guessing a word was deemed valid when participants indicated the basis for their guess by giving responses with clue/clues covered in the above framework. Yet, giving the meaning directly was considered an

invalid attempt and therefore it was not categorized into the ‘meaning’ classification. Each valid attempt was linked with the use of one or more sources of knowledge.

The following extracts explain how the attempt was considered valid or invalid. Extract 4.1 was taken as a valid attempt at guessing the word ‘decentralized’ as the informant had activated two sources of knowledge: (1) sources of clues knowledge and (2) intralingual knowledge. The informant showed he was trying to figure out the meaning of the word by giving (1a) clues within the test word (*it comes from central which is like...like in the middle of a point or a place*); (1b) clues from the context (*‘spread out’ is very similar in meaning to decentralized*), (2b) morphological clues (*there is the prefix...the ‘de’ that says it was not centralized*); and (2d) antonym clues (*It was something opposite of ‘centralized’*). Therefore, this attempt was regarded as successful.

Extract 4.1

[Sentence: Initially it was planned to be a military research network, designed to be **decentralized** or spread out over many locations.]

Interviewer: Okay. Can we move on to the word ‘decentralized’?

Student : Yeah.

Interviewer: Can you guess the meaning of this word?

Student : Er it comes from central which is like...like in the middle of a point or a place. And ‘decentralized’ there is the prefix...the ‘de’ that says it was not centralized. It was something opposite of ‘centralized’. Opposite of making it in the middle of something.

Interviewer: Is there anything else that helped you to guess the meaning of the word?

Student : Here it says ‘spread out’. So ‘spread out’ is very similar in meaning to ‘decentralized’.

Interviewer: So ‘spread out’ gave you a hint?

Student : Yes. So it means put in many locations.

The following extract was regarded as an invalid attempt as the informant was unable to guess the meaning of the word ‘concept’. The interview kept going because of time constraints.

Extract 4.2

[Sentence: The basic **concept** of the internet was first thought of in the early 1960s.]

Interviewer: Could you give me the meaning of the word ‘concept’?

Student : I don’t know.

Interviewer: Okay. Next word...

However, Extract 4.3 shows that although the attempt at guessing was valid, this attempt was considered unsuccessful. This is because the informant tried to draw on the semantic clues to figure out the meaning. He mistakenly linked the word ‘social’ with the test word ‘phenomenon’ because he miscomprehended the sentence.

Extract 4.3

[Sentence: This became a social **phenomenon**, and many other countries started making portable stereos.]

- Interviewer: Can you guess the meaning of the word ‘phenomenon’?
Student : Maybe it’s issue..it’s issue because it said this became a social phenomenon.
Interviewer: Okay.
Student : And I think it’s like issue...like a social issue.
Interviewer: How did you figure out the meaning here?
Student : Because it came with the word social.
Interviewer: I see.

Based on the relationship between valid attempt and guessing, it seemed necessary to differentiate between successful (as shown in Extract 4.1) and unsuccessful (as shown in Extract 4.3) attempts even if the attempt was valid. However, Extract 4.2 denotes an invalid attempt. This distinction aided in the analysis of the interview data.

4.2.1.3 Mini-case analyses

The informants employed different strategies to infer the meaning of unfamiliar words in reading a text. For example, they used various methods of inferencing for the same test word ‘regardless’. In Extract 4.4, the informant used two strategies to guess the meaning of this word: clues within the test word and morphological clues (the suffix-less).

Extract 4.4

[Sentence: Internet is...a powerful tool for communication between people and computers **regardless** of location.]

- Interviewer: Could you guess the meaning of the word ‘regardless’?
Student : It means...not related to..without relation to anything. Here he said ‘computers regardless of location’ so it means wherever computers are, it doesn’t matter.
Interviewer: What else helped you to guess the meaning of the word?
Student : The suffix ‘-less’ gives me what ‘regardless’ meant.

In Extract 4.5, the informant used one source of knowledge to guess the meaning of the word 'regardless', clues within the context.

Extract 4.5

- Interviewer: Let's move on to the next word 'regardless'.
Student : Regardless?
Interviewer: Can you guess its meaning?
Student : 'Regardless'... means..means it's no useful for this thing. So they said 'computers regardless of location'.. their location isn't useful when we are using computers.
Interviewer: Is there anything else that helped you to find the meaning?
Student : The word 'location' helped me.

In the following extract, the informant seemed to miscomprehend the meaning of the test word 'regardless' although he made an attempt at guessing by using a source of clues knowledge (a clue within the test word).

Extract 4.6

- Interviewer: Can you guess the meaning of the word 'regardless'?
Student : 'Regardless' is... '-less' means making something smaller. So it's making the distance between the world smaller.
Interviewer: Making the world smaller?
Student : Yeah. It means making the connection between people smaller by using the internet.
Interviewer: I see.

4.2.1.4 Inter-coder reliability

After the data collected from the interviews was coded, an interview protocol was randomly selected and coded by a second coder. This was done to achieve the reliability of the coding. The protocol included 27% of the data and there was an agreement of 87% on it. Therefore, an inter-coder agreement was maintained for this protocol.

4.2.2 Interview results

This section discusses the results of the interviews conducted with the four students. These results highlight the success rate in students' use of vocabulary depth during lexical inferencing/guessing with the aim of answering the third research question:

RQ3: How do EFL learners use their depth of vocabulary knowledge when trying to guess the meaning of unknown words in a written text?

4.2.2.1 Success rate in lexical inferencing

According to the categorization covered in the above framework and the calculation of valid attempts, the results revealed that the four informants had made 29 valid and 8 invalid attempts during the inferencing process. In Table 4.5, the highlighted words denote successful attempts/guesses. Of the 29 valid attempts, 14 attempts were successful and therefore the success rate in lexical inferencing was $14/29 = 48\%$. The participants' lexical inferencing success rate ranged from 12% to 100%.

Table 4.5 Test words utilized in the interviews

Participants	Test words: valid attempts	Test words: invalid attempts
1	phenomenon plugged regardless diverse mechanism concept	-
2	phenomenon distribution diverse regardless application established decentralized	-
3	phenomenon version regardless mechanism plugged decentralized advances established	padded diverse application concept
4	version established regardless plugged padded application advances phenomenon	decentralized mechanism diverse concept

4.2.2.2 Sources of knowledge utilized in lexical guessing

The four participants drew upon some sources of knowledge when they tried to infer/guess the unknown words. They used one or more knowledge sources. Of the 29 valid attempts, 19 cases included only one source of knowledge, and 10 cases included two sources of knowledge. As stated in Extracts 4.1 and 4.4, when the informant tried to guess the meaning of the word ‘decentralized’, he used two knowledge sources, sources of clues knowledge and intralingual knowledge.

Table 4.6 Sources of knowledge used by the participants (n = 4)

Code	Category	No. of times used	Success rate (%)
1	Location of clues		
a	clues within the test word	18	44%
b	clues from the context	20	60%
c	clues beyond the context	2	0
2	Knowledge of the world	17	41%
3	Intralingual vocabulary knowledge		
a	Phono./orthographic forms	2	0
b	Morphology	12	66%
c	Syntax	4	50%
d	Meaning	23	69%
4	Interlingual knowledge	0	0

Table 4.6 summarizes the knowledge sources the participants used in inferencing. In this table, the column marked ‘No of times used’ indicates the overall number of valid attempts through which various knowledge sources were activated, while the column marked ‘Success rate’ denotes the success rate of using each category. As Table 4.6 shows, the most heavily used source of knowledge was ‘intralingual vocabulary knowledge’. The informants relied greatly on two aspects of this category, morphology and meaning, whereas they relied slightly on phonological/orthographic forms and syntax. The second most activated source was ‘sources of clues knowledge’, followed by

‘knowledge of the world’ category. However, the ‘interlingual knowledge’ category was not employed at all.

4.2.2.3 Vocabulary depth and lexical inferencing

As the focus of the current study was to further examine depth via individual interviews, it appeared necessary to look at the relationship between depth and successful guessing. As stated in [3.2], the four participants were divided into two pairs according to their scores on DVK. The first pair comprised two high-proficiency students (HPS), who occupied the first and second ranks. On the other hand, the second pair comprised two low-proficiency students (LPS), who occupied the third and fourth ranks. According to the interviews, the HPS achieved a higher success rate than did the LPS in inferencing. The HPS produced 10 successful guesses out of 13, achieving a success rate of 76%, whereas the LPS produced only 4/16 achieving a success rate of 25%.

Table 4.7 Sources of knowledge used by HPS and LPS

Category		Success rate	
		HPS	LPS
1	Location of clues		
a	clues within the test word	91%	75%
b	clues from the context	84%	63%
c	clues beyond the context	15%	0
2	Knowledge of the world	23%	25%
3	Intralingual vocabulary knowledge		
a	Phonological/orthographic forms	0	13%
b	Morphology	38%	25%
c	Syntax	7%	0
d	Meaning	61%	43%

As Table 4.7 indicates, when comparing the use of knowledge sources by the two pairs, the results showed that HPS generally activated more knowledge sources than did LPS. Concerning the location of clues category, HPS used more clues within test words and more contextual clues than did LPS (clues within test words: 91% vs. 75%; contextual

clues: 84% vs. 63%). Examining the knowledge of the world category, it was found that the pairs used it evenly.

Additionally, comparing the use of intralingual knowledge, meaning and morphology were the most frequently used aspects of vocabulary knowledge by the pairs. HPS employed more meaning and morphology categories than did LPS (meaning: 61% vs. 43%; morphology: 38% vs. 25%). However, the other two aspects of vocabulary knowledge, syntax and phonological/orthographic forms, were the least frequently used ones. While the latter was minimally used by LPS, the former was slightly used by HPS (13%, 7% respectively). The latter did not appear to be used by HPS while the former did not appear to be used by LPS. As stated earlier, the last category was not included in the analysis as it was not utilized by the pairs at all.

4.3 Summary of the results

The current study reveals a number of empirical findings. According to the results of the quantitative phase of the study, it was found that scores on the three language tests, RC, VS and DVK, were positively intercorrelated. This stresses the relationship between the two aspects of vocabulary knowledge (breadth and depth) and reading comprehension which was reported in the current study literature review. Another finding of this phase was that vocabulary size proved to be a more powerful predictor of reading comprehension scores than depth of vocabulary knowledge, which implies that vocabulary size plays a basic role in EFL learners' reading comprehension.

Regarding the results of the qualitative phase, certain findings were established. Students with stronger depth were more successful in guessing the meaning of unknown words than those with weaker depth. Another finding was that 'intralingual vocabulary knowledge' category was the most heavily used one by the informants. Furthermore, it was found that meaning and morphology were the most activated sources of knowledge whereas syntax and phonological/orthographic forms were the least activated ones.

The following chapter discusses these findings in terms of the literature reviewed earlier with the aim of finding answers to the study research questions posed in the introduction. The current study results are linked directly with the findings of the previous studies.

Chapter Five

Discussion

This chapter discusses the current study findings and links them to the literature reviewed earlier. It provides answers to the research questions: how scores on vocabulary size (VS), depth of vocabulary knowledge (DVK) and reading comprehension (RC) correlate with one another, whether breadth or depth has a greater impact on determining learners' reading comprehension scores, and how EFL learners utilize their vocabulary depth to guess the meanings of unknown words in written texts. It also presents implications for second language teaching and some limitations of the research. Furthermore, it discusses directions for future research and highlights the professional impact on the researcher.

5.1 Relationship between vocabulary knowledge and reading comprehension

RQ1: How do scores on vocabulary size, depth of vocabulary knowledge, and reading comprehension correlate with one another?

The current study findings indicate that there are moderate positive intercorrelations among scores on vocabulary size (VS), depth of vocabulary knowledge (DVK) and reading comprehension (RC). This finding bears a lot of similarities to other research studies in different contexts (e.g., Biemiller 2005; Huang 2006; Mehrpour, Razmjoo & Kian 2011; Qian 1998, 1999, 2002; Quellette 2006; Stanovich 2000; Yap 1979). Based on this, the dimensions of vocabulary knowledge, breadth (vocabulary size) and depth, are closely related to reading comprehension. In relevance to this established relationship, the current research indicated that the correlation between vocabulary size and reading comprehension was the highest ($r = .63$), which means that the higher the vocabulary size scores, the higher the reading comprehension scores. This finding is in agreement with other studies in both ESL and EFL contexts (e.g., Hu & Nation 2000; Laufer 1989, 2000; Laufer & Kalovski 2010; Schmitt, Jiang & Grabe 2011) which reported strong correlations between vocabulary size and reading comprehension.

Similar to Laufer's (1989, 2000) findings, knowledge of about 3000-5000 word families is necessary to comprehend general academic texts, which is considered a lexical threshold as a good indication of high school EFL learners' reading ability. However, this threshold might vary according to different contexts as different lexical researchers have provided different thresholds. Hence, determining a lexical size which can be achievable for EFL learners might seem a pedagogical issue.

Additionally, the association between vocabulary size and reading comprehension was the most noticeable finding in the current study, indicating that vocabulary size seemed to play a fundamental role in reading comprehension in EFL classrooms. This observed relationship corroborates the instrumentalist hypothesis (Anderson & Freebody 1981) and other studies (Biemiller 2005; Stanovich 2000; Yap 1979) in L1 research to some extent, but this finding should be interpreted with caution. This is because this hypothesis and these research studies indicated that knowledge of more words is the direct cause of better reading comprehension; however the current study did not examine the issue of causation, i.e. investigating the role of vocabulary knowledge as the direct causal factor in reading comprehension.

On the other hand, the significant positive correlation ($r = .59$) between vocabulary size and depth of vocabulary proposes that the two aspects of vocabulary knowledge, breadth and depth, are closely related. This finding corroborates Read's (2004) and Vermeer's (2001) hypothesis that both breadth and depth are not dichotomous. It is also in congruence with earlier research (Schmitt & Meara 1997) which found that the correlation coefficient between vocabulary size and depth of vocabulary was $r = .62$. However, other studies (e.g., Nurweni & Read 1999; Qian 1999; Vermeer 2001) reported higher correlation coefficients ($r = .81$, $r = .82$ and $r = .82$ respectively) than did the present study. This discrepancy in findings might be due to the fact that the current study participants are exposed to a less-varied language input in comparison to that in other contexts. Another possible explanation for this discrepancy might be because these studies used other breadth and depth tasks in their procedures. Based on this, it can be concluded that the correlation between vocabulary size/breadth and depth might be attributed to the partial overlapping of the two measures. While breadth tests measure

primarily knowledge of word meaning, depth tests measure synonymy and collocation. Although depth tests examine deeper components of word knowledge than breadth tests, primary meanings of words in breadth tests affect the knowledge of synonyms and collocations in depth tests.

5.2 Vocabulary knowledge tests as predictors of reading comprehension

RQ2: Which aspect of vocabulary knowledge, breadth or depth, is a stronger predictor of reading comprehension scores?

The findings of the present study indicate that breadth is found to be a stronger predictor of reading comprehension than depth. This finding is in agreement with Huang's (2006) results who found that vocabulary size alone explained a more significant proportion of variance in reading comprehension than did depth alone (50% vs. 44.3%). This explained proportion of variance was similar to that (40% vs. 31.9%) obtained in the current study. Nevertheless, the current study finding is in disagreement with other researchers' results (Mehrpour, Razmjoo & Kian 2011; Qian 1998, 1999, 2002; Qian & Schedl 2004; Quелlette 2006) who concluded that depth was a more powerful predictor of reading comprehension than breadth. This discrepancy in findings might be due to the fact that these studies and the current study employed different test designs and recruited participants from different backgrounds.

A key question needs to be raised here: why vocabulary breadth performed better than vocabulary depth in the regression analysis. One possible explanation for this was that the vocabulary size test measured 2000, 3000 and 5000 word levels and academic vocabulary whereas the vocabulary depth test was only based on the words at 2000 and 3000 levels (Qian 1999). Another possible explanation was that the reading comprehension texts used in the current study procedures might have been difficult enough to discriminate between breadth and depth.

Similar to other studies (Huang 2006; Mehrpour, Razmjoo & Kian 2011; Qian 1998, 1999), the present study came to the conclusion that both breadth and depth were good predictors of reading comprehension. This conclusion in some ways supported the instrumentalist hypothesis (Anderson and Freebody 1981) which claimed that vocabulary

knowledge is the causal factor in reading, though this causation was not examined in the current study as stated above. From this, it can be inferred that vocabulary knowledge has an impact on reading comprehension and that vocabulary breadth plays an essential role in the link between vocabulary knowledge and reading comprehension. Yet, the fact remains that attention should be given to both breadth and depth in EFL classrooms.

5.3 The role of vocabulary depth in lexical inferencing (guessing) success

RQ3: How do EFL learners use their depth of vocabulary knowledge when trying to guess the meaning of unknown words in a written text?

The current study results suggest that students with greater depth of vocabulary knowledge seemed able to guess the meaning of unknown words more successfully than those with less depth of vocabulary knowledge. The HPS achieved a higher success rate (76%) than the LPS (25%). This finding is in agreement with other researchers' results (Nassaji 2006; Qian 2005) who grouped their learners according to levels of proficiency. Other scholars (Liu & Nation 1985; Morrison 1996) obtained similar findings using another basis for dividing their learners. Yet, the findings in these studies are still congruent with the current study as knowledge of vocabulary is associated with different language skills (Meara & Jones 1988).

The difference in success rates between HPS and LPS might lead to the assumption that there appears to be a relationship between vocabulary depth and success in guessing meanings of unknown words when reading English texts. This argument is in line with the Matthew effect (rich-get-richer) on L1 reading described by Stanovich (1986) who assumes that knowledge of vocabulary develops reading, which in turn contributes to vocabulary growth. From this, it can be inferred that learners with better vocabulary knowledge can guess the meanings of new words during reading, which in turn develops their vocabulary.

Examining the location of clues, it appeared that both HPS and LPS used the clue within the test word more frequently than all the other clues. This finding is incongruent with other studies (Morrison 1996; Qian 2005) in which the contextual clue was the most

activated source of clues. This discrepancy might be due to the fact that the current study used a different text in the experiment or that the participants came from different settings. However, according to the current study findings, students with greater depth could notice and utilize more clues than those with less depth. Accordingly, there might be a relationship between depth and students' ability to employ these clues.

Additionally, the results suggest that intralingual vocabulary knowledge, which represents vocabulary depth, was the most activated source by both HPS and LPS. This implies that depth of vocabulary knowledge could facilitate guessing. Under this category, HPS heavily employed morphology and meaning subcategories, whereas LPS employed phonological/orthographic forms subcategory. This finding conforms to other research studies (Haynes 1993; Qian 2005) in which LPS relied on analyzing the form of target words.

Likewise, these findings propose that students with greater depth tended to employ the top-down reading model (Goodman 1981) as they focused on guessing the meaning of the target word. This might be because these students were able to identify the meanings of other words near the unknown word. On the other hand, students with less depth tended to employ the bottom-up reading model (Gough 1972) as they focused on the form of the unfamiliar word. This is probably because these students were unable to identify the meanings of other words in the context of the new word. This finding matches Qian's (2005) results showing that LPS focused less on contextual meaning. However, it is in disagreement with Morrison (1996) who claimed that students with less depth were likely to overuse the top-down model. This difference may be due to the fact that Morrison's study was conducted in an ESL context while the present study was conducted in an EFL context.

5.4 Pedagogical implications

'Vocabulary is an essential building block of language' (Schmitt, Schmitt & Clapham 2001, p. 55). The quantitative findings have provided empirical evidence that not only superficial word meanings but also other components of vocabulary knowledge such as polysemy (a word with more than one meaning) and collocation should receive ESL/EFL

teachers', practitioners' and testers' attention. Furthermore, learners' vocabulary size should be developed in ESL/EFL classrooms by applying a variety of tasks to increase their vocabulary size for understanding written texts. However, as the results suggest, promoting both breadth and depth seems to be necessary in second language teaching and therefore a host of in-depth vocabulary activities is specifically encouraged in assessing reading comprehension.

In the same vein, the qualitative results indicate the importance and the value of the depth component of vocabulary knowledge in lexical inferencing, and hence, in reading comprehension. Thus, since only students with stronger depth of vocabulary knowledge seemed to be successful in guessing the meaning of target words, ESL/EFL students need to be trained in this area by using a variety of inferencing tasks in the classroom. In this regard, ESL/EFL teachers should teach the target words in context rather than teach isolated words in order to develop learners' guessing ability.

According to the above mentioned notions, educators and curriculum designers are asked to decide whether to include the depth of vocabulary knowledge component in ESL/EFL syllabi and activities. Moreover, as mentioned earlier in [1.2], breadth and depth tests could be employed to assess grade 12 learners' vocabulary knowledge in the UAE context instead of designing vocabulary tests based on multiple-choice formats. Accordingly, these breadth and depth tests could also be used in universities for placing students into the appropriate programmes.

5.5 Limitations

The current study has some limitations. First, since the participants' native language is Arabic, which is linguistically different from English, cognate effect of the participants' L1 was reduced to the minimum in the study in the sense that it was almost impossible for them to guess the meaning of unfamiliar English words by using their L1 in the three language tests of the study. Yet, the research findings should be interpreted with caution because the sample only involved Arabic-speaking high school students with no other populations. This situation has led to limiting the scope for generalization of the results. Second, it was not feasible to apply methods of random sampling in the study which

negatively affected the generalization of the results. Third, using individual interviews influenced the information flow as this form of qualitative data collection did not require any training on the part of the participants. On some occasions when an informant made an invalid guess, some consequent interview questions were not asked due to time constraints. For these reasons, using pair-think-aloud protocols could be useful to easily maintain information flow when two peers are asked to discuss a target word.

5.6 Directions for future research

Future research would benefit from the current study in many ways. Only two components of vocabulary depth of knowledge, polysemy and collocation, were examined. This means that other components such as morphology, register and frequency need to be investigated to better understand what impact these components of vocabulary depth has on reading comprehension under different conditions. Moreover, a positive relationship between vocabulary knowledge and reading was found in the study, but it was not investigated whether vocabulary knowledge was the direct causal factor in reading comprehension. Thus, examining causality in the relationship between vocabulary and reading may be useful.

Additionally, based on the qualitative results, students with weaker depth of vocabulary knowledge lacked mastery of deep word knowledge (e.g. knowledge of collocation, morphology and word associations). This indicates that future research needs more in-depth vocabulary measures to promote L2 vocabulary learning. More importantly, since vocabulary acquisition is incremental by nature (Schmitt 2010), one-off studies would not necessarily reflect this process. Hence, longitudinal studies to pursue how learners acquire vocabulary knowledge may be useful in this direction.

5.7 Professional impact

Implementing this research has impacted the researcher in many respects. It has developed the researcher professionally in the sense that it has assisted in gaining more and better insights into teaching and learning vocabulary in ESL/EFL contexts. The fact that the major finding of this study indicates the value of vocabulary breadth to

understand written texts has led the researcher to focus on increasing learners' vocabulary size in EFL classrooms through designing a variety of tasks. Moreover, the researcher has realized that guessing the meanings of new words in a written text requires both breadth and depth of vocabulary knowledge. This probably stresses the importance and the value of looking at teaching new words in two complementary ways, breadth and depth, to increase students' vocabulary knowledge. In other words, students should be exposed to the basic meanings of words (breadth), their synonyms, derivations and collocations (depth) in written texts.

On the other hand, carrying out the current study has developed the researcher's research skills in many ways. The research process has helped in enriching and contributing to prior knowledge of conducting research. The skill in defining problems in learning an FL, collecting and analyzing data and finding solutions has strengthened. Furthermore, the confidence in conducting future research has increased.

The next chapter will focus on the core points of the research. It will give an outline of the purpose, the adopted methodology and the major findings of the current study.

Chapter Six

Conclusion

The aim of this chapter is to summarize the research. First, it outlines the purpose, the adopted methodology, and the results of the current study. Moreover, it focuses on how this study can inform teaching and learning EFL.

The present research investigated the association between vocabulary knowledge and reading comprehension of high school EFL learners. It examined the extent of intercorrelations among the three language tests: vocabulary size, depth of vocabulary knowledge and reading comprehension. It also examined whether breadth or depth was a stronger predictor of reading comprehension, and how learners use their vocabulary depth when trying to guess the meanings of unknown words in a written text.

This study employed a mixed-methods approach which included two phases: an initial quantitative phase of 93 EFL learners with a similar linguistic background and different proficiency levels, and a second qualitative phase of four participants drawn from the 93 learners. The data collected from the three language tests were analyzed by using correlational and regression analyses, while the qualitative data obtained from semi-structured interviews were analyzed by using an analytical framework. Subsequently, the current study results were discussed in light of the research questions posed earlier in [1.3].

The quantitative results reveal that there are moderate positive intercorrelations among the three language tests. The results also reveal that vocabulary size appears to be a more powerful predictor of reading comprehension than vocabulary depth. The qualitative results indicate that vocabulary depth plays a fundamental role in lexical guessing and hence in reading comprehension. The research findings have revealed the importance and value of breadth and depth of vocabulary knowledge in reading comprehension in EFL classrooms.

In spite of the fact that the results of the current study cannot be generalized to other contexts, the study has some pedagogical implications for second language teaching. Not

only vocabulary breadth but also vocabulary depth should receive much more attention from teachers, practitioners and testers than has been previously thought. Teachers should also focus on designing a wide range of both vocabulary breadth and depth tasks in order to help learners increase their vocabulary knowledge and understand written texts. Furthermore, teachers should look at teaching vocabulary in two ways: widening and deepening learners' vocabulary.

To conclude, the current research has empirically indicated that learners' vocabulary size should be increased, yet developing their depth of vocabulary should not be ignored. For this reason, combining both vocabulary breadth and depth in assessing reading comprehension seems to be beneficial. The study has been an attempt to examine the link between only two components of vocabulary knowledge in reading comprehension. Future research could look into other components of vocabulary knowledge in reading. Hopefully, educators, curriculum designers, teachers, practitioners and testers in the Arab world will consider the roles of depth and breadth of vocabulary knowledge in reading comprehension.

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Appendix A

Informed Consent Form

Research Project Title: Depth and breadth of vocabulary Knowledge: Assessing their roles in high-school EFL learners' reading comprehension in the UAE

Researcher:

Mobile No.:

I am asking for your voluntary participation in the research which I am carrying out to examine the relationship between vocabulary knowledge and reading comprehension. If you would like to participate, please sign in the appropriate space below.

The tests and the interview will have no impact on your academic record and the data from the interview will be kept strictly confidential. When the tests and interview are completed, each participant's name will be replaced by a code and I will be the only one having access to these codes.

Participation in this study is completely voluntary. If you decide not to participate there will not be any negative consequences. You will be consulted after the interview has been transcribed.

Check (√) here:

- I am willing to participate in the study.
- I am not willing to participate in the study.
- I agree to the interview being audio recorded.
- I do not agree to the interview being audio recorded.

Name.....Signature.....

Date.....

Appendix B

Vocabulary Size Test (VS)

Student instruction sheet for the Levels Test

This is a vocabulary test. You must choose the right word to go with each meaning. Write the number of that word next to its meaning.

Here is an example:

- | | |
|-------------|----------------------------------|
| 1- business | |
| 2- clock | _____ part of a house |
| 3- horse | _____ animal with four legs |
| 4- pencil | _____ something used for writing |
| 5- shoe | |
| 6- wall | |

You answer it in the following way:

- | | |
|-------------|-------------------------------------|
| 1- business | |
| 2- clock | <u>6</u> part of a house |
| 3- horse | <u>3</u> animal with four legs |
| 4- pencil | <u>4</u> something used for writing |
| 5- shoe | |
| 6- wall | |

Some words are in the test to make it more difficult. You do not have to find a meaning for these words. In the example above, these words are *business*, *clock*, and *shoe*.

If you have no idea about the meaning of a word, do not guess. But if you think you know the meaning, then you should try to find the answer.

Version 2 The 2,000 word level

1 copy
2 event ___ end or highest point
3 motor ___ this moves a car
4 pity ___ thing made to be like
5 profit another
6 tip

1 admire
2 complain ___ make wider or longer
3 fix ___ bring in for the first time
4 hire ___ have a high opinion of
5 introduce someone
6 stretch

1 accident
2 debt ___ loud deep sound
3 fortune ___ something you
4 pride must pay
5 roar ___ having a high
6 thread opinion of yourself

1 arrange
2 develop ___ grow
3 lean ___ put in order
4 owe ___ like more than
5 prefer something else
6 seize

1 coffee
2 disease ___ money for work
3 justice ___ a piece of clothing
4 skirt ___ using the law in the
5 stage right way
6 wage

1 blame
2 elect ___ make
3 jump ___ choose by voting
4 manufacture ___ become like water
5 melt
6 threaten

1 clerk
2 frame ___ a drink
3 noise ___ office worker
4 respect ___ unwanted sound
5 theatre
6 wine

1 ancient
2 curious ___ not easy
3 difficult ___ very old
4 entire ___ related to God
5 holy
6 social

1 dozen
2 empire ___ chance
3 gift ___ twelve
4 opportunity ___ money paid to
5 relief the government
6 tax

1 bitter
2 independent ___ beautiful
3 lovely ___ small
4 merry ___ liked by many
5 popular people
6 slight

Version 2 The 3,000 word level

1 bull		1 abandon	
2 champion	_____ formal and serious manner	2 dwell	_____ live in a place
3 dignity	_____ winner of a sporting event	3 oblige	_____ follow in order
4 hell	_____ building where valuable	4 pursue	_____ to catch
5 museum	_____ objects are shown	5 quote	_____ leave something
6 solution		6 resolve	_____ permanently

1 blanket		1 assemble	
2 contest	_____ holiday	2 attach	_____ look closely
3 generation	_____ good quality	3 peer	_____ stop doing
4 merit	_____ wool covering used	4 quit	_____ something
5 plot	_____ on beds	5 scream	_____ cry out
6 vacation		6 toss	_____ loudly in fear

1 comment		1 drift	
2 gown	_____ long formal dress	2 endure	_____ suffer patiently
3 import	_____ goods from a foreign	3 grasp	_____ join wool
4 nerve	_____ country	4 knit	_____ threads together
5 pasture	_____ part of the body	5 register	_____ hold firmly with
6 tradition	_____ which carries feeling	6 tumble	_____ your hands

1 administration		1 brilliant	
2 angel	_____ group of animals	2 distinct	_____ thin
3 frost	_____ spirit who serves	3 magic	_____ steady
4 herd	_____ God	4 naked	_____ without clothes
5 fort	_____ managing business	5 slender	
6 pond	_____ and affairs	6 stable	

1 atmosphere		1 aware	
2 counsel	_____ advice	2 blank	_____ usual
3 factor	_____ a place covered	3 desperate	_____ best or most
4 hen	_____ with grass	4 normal	_____ important
5 lawn	_____ female chicken	5 striking	_____ knowing what
6 muscle		6 supreme	_____ is happening

Version 2 The 5,000 word level

1 analysis		1 contemplate	
2 curb	_____ eagerness	2 extract	_____ think about deeply
3 gravel	_____ loan to buy a house	3 gamble	_____ bring back to
4 mortgage	_____ small stones mixed	4 launch	health
5 scar	with sand	5 provoke	_____ make someone
6 zeal		6 revive	angry
1 cavalry		1 demonstrate	_____ have a rest
2 eve	_____ small hill	2 embarrass	_____ break suddenly
3 ham	_____ day or night before	3 heave	into small pieces
4 mound	a holiday	4 obscure	_____ make someone
5 steak	_____ soldiers who fight	5 relax	feel shy or nervous
6 switch	from horses	6 shatter	
1 circus		1 correspond	
2 jungle	_____ musical instrument	2 embroider	_____ exchange letters
3 nomination	_____ seats without a back	3 lurk	_____ hide and wait for
4 sermon	or arms	4 penetrate	someone
5 stool	_____ speech given by	5 prescribe	_____ feel angry about
6 trumpet	a priest in a church	6 resent	something
1 artillery		1 decent	
2 creed	_____ a kind of tree	2 frail	_____ weak
3 hydrogen	_____ system of belief	3 harsh	_____ concerning a city
4 maple	_____ large gun on	4 incredible	_____ difficult to believe
5 pork	wheels	5 municipal	
6 streak		6 specific	
1 chart		1 adequate	
2 forge	_____ map	2 internal	_____ enough
3 mansion	_____ large beautiful house	3 mature	_____ fully grown
4 outfit	_____ place where metals	4 profound	_____ alone away from
5 sample	are made and shaped	5 solitary	other things
6 volunteer		6 tragic	

Version 2 Academic Vocabulary

1 area _____ written agreement
 2 contract _____ way of doing
 3 definition _____ something
 4 evidence _____ reason for believing
 5 method _____ something is or is
 6 role _____ not true

1 alter _____ change
 2 coincide _____ say something
 3 deny _____ is not true
 4 devote _____ describe clearly
 5 release _____ and exactly
 6 specify _____

1 debate _____ plan
 2 exposure _____ choice
 3 integration _____ joining something
 4 option _____ into a whole
 5 scheme _____
 6 stability _____

1 correspond _____ keep
 2 diminish _____ match or be in
 3 emerge _____ agreement with
 4 highlight _____ give special attention
 5 invoke _____ to something
 6 retain _____

1 access _____ male or female
 2 gender _____ study of the mind
 3 implementation _____ entrance or way in
 4 license _____
 5 orientation _____
 6 psychology _____

1 bond _____ make smaller
 2 channel _____ guess the number or
 3 estimate _____ size of something
 4 identify _____ recognizing and
 5 mediate _____ naming a person or thing
 6 minimize _____

1 accumulation _____ collecting things over time
 2 edition _____ promise to repair a broken
 3 guarantee _____ product
 4 media _____ feeling a strong reason or
 5 motivation _____ need to do something
 6 phenomenon _____

1 explicit _____ last
 2 final _____ stiff
 3 negative _____ meaning `no'
 4 professional _____ or `not'
 5 rigid _____
 6 sole _____

1 adult _____ end
 2 exploitation _____ machine used to
 3 infrastructure _____ move people or goods
 4 schedule _____ list of things to do
 5 termination _____ at certain times
 6 vehicle _____

1 abstract _____ next to
 2 adjacent _____ added to
 3 controversial _____ concerning the
 4 global _____ whole world
 5 neutral _____
 6 supplementary _____

Appendix C

Depth of Vocabulary Knowledge Test (DVK)

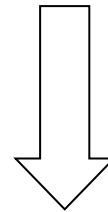
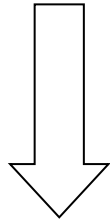
Test Instructions

This is a test of how well you know the meaning of adjectives that are commonly used in English. See if you can find the **four words** that are related to each target word. Each item looks like this:

sudden

beautiful thirsty quick surprising

change doctor noise school



There are eight words in the **two** boxes (left and right boxes).

The words here on the left side may help to explain the **meaning** of "sudden".

The words here on the right side are **nouns** that come after "sudden" in a phrase.

"Sudden" means "happening quickly and unexpectedly" and so the correct answers on the left side are quick and surprising.

We do not normally say "a sudden doctor" or "a sudden school", but we often say "a sudden change" and "a sudden noise", so "change" and "noise" are the correct answers.

Please circle the answers like this:

sudden

beautiful thirsty quick surprising change doctor noise school

Students answer by doing one of the following:

- A- Choose two correct words from the left box and two correct words from the right box.
(2-2)
- B- Choose three correct words from the left box and one correct word from the right box.
(3-1)
- C- Choose one correct word from the left box and three correct words from the right box.
(1-3)

Read the following and circle the four correct words:

Synonym	Collocation
----------------	--------------------

1. fine

excellent average constant natural	day athlete removal china
--	---------------------------------

2. bright

clever famous happy shining	color hand poem taste
-----------------------------------	-----------------------------

3. calm

open quiet smooth tired	cloth day light person
-------------------------------	------------------------------

4. natural

expected helpful real short	foods neighbors parents songs
-----------------------------------	-------------------------------------

5. fresh

another cool easy raw	cotton heat language water
-----------------------------	----------------------------------

6. general

closed	different	usual	whole	country	idea	reader	street
--------	-----------	-------	-------	---------	------	--------	--------

7. bare

empty	heavy	uncovered	useful	cupboard	feet	school	tool
-------	-------	-----------	--------	----------	------	--------	------

8. acute

hidden	often	rich	sharp	angle	hearing	illness	stones
--------	-------	------	-------	-------	---------	---------	--------

9. common

complete	light	ordinary	shared	boundary	circle	name	party
----------	-------	----------	--------	----------	--------	------	-------

10. complex

angry	difficult	necessary	sudden	argument	passengers	patterns	problem
-------	-----------	-----------	--------	----------	------------	----------	---------

11. broad

full	moving	quiet	wide	night	river	shoulders	smile
------	--------	-------	------	-------	-------	-----------	-------

12. conscious

awake	healthy	knowing	laughing	face	decision	effort	student
-------	---------	---------	----------	------	----------	--------	---------

13. digital

numerical valuable binary body	liquid computer keyboard wind
---	--

14. convenient

easy fresh near suitable	experience sound time vegetable
-----------------------------------	--

15. dense

crowded hot noisy thick	forest handle smoke weather
----------------------------------	--------------------------------------

16. brief

short fleeting quick clear	help summer tool approach
-------------------------------------	------------------------------------

17. dull

cloudy loud nice secret	color knife place rock
----------------------------------	---------------------------------

18. direct

honest main straight wide	fence flight heat river
------------------------------------	----------------------------------

19. favorable

helpful legal possible positive	habit response teacher weather
--	---

20. secure

confident	enjoyable	fixed	safe	game	job	meal	visitor
-----------	-----------	-------	------	------	-----	------	---------

21. tight

close	rough	uncomfortable	wet	schedule	pants	surface	wood
-------	-------	---------------	-----	----------	-------	---------	------

22. violent

expected	smelly	strong	unlucky	anger	death	rubbish	storm
----------	--------	--------	---------	-------	-------	---------	-------

23. chronic

continuing	local	serious	unplanned	accident	examination	illness	shortage
------------	-------	---------	-----------	----------	-------------	---------	----------

24. compact

effective	small	solid	useful	group	kitchen	medicine	string
-----------	-------	-------	--------	-------	---------	----------	--------

25. crude

clever	fair	rough	valuable	behavior	drawing	oil	trade
--------	------	-------	----------	----------	---------	-----	-------

26. domestic

home	national	regular	smooth	animal	movement	policy	speed
------	----------	---------	--------	--------	----------	--------	-------

27. portable

movable	deep	light	fixed	person	device	recorder	trees
---------	------	-------	-------	--------	--------	----------	-------

28. fertile

dark	growing	private	special	business	egg	mind	soil
------	---------	---------	---------	----------	-----	------	------

29. formal

fast	loud	organized	serious	bomb	education	growth	statement
------	------	-----------	---------	------	-----------	--------	-----------

30. independent

changed	equal	important	separate	child	country	ideas	prices
---------	-------	-----------	----------	-------	---------	-------	--------

31. original

careful	closed	first	proud	condition	mind	plan	sister
---------	--------	-------	-------	-----------	------	------	--------

32. sensitive

feeling	interesting	sharp	thick	clothes	instrument	skin	topic
---------	-------------	-------	-------	---------	------------	------	-------

33. key

primary	fundamental	hidden	false	issues	purpose	wealth	duration
---------	-------------	--------	-------	--------	---------	--------	----------

34. critical

clear dangerous important rough	festival illness time water
--	--------------------------------------

35. powerful

moderate strong effective practical	computers desks weapon patients
--	--

36. liberal

free moderate plenty valuable	crops furniture parents transport
--	--

37. dramatic

exciting official surprising worried	adventure change patient salary
---	--

38. conservative

cautious hopeful traditional warm	clothes estimate meeting signal
--	--

39. sound

logical healthy bold solid	snow temperature sleep dance
-------------------------------------	---------------------------------------

40. surrounding

central internal linear encircling	neighborhood areas trees math
---	--

Appendix D

Reading Comprehension Test (RC)

Read the following texts and answer the questions:

Text 1

Many people today have heard of Botox. It is a popular chemical substance that treatment centers around the world use to make people look younger and less tired by temporarily removing lines from their faces.

However, few people know that Botox is one of the most poisonous natural substances in the world, and in large quantities it can kill people. Commercially called Botox or Dysport today, its official name is “botulinum toxin.” In the early 1800s, a German doctor, Justinus Kerner, named botulinum “sausage poison” and “fatty poison” because it often appears in meat.

Although botulinum is a poison when injected under the skin in small doses, it relaxes muscles and makes faces appear younger. It is often used to lessen the lines around people’s eyes (called **crow’s feet**) between their eyebrows and on their foreheads. In 1988, the Allergan Company gave this substance the name Botox and began to sell it as a beauty product. Now there are thousands of treatment centers around the world where you can go to get a Botox treatment. The Dubai Cosmetic Surgery Center, for example, offers these treatments and says that **they** will make you look younger and less tired, and make you feel better about yourself.

Some people, however, are not so sure about Botox treatments. For example, Botox is now approved for use in Canada, yet some Canadians want more research done on it. They worry that because Botox is a poison, if it spreads from the face to other parts of the body it could cause injury or even death. Other people, however, say this is not true. The Allergan Company claims that no one has ever died from Botox treatments, and treatment centers say that Botox is very safe.

Because Botox is a poison, it is very likely that people will continue to argue about how safe it is to use for beauty treatments. But it appears that many people around the world, both men and women, are willing to risk possible harm from Botox in order to achieve a more youthful look.

1. What is Botox’s official name?

- a) Dysport
- b) Botulinum toxin
- c) Fatty poison
- d) Allergan

2. Botox makes the face look younger by _____.
- a) energizing the face
 - b) tightening the skin
 - c) clearing the color
 - d) relaxing muscles
3. The phrase "**crow's feet**" in paragraph 3 refers to lines _____.
- a) near the eyes
 - b) on the forehead
 - c) under the nose
 - d) between the eyebrows
4. Who gave this chemical the name Botox?
- a) Canadian researchers
 - b) The Allergan Company
 - c) The Dubai Cosmetic Surgery Company
 - d) Justinus Kerner
5. The word "**they**" in paragraph 3 refers to _____.
- a) Canadians
 - b) offers
 - c) surgery
 - d) treatments
6. What is the main topic of paragraph 4?
- a) The Allergan Company
 - b) Botox injuries in Dubai
 - c) Canadian Botox research
 - d) Possible dangers of Botox
7. Where in the text is the best place for the sentence, "They say that people will be very happy with their Botox treatments"?
- a) End of paragraph 5
 - b) Beginning of paragraph 2
 - c) Middle of paragraph 5
 - d) End of paragraph 3
8. From the text, which of the following is true?
- a) Botox treatments are perfectly safe.
 - b) The safety of Botox is still being debated.
 - c) A few people have been injured by Botox treatments.
 - d) Botox is not allowed in Canada.

9. Where would you be most likely to find this text?

- a) A geography book
- b) A travel magazine
- c) A health magazine
- d) An English novel

Text 2

Have you seen young people wearing headphones while walking, exercising, riding buses or trains, or relaxing on campuses, in shopping malls, or at parks? They are listening to music on one of the most popular inventions of the past 30 years: the personal audio system or as it is commonly called, the Walkman.

Millions of people own these small portable stereos, but few know how the systems were developed. It all started in the 1970's when a German inventor, Andreas Pavel, had an idea for a stereo that could be clipped to a belt or handbag, and play sound through headphones. He called it the "Stereo belt". By 1977, he had made some **prototypes**, but the idea never reached the market. About the same time, an American skier took a car stereo cassette tape player, powered it with batteries, and put it in a padded pack. He enjoyed music while racing down the ski runs with the player strapped to his chest. This invention was named "Astral tunes". It was popular with skiers, but did not become widely known.

In 1979, the Sony Company of Japan used these two concepts to develop a portable cassette player called the "Walkman". The Walkman quickly became very popular especially with young people. People enjoyed being able to listen to music anytime, anywhere. This became a social phenomenon, and many other companies started making portable stereos.

As new music media were developed, new types of players became popular. Sony introduced the Discman portable CD player in 1984 and the minidisc CD player in 1992. By 1998, advances in computer software led to the invention of a music file called the MP3. These files could be played on a computer or loaded onto a small memory stick. The sticks held many songs and plugged into a portable player. The memory stick player had no moving parts, and there was no need to carry CDs.

Since then, several companies have developed portable MP3 players that worked with new computer CD ROM technology and the Internet. These players load music files directly into their memories; no sticks or CDs are needed. **They** hold hundreds of songs and are very convenient to use. They can also be built into a mobile phone or palm-top computer. Today, the convenience of the MP3 player has made listening to music anytime, anywhere, and more popular than ever.

- 10-** The personal audio system is a _____.
- a) type of computer
b) belt or handbag
c) file pair of headphones
d) small, portable stereo
- 11-** The word "prototypes" in paragraph 2 means _____.
- a) samples
b) backpacks
c) ideas
d) sounds
- 12-** Andreas Pavel _____.
- a) invented "Astra tunes"
b) developed the Sony Walkman
c) disliked listening to music while skiing
d) never sold his Stereo belt system
- 13-** Where did the Sony Company get the idea for the Walkman from?
- a) Many young people
b) The "stereo belt" and "Astraltunes"
c) The record function of a portable cassette player
d) Other companies that made small stereos
- 14-** The purpose of paragraph 4 is to _____.
- a) describe some computer technology
b) describe new music technology
c) explain why players became cheap
d) talk about portable CD players
- 15-** The memory stick can _____.
- a) download music from the internet
b) be played on a CD player
c) hold MP3 files
d) carry CDs
- 16-** In paragraph 5, the word "They" refers to _____.
- a) computers b) MP3 players c) memory sticks d) CDs
- 17-** The best title for this article is _____.
- a) The development of personal audio systems c) Building a small stereo system
b) Andreas Pavel: Sony's best engineer d) The portable MP3 players

Appendix E

Experimental Text

The History of the Internet

The internet has become a familiar part of the lives of people all over the globe, and as of September 2002, the worldwide population online was estimated at over 600 million. The Internet is a revolutionary **mechanism** for worldwide information **distribution** and a powerful tool for communication between people and their computers **regardless** of location.

The basic **concept** of the Internet was first thought of in the early 1960s. Initially, it was planned to be a military research network, designed to be **decentralized** or spread out over many locations. In case one location was attacked, the military could still control its communications and equipment from another connected location. Created by ARPA (the Advanced Research Project Agency), ARPANET-the first small network-went online in 1969 and connected four universities in the United States.

This network was very successful from the beginning. Originally, APRANET was designed to allow scientists to share data and access remote computers. However, after the first email program was invented in 1972, communication through email quickly became the most popular **application**. By the end of 1972, APRANET had over 23 hosts which connected universities and government research centers around the United States.

The general public became aware of APRANET in the late 70s when the commercial (non-military public) **version** was released. USENET newsgroups (the decentralized newsgroup network) were **established** on the Net at this time and users from all over the world started to join these discussion groups to talk about the Net, politics, religion and thousands of other subjects.

With corresponding **advances** in network technology, particularly the creation of TCP/IP as a common language for the network computers, the **diverse** collection of networks making up APRANET was recognized as an international network.

Appendix F

Interview Questions

1. How do you explain this sentence in your own words?
2. What is the meaning of _____ (test word) in this sentence?
3. How did you figure out the meaning?
4. Did you consider other meanings before deciding on this one?
5. What helped you to guess the meaning?
6. Is there anything else that helped you to guess the meaning?

Appendix G

Transcript Format

- ◆ To maintain anonymity, ‘S’ represents ‘student’ and ‘I’ represents ‘Interviewer’.
- ◆ To ensure the flow of the conversation, the transcript does not follow the standard punctuation, except for question marks and periods.
- ◆ A short pause is represented by two dots (..), whereas a long pause is represented by three dots (...).
- ◆ Words that are said with a loud voice are **bolded**.
- ◆ Fillers (e.g. ‘Er’ and ‘Uhuh’) and repetitions are included in the formatting task.

Appendix H

A Sample of Interview Transcript

Turn #	Who	Transcript
01	I	[Sentence: This became a social phenomenon , and many other countries started making portable stereos.] Could you explain this sentence?
02	S	It's talking about the... hold stereo and Walkman idea became very popular and widely spread for people .. so ... many companies. Many people try to actually do the same idea because it's actually a popular idea .
03	I	Okay. Could you explain the meaning of the word 'phenomenon'?
04	S	Phenomenon is the..something that is ... it's like a whole idea that is spread idea or something or ...a habit that spread on people.
05	I	What helped you to work out the meaning of the word here?
06	S	The word ' social '.
07	I	How?
08	S	'Social' can make me guess that is something related to the society.
09	I	Is there anything else that helped you to guess the meaning?
10	S	Actually from my previous experience... reading this word many times.
11	I	Uhuh.
12	S	It is something that happens..not all the time...we use it in physics.

13	I	[Sentence: The sticks held many songs and plugged into a portable player.] Good. Can we move on to the second sentence starting with the sticks? Can you explain this sentence?
14	S	Here in the sentence.. he talking about sticks. These sticks play music. They can be attached or connected to players. These players can actually play music and he says... memory stick players had no moving parts.. so that it's just one piece and there is no need to carry CDs so... there is nothing else than one piece.
15	I	Can you guess the meaning of the word 'plugged'?
16	S	You can say that you can play songs..into a portable player that means that you...you are using another device ... so using another device means there is a connection between the both.
17	I	What is the basis for your guess?
18	S	'Plugged' is an adjective..from 'plug'...so it must be connected to.
19	I	So the form of the word helped you to guess the meaning?
20	S	Yeah.
21	I	Thank you. Let's go to the text. You just indicated you don't know this word ' mechanism ', right?
22	S	Mechanism?
23	I	Can you guess?
24	S	It's like a ...a device.
25	I	Good. How did you figure out the meaning?
26	S	The context and you can read the sentence and ... other words can help you.
27	I	What are these words?
28	S	'The internet is a revolutionary mechanism'. Here it's a noun and ..it's preceded by an adjective. So ' revolutionary mechanism'

		describing the internet.
29	I	What else helped you to guess it in this way?
30	S	The whole context of the paragraph.
31	I	So context helped you to guess?
32	S	Yeah.
33	I	Okay. Can we move on to the word 'regardless'?
34	S	' Regardless '?
35	I	Can you tell me your guess?
36	S	Er I think.. 'Regardless of location'. It's like without taking like..attention to this. ' Regardless of location' is something that is not important .
37	I	Not important?
38	S	Yeah. When we read the sentence " people and their computers regardless of location".. so there is actually the suffix "less" so that means something that is not needed and also from reading the paragraph.
39	I	Are there any other sources that helped you to guess it in this way?
40	S	No
41	I	So the words surrounding 'regardless' helped you guess the meaning?
42	S	Yeah.
43	I	Okay. Next word.. 'concept'. What is the meaning of the word 'concept' in this sentence?
44	S	Er it means... idea .
45	I	An idea? How did you guess the meaning?
46	S	It says 'The basic concept of the internet'. So here it is describing the internet as being a concept. It means an invention or... an idea that some people had and they try to develop. It's like an idea.

47	I	Anything else that helped you to guess?
48	S	Yeah. Describing it as basic . That means ...there is a ..like an idea .. some ideas complicated .. some ideas are basic. So there is the internet. The internet is basic idea.
49	I	So the word 'basic' gave you a hint about the meaning?
50	S	Yeah.
51	I	Okay. Next word.. 'diverse'
52	S	'Diverse'?
53	I	Can you guess its meaning?
54	S	It comes in the same meaning of various.
55	I	Uhuh. How?
56	S	'Diverse collection of networks'.. here he says collection . So there is a ...multiple things made in one group and he is talking about networks. So there is diverse collection of networks. So the word collection is described as diverse. So that means there is difference.
57	I	Difference in what?
58	S	Difference in characteristics .
59	I	Any other sources that helped you to guess it in this way?
60	S	'Diverse' is a noun..no an adjective. It's not one type of collection . It's a variety of collections.
61	I	How do you know?
62	S	Yes. By reading I think ...most of the words ..reading the text and understanding the whole meaning specially the paragraph we can actually work out the meaning .
63	I	So your understanding of the paragraph helped you to guess?
64	S	Yeah.
65	I	Thanks a lot for your cooperation.
66	S	No problem.