

**Detecting and Comparing the Incremental Changes of Three Aspects of Word Knowledge
in Educational and Naturalistic Settings**

By

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Abstract

Knowing words involves knowing multiple aspects of word knowledge (Nation, 2013). Most previous research focused on single aspects and measured the ultimate gains at single points of time. The uniqueness of this dissertation lies in detecting and comparing the productive incremental changes of three aspects of word knowledge (meaning, spelling, and word part) in Educational (e.g., school) and naturalistic settings (e.g., workplace) at different time intervals over a 24-month period.

Using Nation's (2013) Word Knowledge Framework, two main studies and a follow-up study were conducted from January 2018 to January 2020. Drawing on Yin, (2014) a single case study design was used with multiple embedded units of analysis, across two main studies and a follow-up study. Five upper-intermediate Arabic-speaking learners participated in Study 1, and two advanced Arabic-speaking learners participated in Study 2. Three participants from *Study 1* and both participants from *Study 2* participated in the *Follow-up Study*. The same battery of pen-and-paper tests (i.e., spelling, multiple choice and fill-in-the-blanks) was used in both the two main studies and the follow-up, which were then analyzed statistically. Data drawn from semi-structured interviews were analyzed using Saldaña's (2013) first cycle and top down coding method.

Results countered those previously reported (e.g., González-Fernández & Schmitt, 2019; Schmitt, 1998). A developmental hierarchy was detected among the three measured aspects of word knowledge. They developed concurrently and in varying proportions. Basic meaning knowledge always enjoyed the highest gains, followed by spelling, word part, and polysemy knowledge. A relationship between the incremental changes of the three measured aspects and vocabulary size was also detected.

Vocabulary learning strategies such as word lists, word parts, and orthographic repetition seemed to play a positive role in word knowledge development. Factors such as lack of adequate word exposure opportunities and learners' first language transfer were found to negatively affect word knowledge development. This study concludes that certain aspects require more attention and time than others. Learners need to be exposed several times to the target words and in different contexts. They also need to be taught and trained to use the different vocabulary learning strategies to enhance attainment.

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List of Key Abbreviations

Abbreviation	Definition
SLA	Second Language Acquisition
LINC	Language Instruction for Newcomers
CLB	Canadian Language Benchmarks
WKF	Word Knowledge Framework
UWL	University Word List
ESL	English as Second Language
VLT	Vocabulary Levels Test
EFL	English as Foreign Language
LLS	Language Learning Strategies
VLS	Vocabulary Learning Strategies
WPLT	Word Part Levels Test
Thematic Words	Explicitly Learned Words
Matching Words	Incidentally Learned Words
Educational Words	Words Learned in School
Naturalistic Words	Words learned outside School

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Chapter 1: Introduction

1.1 Rationale for the Study

Research findings over the past two decades in the field of Second Language Acquisition (SLA) have revealed that vocabulary development is one of the most important aspects of second language development (Douglas, 2013a, 2015; Laufer, 2009; Nation, 2013; Nguyen & Webb, 2017; Schmitt et al., 2015). In the discussion of second language vocabulary development, a distinction is often made between breadth of vocabulary knowledge and depth of vocabulary knowledge, although the relationship between them is still unclear.

While depth of vocabulary knowledge refers to number of words non-native speakers need to know, number of words native speakers know, or number of words gained from implicit or explicit learning, depth of vocabulary knowledge refers to how well these words are known (Schmitt, 2014).

However, it has been argued that breadth of vocabulary knowledge research is of marginal importance as it neglects the extent to which a word is known (Nation, 1990, 2001, 2013; Read, 2000; Richards, 1976; Schmitt, 1997, 2014; Schmitt & Meara, 1997; Wesche & Paribakht, 1996). According to Nation (2013) breadth of knowledge tells us little about how well learners know words they know and how they develop these words.

Consequently, “the construct of vocabulary knowledge as a whole is still largely unexplored, and it is unclear how the different word knowledge components are acquired and fit together” (González-Fernández & Schmitt, 2019, p. 1). Nation (1990, 2013) proposed that future research needs to consider the question ‘what does it mean to know a word?’ or ‘what is

involved in knowing a word?’ to have a clearer picture of what is involved in second language vocabulary development.

Nation suggested that this requires the study of depth of vocabulary knowledge by breaking words down into their separate components or aspects. This approach of conceptualizing vocabulary knowledge is referred to as the dimension approach or the component approach (Nation, 2013). It proposes that knowing a word involves knowing nine types of word knowledge: spoken form, written form, word parts, form and meaning knowledge, concepts and references, associations, grammatical function, and collocations.

Few studies have attempted to use this word knowledge framework as a research rationale and add to the general theory of vocabulary development. Therefore, informed by the component approach, this thesis detected and compared the incremental changes of three aspects of word knowledge in two main longitudinal research studies (Study 1 and Study 2) and a Follow-up Study. It detected and compared the learning behaviours of three aspects of word knowledge (meaning, spelling, and word part) in and out of class and the way they develop over time, as discussed in the following sections.

1.2 Study Context

Canada receives hundreds of thousands of adult newcomers every year (e.g. international students, workers, refugees, and visitors). They come from different backgrounds with diverse goals and ambitions. Many of these newcomers “do not possess advanced levels of fluency in the English language” (Douglas, 2010, p. 12). Douglas adds that they face challenges to meaningfully integrate into the Canadian economy as a consequence of their level of English language

proficiency (ELP), which is often inadequate to meet the requirements of credentialing and practice in their chosen professions.

Baril (2007) reports that some of these newcomers to Canada join Language Instruction for Newcomers (LINC) programs to improve their general language proficiency or to pursue their education for better employment opportunities. LINC programs were established by the Canadian government in 1992 to help facilitate successful adaptation and integration processes of adult newcomers to the Canadian society (Baril, 2007). In these programs learners receive part-time and full-time free basic language training. The program also provides socio-cultural activities to facilitate their successful adaptation and integration processes to Canadian society (Baril, 2007).

LINC classes are offered in many sites across the country including community-based organizations, school boards, community colleges, churches, and private educational institutions (Baril, 2007). Classes are based on the Canadian Language Benchmarks (CLBs) ranging from levels 1 to 8. Learners who complete the CLB-9 level meet the language requirement to join most Canadian post-secondary institutions.

As language development of adult newcomers to Canada is under investigated, this thesis aimed to explore language development of these adult newcomers to Canada in two main studies (Study 1 and Study 2) and a Follow-up Study. The researcher is familiar with the program and the context as he conducted a similar longitudinal case study in a similar research site during his studies in Canada. As this two-phase longitudinal study involved individual extended interviews with relatively low proficiency learners and requires the use of L1, and as the researcher speaks English and Arabic only, it was decided that only adult Arabic-speaking learners would be recruited for Study 1 and Study 2.

1.3 General Questions to be Addressed

This dissertation addressed the following research questions:

1. How does knowledge of individual vocabulary items develop over time in Educational and Naturalistic settings?
 - Are they learned in a developmental sequence?
 - Do they develop at a similar rate? Why?
 - What facilitated or inhibited their development?
2. Is there a relationship between learners' word knowledge development and vocabulary level development?
3. What types of vocabulary learning strategies and activities do learners engage in to learn the three measured aspects of word knowledge?

Chapter 2: Theoretical Framework

2.1 Introduction

This chapter is devoted to discussing the theoretical bases of this longitudinal research study. It starts with the exploration of early theories of second language vocabulary development and the main arguments made concerning these theories. It also discusses the component approach to second language vocabulary development and how it was adopted as a research rationale in this longitudinal research study to add to the general theory of vocabulary development.

2.2 Theories of Second Language Acquisition

2.2.1 Processability Theory (PT)

Processability Theory (PT), sometimes called Multidimensional Model, as set out by Pienemann (1998) maintains that learners follow universal and predictable stages in their language development. They can only perceive and produce linguistic forms at the current level of their language processor. To understand how learning occurs in these stages, we need to understand the architecture of the language processor and the mechanisms involved in processing the input. Stages in the Processability Theory apply to any second language and can predict developmental trajectories and account for any differences between them (Pienemann, 1998).

Pienemann (1998) developed six sequential stages in L2 production and argued that in the first stage learners have very limited vocabulary size and can only generate simple utterances. As they progress to the next sequential stages, their vocabulary expands and they become able to generate complex sentences. The stages are as follows:

1. No procedure: produce single simple words such as *eat and car*
2. Category procedure: add adjective morpheme to a noun

3. Noun phrase procedure: match plurality as in *five cars*
4. Verb phrase procedure: replace an adverb out of its verb phrase to the front of the sentence
5. Sentence procedure: subject-verb agreement
6. Subordinate clause procedure: use of the subjunctive in subordinate clauses triggered by information in the main clause (Pienemann, 1998).

2.2.2 The Monitor Theory

One of the early theories of second language vocabulary development was the Monitor Theory (MT) proposed by the linguist Steven Krashen in the early 1980s. The Monitor Theory was inspired by findings from research studies on the nature of Interlanguage Theory as well as the Identity Hypothesis.

The Monitor Theory emphasizes the critical role of input in second language development. Krashen believed that in order to learn new languages successfully learners need rich linguistic input. He also proposed that language acquisition occurs when learners comprehend messages in which the linguistic input interacts with their innate language learning faculty (Krashen, 1985).

The Monitor Theory is an umbrella theory covering five interconnected hypotheses: acquisition-learning hypothesis, the monitor hypothesis, the natural order hypothesis, comprehensible input hypothesis, and affective filter hypothesis. Each of these hypotheses will be clarified below.

2.2.2.1 Acquisition-Learning Hypothesis

The main principle in the acquisition-learning hypothesis is the distinction between acquisition and learning as two distinct systems that involve different mental processes. While acquisition occurs spontaneously while interacting in meaningful activities, learning results from receiving explicit language instruction. The acquired knowledge results in fluent and spontaneous output which is monitored by the learned knowledge.

Sometimes, Krashen's (1985) model is referred to as the 'non-interface position' or 'the zero option' because the acquired knowledge cannot be converted into learned knowledge as these two types of knowledge are stored independently. This explains why some people who acquire language are not able to articulate its grammatical rules. At the same time, learned language cannot be always converted into acquired language and become available for spontaneous production even after extensive practise. This also explains why some people who learned a second language are unable to produce it spontaneously even though they know its rules and patterns (Ortega, 2009).

Therefore, advocates of this theory place less emphasis on the formal study of grammatical knowledge as it most likely will not be accessed in spontaneous interactions; instead suggest learners be provided access rich linguistic input and be encouraged or be given opportunities to participate in meaningful interactive activities (VanPatten & Williams, 2015).

2.2.2.2 The Monitor Hypothesis

Krashen argues for the secondary role of learned knowledge as during language production the role of learned knowledge is restricted to editing the acquired knowledge, especially when learners have adequate time to refer to their existing linguistic knowledge (Krashen, 1985).

Under the Monitor Hypothesis, Krashen (2003) defined three types of second language learners:

i) optimal monitor users are those learners who refer to their learned knowledge as long as it does not disrupt genuine exchange of linguistic knowledge; ii) monitor underusers those learners who are concerned with language fluency rather than language accuracy; and iii) monitor overusers those learners who overly rely on their formal linguistic system at the expense of their communicative skills.

2.2.2.3 The Natural Order Hypothesis

According to Krashen (1985), the Natural Order Hypothesis (NOH) was inspired by Corder's (1967) proposal in which he argued that:

we acquire the rules of language in a predictable order. Some rules tending to come early and others late. The order does not appear to be determined solely by formal simplicity and there is evidence that it is independent of the order in which rules are taught in language classes (Krashen, 1985, p. 79).

Language acquisition and language learning follow similar sequential and predictable stages of development because both processes take place in the language acquisition device (LAD) proposed by Chomsky (1985). For instance, the grammatical morpheme -ing develops before the third person -s morpheme.

2.2.2.4 The Comprehensible Input Hypothesis

Krashen (1985) claimed that second language development emerges from interaction between learners' language acquisition device (LAD) and the linguistic knowledge derived from written or spoken comprehensible input the learner receives in meaningful activities. That is, all that is needed for second language acquisition to take place is the presence of rich input and the

innate faculty. Krashen defined the 'comprehensible input' as any level of input that is just beyond a learner's current level of proficiency. There are two levels of comprehensible input: i (learner's current level of proficiency) and $i + 1$ (slightly beyond learners' current level of proficiency).

Although he did not identify or specify what i and $i + 1$ is, Krashen argued that if the latter is assured it would be the most useful input that could be delivered to the learner. Any level of input that is between the learner's current level and the more knowledgeable person(s) is comprehensible input.

Krashen (2003) further questioned the role of formal instruction and language production in L2 development. He believed that pushing learners especially in the beginning levels takes their attention away from input processing and prevents acquisition. This argument was based on the view that comprehensible input activates the innate faculty and thus allows the learner to move from one level to the next higher level in natural developmental sequences. Therefore, language production (output) and formal instruction have no role in second language acquisition since production (output) occurs as a result of the acquisition process and never causes it.

Although the comprehensible input hypothesis succeeded in highlighting the critical role of input in second language development, the hypothesis was perceived to have the following four drawbacks:

1. The hypothesis did not define the levels of comprehensible input;
2. it did not explain how comprehensible input becomes intake;
3. it underestimated other important aspects of second language development such as language production and corrective feedback; and

4. the suggestion that input transfers into a production is not rational as these two aspects are processed differently.

2.2.2.5 The Affective Filter Hypothesis

Krashen (1985) believed that pushing demanding too much from learners especially in the beginning levels, most probably increases their ‘affective filter’. He defined ‘affective filter’ as “a mental block that prevents acquirers from fully utilizing the comprehensible input they receive for language acquisition” (p. 81) and argued that “the acquirer needs to be open to the input” (p. 81). Learners whose filters were set low were said to have positive language attitudes and could access comprehensible input more easily. On the other hand, learners whose filters were set high were said to have negative language attitudes and had difficulty accessing comprehensible input.

It is worth mentioning that many second language acquisition theories have supported Krashen’s Monitor Theory and have acknowledged the critical role of rich input in second language development. Some of these theories attach less importance to the role of input and place greater importance on the role of output in second language development such as the Pushed Output Hypothesis discussed below.

2.2.3 Pushed Output Hypothesis (COH)

The Pushed Output Hypothesis was proposed by Merrill Swain (1985) based on her empirical studies with Canadian French immersion students. In these serial studies (Swain, 1985, 1995, 2000, 2001) Swain revealed that although these students had received adequate comprehensible input, their sociolinguistic competence and grammatical accuracy did not reach the proficiency level of the French native speaker. This result led her to conclude that what these

learners need to reach native speaker competence is ‘pushed output’. Learners need to be encouraged and pushed to actively use their linguistic knowledge (competence) to ensure their attainment.

Swain (1985) suggested that pushed output can draw learners’ attention to novel linguistic input and added that “producing the target language may be the trigger that forces the learner to pay attention to the means of expression needed in order to successfully convey his or her own intended meaning” (p. 249). During production, speakers and writers activate their prior knowledge, think over their language use, and reflect on their output.

2.2.3.1 Three Functions of Pushed Output

In subsequent work, Swain (1995) refined her Pushed Output Hypothesis and proposed three functions of pushed output: Noticing / triggering function, Hypothesis-testing function, and Metalinguistic function.

Noticing / triggering function. Learners can reinforce their linguistic attainment through the noticing function. While they are producing language, they might “notice a gap between what they want to say and what they can say, leading them to recognize what they do not know, or know only partially” (Swain, 1995, p. 126). That is, learners only attend to relevant linguistic knowledge in the target input when they recognize their language problems. This also triggers their cognitive processes in which they consolidate their existing knowledge and/or create new linguistic knowledge (Swain & Lapkin, 1995).

In a series of qualitative research studies Swain and Lapkin (1995, 1998, 2001, 2002) demonstrated that second language learners’ noticing can be triggered by an output modification process. They argued for the facilitative role of pushed output in second language vocabulary

development driven by instances of implicit corrective feedback that took the form of clarification requests.

Hypothesis-testing Function: Language output helps learners modify their output by testing their hypothesis about their interlanguage. Learners will be able to judge their output's linguistic accuracy, appropriateness, and comprehensibility against the input or feedback provided by an interlocutor.

Metalinguistic function: Swain (1995) argued that "as learners reflect upon their own target language use, their output serves a metalinguistic function, enabling them to control and internalize linguistic knowledge" (p. 126). That is, learners will be able to reveal their personal hypothesis and reflect on their language use. Reflecting on one's own or others' language use "mediates second language learning" and increases learner's awareness of rules and forms" (Swain, 2005, p. 478).

According to Swain (1995), the use of metalinguistic function and metatalk in the classroom helps the noticing function of output and the hypothesis testing function of output to operate. Moreover, it was claimed that pushed output plays the 'fluency function' through enhancing automaticity (rapid access of existing knowledge) in learners' language use. Pushed output provides learners with more opportunities to use and practice their existing knowledge in communicative tasks. However, Swain did not emphasize the fluency function as she believes that this function is self-obvious and natural.

De Bot (1996) had a different view and considered the fluency function as the most important function of pushed output. According to his view, output aids automaticity of processing and thus enables learners to devote more 'attentional resources' involved in message creation to higher-level processes.

It is important to note that Swain's Pushed Output Hypothesis was also supported by the interaction hypothesis as discussed below.

2.2.4 Interaction Hypothesis

Similar to Krashen's (1985) Comprehensible Input Hypothesis, Hatch's (1978) ideas of the role of conversation in language development, and Swain's Pushed Output Hypothesis, Michael Long (1985, 1996) proposed the interaction hypothesis (IH) to emphasize the crucial role of interactional modifications in second language development.

There are two versions of the interaction hypothesis: the early version and the updated version (sometimes referred to as the weak form and strong form). In both versions, Long emphasized the negotiation of meaning which he defined as tactics or strategies that students use to solve communication problems. In the early version, Long (1996) proposed that negotiation of meaning provides more useful comprehensible input needed for language development. He proposed four meaning negotiation strategies: clarification requests, recasts, comprehension checks, and confirmation checks.

In the updated version of the IH Long (1996) highlighted the critical role of negotiation of meaning and offered a broader view of how language development can be enhanced through negotiation of meaning. He combined new ideas in the field of second language acquisition research, including Krashen's (1985) Comprehensible Input Hypothesis, Swain's (1985) Pushed Output Hypothesis and Schmidt's (1990) Noticing Hypothesis.

The main argument in this updated version is that "environmental contributions to acquisition are mediated by selective attention and the learner's developing L2 processing capacity, and that these resources are brought together most usefully, although not exclusively, during

negotiation for meaning” (Long, 1996, p. 414). Long adds that “negotiation for meaning, and especially negotiation work that triggers interactional adjustments by the NS or more competent interlocutor, facilitates acquisition because it connects input, internal learner capacities, particularly selective attention, and output in productive ways” (Long, 1996, p. 452).

The Interaction Hypothesis emphasizes the importance of interactionally modified input in language development that enables learners to notice language forms in the target input that are within their processing capacity. According to Ellis (199), this hypothesis combined an intrapersonal and interpersonal view of learner interaction. While intrapersonal interaction helps learners to process and learn from the negotiated input, interpersonal interaction helps learners to notice linguistic information in the target input.

In several research studies conducted by Pica and her colleagues (Pica, 1994; 1996a, 1996b; Pica & Doughty, 1985; Pica et al., 1993) it was found that negotiation of meaning provides learners with adequate comprehensible input, modified output, and feedback required for successful second language development. In particular, it was found that negotiation of meaning “contributes to conditions, processes and outcomes of L2 learning by facilitating learners’ comprehension and structural segmentation of L2 input, access to lexical form and meaning, and production of modified output” (Pica, 1994, p. 493).

However, Pica and her colleagues argued that it is not easy to distinguish the different kinds of modified interactions from comprehensible input in meaning negotiation events as they occur reciprocally in conversational exchanges. They added that interaction by itself is not enough for successful language development as learners need to focus on form as well. Richard Schmidt (1990) also added that meaning interactions alone are not enough for successful language development. He claimed that learners need to notice forms and other linguistic

information in the target language to maximize enhancement, as proposed in his Noticing Hypothesis discussed below.

2.2.5 Noticing Hypothesis

The Noticing Hypothesis was proposed by Richard Schmidt (1990, 2001) to challenge Krashen's (1985) views on the role of implicit learning and his understanding of the word 'unconscious'. Schmidt argued that learning refers to three different phenomena: learning without explicit metalinguistic knowledge, learning without intention, and learning without awareness.

Schmidt based his claims on results obtained from a previous research study with an adult Japanese artist (Schmidt, 1983) which was originally designed as a test case of the Acculturation Model and from a later case study of himself learning Portuguese during a five-month stay in Rio de Janeiro (Schmidt & Frota, 1986). Noticing, according to Lourdes Ortega (2009), refers to:

the brain registering the new material, with some fleeting awareness at the point of encounter that there is something new, even if there is no understanding of how the new element works, and possibly even if there is no reportable memory of the encounter at a later time. (p. 63)

Schmidt believed that not all learning is intentional as not all learners' intentions are conscious. It is very difficult to distinguish the boundaries between explicit and implicit processes as the two are part of a continuum and not separate phenomena. Therefore, Schmidt (2001) proposed that second language development is a conscious process "largely driven by what learners pay attention to and notice in target language input and what they understand of the significance of noticed input to be" (p. 4). According to Schmidt (1995), "what learners notice in input is

what becomes intake for learning” (p. 20), or put differently, intake is “that part of the input that the learner notices” (p. 139).

Second language learners need to notice relevant knowledge in the linguistic data afforded by the environment in order to develop their language proficiency. That is, language development increases if noticing increases and decreases if noticing decreases. Target linguistic information that was not noticed in the target input most likely will not be internalized and ultimately attained. Therefore, learning without noticing has a minimal effect in second language development, if exists at all (Schmidt, 2010).

Learner’s ability to attend to linguistic information in the target input can be supported by internal as well as external means. Internally, the concept of noticing can be supported when the learner works to construct a new sentence and reveals an idea, and meanwhile, s/he discovers something new. Externally, noticing can be supported, for instance when the learner receives a response from a teacher or an interlocutor.

These internal and external means help learners pay more attention to the new linguistic information in the target input. They enable learners to discover possible gaps between their own linguistic knowledge (competence) and the teacher or interlocutor’s linguistic knowledge (Schmidt & Frota, 1986).

Noticing is a fundamental psycholinguistic condition for vocabulary development. It refers to paying attention to vocabulary items and being aware of them as useful language items and being aware of them as useful language items. For successful vocabulary noticing, learners need to temporarily detach vocabulary items from the message context and focus on them through metalinguistic thinking (Schmidt, 2010). Wood (2009a) added that vocabulary learners develop high levels of formulaic sequences by focusing “on their constituent parts and see how

they fit into the flow of discourse” (p. 11). Learners also attend to the formulas or chunks in long texts “in order to minimize processing load” (Wood, 2010, p. 202).

According to Robinson (2003) the Noticing Hypothesis was supported by several research studies (Ellis, 1994; Fotos, 1993; Swain, 1985; Swain & Lapkin, 1995) and theories of second language acquisition: focus on form (Long & Robinson, 1998), processing instruction (VanPatten 1996), Output Hypothesis (Swain, 1995) and input enhancement (Smith, 1991) all of which placed a great emphasis on the role of noticing in language development.

It is also important to note that the pushed output function of attending to breakdowns in learner’s language production provided additional support for the Contrastive Analysis Hypothesis (CAH) as discussed below.

2.2.6 Contrastive Analysis Hypothesis (CAH)

Contrastive Analysis Hypothesis was coined by Robert Lado’s (1957) work *Linguistics across cultures* to refer to any systematic comparison between a learner’s first language and the target language. It aimed to help identify areas of difficulties to help learners overcome potential negative L1 transfer based on the belief that most of the difficulties a second language learner faces in developing proficiency in the target language stem from interference from the mother tongue (Lado, 1957).

Difficulty level depends on the degree of similarity and difference between a learner’s L1 language system and the target language system. Lado (1957) claimed that “those elements which are similar to the learner’s native language will be simple for him, and those elements that are different will be difficult” (p. 2). When a learner improperly transfers and applies certain strategies and rules from the mother tongue, errors or incorrect linguistic forms are produced.

Lado also believed that systematic contrastive analysis between the two languages can predict potential areas of linguistic difficulties a learner might face during second language development.

There exist two versions of the Contrastive Analysis Hypothesis: the strong version and the weak version. While the strong version postulates that identifying differences between learner's L1 and L2 can predict potential errors, the second version holds that L2 errors can only be diagnosed and/or explained.

However, several second language pioneers (e.g., Corder, 1967; Richard, 1985) criticized Contrastive Analysis Hypothesis and proposed that there are several errors which are not caused by a learner's first language and that differences between the two languages do not necessarily result in negative transfer. These proposals comprise the fundamental bases of the Error Analysis Hypothesis discussed below.

2.2.7 Error Analysis Hypothesis

The Error Analysis Hypothesis was developed in the early 1970s to replace the Contrastive Analysis Hypothesis. It aimed to predict potential linguistic errors by comparing learners' first language system and target language system. Learner error analysis provides significant feedback for the learner and the teacher (Ellis, 1994). Corder (1967) defined error as all linguistic forms that differ from the target language. Richard (1985) also defined errors as any produced linguistic form that differs from the native speakers' language.

Overall, all the theories discussed above were developed based on the idea that cognitive variables (e.g., memory and reasoning) must be considered to understand how learning occurs (Ortega, 2009). However, over the last 30 years, the Sociocultural Theory (Vygotsky, 2012) has

challenged this approach and argued for the critical role of society and environment in understanding human cognitive development. Advocators of this theory believe language development takes place during meaningful interactions between learners and more knowledgeable person(s) (e.g., teacher, father) in the environment as discussed in the following sections.

2.2.8 Sociocultural Theory (SCT)

Over the last 30 years, Sociocultural Theory (Vygotsky, 1978) has challenged the linguistic approach and argued for the critical role of society and environment in understanding human cognitive development. Language acquisition takes place during meaningful interactions between learners and more knowledgeable person(s) (e.g., teacher and parent) in the environment (Vygotsky, 2012).

The theory was developed basically on the work of Vygotsky (1978) “*Mind in society: The development of higher psychological processes*”. It is a theory of how the human mind is constructed socially. The Sociocultural Theory argues for the mediation function that social interaction plays in language development. The central idea of SCT is that higher order mental processes such as problem solving, planning and attention are mediated via social activity (Vygotsky, 2012).

Mediation, according to Vygotsky (2012) occurs in three ways: using symbols, using physical tools, and interacting with a more knowledgeable person. Vygotsky perceives language to be the most powerful symbolic mediational tool and thus the means of managing mental activity and accomplishing social interaction.

Mediation occurs explicitly and incidentally; explicitly, when a learner accomplishes some tasks with the help of some artifacts or more knowledgeable person(s), and incidentally

when s/he uses his/her own resources to take control over functions. According to Vygotsky (2012), there are three types of mediation: social mediation, artifact mediation and self-mediation.

2.2.8.1 Social Mediation

Social mediation can be traced in meaningful interpersonal interactions between learners or between the learner and the more knowledgeable person(s). During these social interactions mediated learning occurs in what Vygotsky (2012) called the Zone of Proximal Development (ZPD). The ZPD can be defined as the difference between what the learner can accomplish when s/he performs tasks individually and what s/he can accomplish while performing with the help of the more knowledgeable person(s).

Vygotsky argues that the ZPD helps teachers determine learners' mental functions that are in the process of maturation but have not fully matured. Lantolf (2000) supported Vygotsky's proposal and stressed that "attending to the talk generated by learners during peer mediation allows us access to some of the specific cognitive processes learners deploy to learn a language" (p. 85). Lantolf added that for effective learning, good instruction needs to precede development to provoke several functions that lie in the ZPD and are in the process of maturation.

Although Vygotsky did not offer many pedagogical directions as to how the ZPD could be applied successfully in the classroom, the principle of scaffolding offers useful insights. Scaffolding was proposed by Wood et al.; (1976) to emphasize the role of explicit instruction and interaction in language development. Scaffolding is the

process that enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts. This scaffolding consists essentially of the

adult “controlling” those elements of the task that are essentially beyond the learners’ capacity, thus permitting him to concentrate upon and complete only those elements that are within his range of competence (Wood et al., 1976, p. 90).

2.2.8.2 Artifact Mediation

This type of mediation is perceived as a mediation of human mind processes via non-linguistic aspects. Vygotsky (2012) argued that human cognition is mediated by socioculturally constructed signs and artifacts, foremost among which is language.

2.2.8.3 Self Mediation

Based on Lantolf’s (2000) definition, self-mediation is private speech that can be perceived as self-directed language in which language users ask themselves particular questions, answer these questions, tell themselves to hinder particular activity, tell themselves that they are not able to achieve something or they are wrong, or tell themselves that they have performed a task.

Private speech and social speech are different features. That is, in private speech people use their mother tongue and takes elliptical form. Private speech is also popular with young children while performing an activity individually or with other peer(s). It is a method of doing self-control in an activity. Language users also engage in private speech when they confront difficult activities or do a new function for making self-regulation (Vygotsky, 2012).

Private speech becomes sub-vocal as cognitive development continues and lastly evolves into internal speech. Therefore, private speech is the language that at the deepest level misses its formal features as it transforms into clearer meanings (Vygotsky, 2012). Lantolf (2000) claims that private speech is important for second language acquisition, but it is still

not obvious to what level private speech can add to language learning, as very few studies focused on this issue.

2.2.9 Activity Theory (AT)

The first version of Activity Theory (AT) was established by Lev Vygotsky's student Aleksei Leont'ev, (1981) (cited in Engstrom, 1987). Leont'ev's main proposal was based on activities encompassing human individuals and the surrounding environment affected by their cultures as the unit of analysis. The second version of AT was developed by Engeström, (1987) whose main proposal was the unit of analysis as a collective, artefact-mediated and object-oriented activity system seen in its network relation to other activity systems.

Activity Theory is a theoretical and methodological lens that illuminates how groups of people from the same or different paradigms and with diverse experiences work on the same problem and/or can work on a new problem and together create novel tools and knowledge to overcome the problem. AT considers all human activities as they relate to shared practices, artefacts and institutions. It goes beyond individual knowledge to consider developmental views of minds in the whole context

According to Artemeva (2006), Activity Theory “considers human behavior in terms of activity systems” (p.167). In activity theory, the unit of analysis is activity that includes individuals and their culturally defined environment (Artemeva & Freedman, 2001). An activity is any collaborative human action. It is the least meaningful context for understanding individual actions, relationships and systemic interactions.

Any activity system should include six elements (nodes): subject, object, mediating artifact, rules, community and division of labor. Dialectically, every element in the activity

system is related to all other elements. The object-oriented nature of activity defines the activity and distinguishes it from other activities (Artemeva & Freedman, 2001).

Activity systems do not occur in vacuum and tend to emerge out of a bundle of necessary elements or needs. Internally, every system is composed from different viewpoints and artefacts that afford and constrain it. These different viewpoints and artefacts create tensions and contradictions that may exist within the different elements of the system or between different systems (Engeström, 1987).

Tensions and contradictions lead to the development of new practices. Contradictions emerge when the currently used activity system becomes unable to fulfill the needs of its group or community, which results in tensions and contradictions within the whole system and finally could lead to the breakdown of the activity system itself (Engeström, 1987).

Engeström (1987) designates four levels or layers of contradictions that can emerge in any activity system. While primary contradictions occur within each element of the activity system, secondary contradictions take place when two elements of the activity system conflict with one another. Tertiary contradictions arise when the object of a culturally more advanced activity is introduced into the old system; quaternary contradictions arise between the current activity system and any surrounding activity systems (Engeström, 1987).

Rather than viewing tensions or contradictions in the activity as negative aftermaths, Engeström (1987) perceives them as *springboards* for changing activity systems as they provide source for development and innovation of services and practices. Also he perceives activity systems as a learning cycle as they are constantly influenced by the people who are involved in the activities as well as by other activity systems. That is, they continually strive for balance while experiencing contradictions and tensions.

Most importantly, contractions and tensions lead people to what Engeström, (1987) calls expanded learning or expansive learning. People learn something which is not there by constructing new activities. They construct bigger picture or bigger activity to expand the current activity or context. That is, they go beyond the information given to construct a broader object in their activity.

One of the interesting features of AT was the idea of the collectivity in the ZPD. The ZPD proposed in the AT is very close to the ZPD proposed by Vygotsky, that the individual needs to work with a more knowledgeable person to act within the ZPD. Vygotsky and Engeström go beyond the individual to focus on the entire context of which the individual is a part. Engeström (1987) goes further to argue that for an individual human to act within the ZPD, s/he needs to interact with more than one person and must participate and become a member of the community s/he is taking part in.

2.2.10 Situated Learning Theories

Situated Learning Theories (e.g., Lave & Wenger, 1991; Rogoff, 1990) are based on the view of learning and knowing as social, rooted in the experiences of daily life of the learner. Sharing its origins with activity theory, the view of learning as situated in the social is based on the Vygotskian understanding of higher mental functions in the individual as being derived from social life and on his recognition of the social as primary. Theorists of situated learning see learning as active and accomplished through co-participation, and that cognition is socially shared.

Theories of Situated Learning ask the following questions: Is learning social or individual? How and to what extent does culture matter? What constitutes a community of practice? How do individuals change through their participation in cultural activities? What are the

structuring resources for learning in practice? Two distinct perspectives developed within the situated learning framework are Rogoff's (1990) guided participation (p. 8) and Lave and Wenger's (1991) analytical perspective. The main foundations of Theories of Situated Learning are: guided participation, legitimate peripheral participation, communities of practice, and distributed cognition, each of which is detailed below.

2.2.10.1 Guided Participation

Guided Participation refers to the process by which learners actively learn new skills and problem-solving capabilities through their interaction in meaningful activities with peers, teachers, parents or any more knowledgeable persons (Rogoff, 1990). It emphasizes the active role of the learner in learning and cognitive development and the complementary role of peers, teachers, parents or any more knowledgeable persons in supporting and guiding him/her through arranging and organizing his/her participation in the activity (Rogoff, 1990, 2003). Guided participation does not have a specific duration as it occurs throughout the course of learning, specifically, from the peripheral stage to the mastery stage (Rogoff, 1990).

2.2.10.2 Legitimate Peripheral Participation (LPP)

According to Artemeva (2006), the focus in Legitimate Peripheral Participation is “on person-in-the-world, as member of a sociocultural community” (p.48). Legitimate Peripheral Participation refers to systematic interaction or participation in an activity in which newcomers are trained by old-timers. Learners participate to a limited degree with a limited access and responsibility in the production and to the product of the community (Lave & Wenger, 1991). To some extent, guided participation and LPP are seen as opposite to schooling and traditional learning where learning is criterion-based and age-related.

2.2.10.3 Communities of practice (CoP)

According to Lave & Wenger (1991), communities of practice refer to any group of people (e.g., students, researchers, workers) who share a concern or a passion for something they do and learn how to do it better as they interact regularly.

2.2.11 Distributed Cognition

Distributed Cognition provides theoretical treatment to problem solving in authentic settings and provides a novel framework for cognitive science. According to Hutchins (1995), we are not computers that sit on their own, rather, we think in an environment in which we are a central part. When we take part in a group, we think things we cannot think alone because a group can know things without any member of the group fully knowing it and solve problems which any member of the group cannot solve alone.

The tools and artifacts we use are an essential part of our thinking and knowing. Contrary to the conventional psychological view that the world is in our mind, Hutchins argues that the mind is in the world and knowledge and cognition do not exist solely within our head but they are distributed across several individuals (minds), tools, objects and artifacts of an environment (Hutchins, 1995).

To sum up, the situated learning theories discussed above are very similar. They spring from Vygotsky's (1978) sociocultural theory that views learning as a social process rather than solely individual, and that "higher mental functions in the individual are derived from social life" (Artemeva, 2006, p. 44). They share the idea that active participation (interaction) with the environment (including the learner) is the source of learning and not the instruction the learner receives. They view learning as 'distributed' across nodes of an activity or community of practice.

However, learners differ in degree of participation and guidance they receive. That is, on the one hand, learners within the context of guided participation have the least freedom in the participation since they have to operate within the guidance of the more knowledgeable persons (MKP). On the other hand, learners within a situation of distributed cognition are more independent. They have the highest degree of participation as all the participants in the activity have similar experiences or everyone has his/her own role in the activity.

It is worth mentioning that the discussed theories of second language acquisition not only contribute to what we know about second language development, viewing the results of the research undertaken here with both cognitive and a sociocultural theoretical perspectives in mind may help to highlight the results in a more meaningful and useful way. However, research in the vocabulary field is largely empirically driven without adherence to a single theory or hypothesis. Thus, this dissertation is largely informed by the empirical research that has been influential in the study of vocabulary development as discussed below.

2.3 The Component Approach

Some researchers (e.g., Nation, 2001, 2013; Schmitt, 1997, 2014) connected the component approach with the work of Jack Richards' (1976) 'role of vocabulary teaching'. However, the British linguist Harold Palmer (1921) in his book *The principles of language study* was actually the first researcher to discuss the component approach and what it means to know a word.

Palmer was the first to view receptive and productive vocabulary as different forms of vocabulary knowledge. He proposed three principle components of word learning: meaning, written form, and spoken form. His proposal was supported by a recent research study in which

Milton and Hopkins (2006) demonstrated that these three components of vocabulary are good indicators of second language learners' word knowledge development.

Richards (1976) added that knowing a word involves more than just acquiring its form and meaning. Instead, he suggested six aspects that contribute towards fully having knowledge of vocabulary, as illustrated in Table 2.1 below:

Table 2.1

Richards' (1976) Word Knowledge Framework

Frequency	knowledge about the degree of probability of meeting the word in speech or writing
Register	knowledge about limitations on use according to function and situation
Position	knowledge about syntactic behavior associated with the word
Form	knowledge about underlying form and derivatives
Association	knowledge about network of associations between the given word and other words in the language
Meaning concept	knowledge about the semantic value of a word

These six aspects were then refined by Nation (1990) who proposed eight aspects of word knowledge in his Word Knowledge Framework (WKF) as discussed below.

2.3.1 Nation's Word Knowledge Framework

Nation (1990) refined Richard's list and proposed a new list comprising eight components of word knowledge that need to be mastered receptively and productively to have complete command of any word:

1. spoken form
2. written form
3. grammatical behaviour
4. collocational behaviour
5. frequency
6. stylistic register constraints
7. conceptual meaning
8. associations the word has with other related words

Nation believed that to understand the whole we need to study the small components. That is, the best way to study the development of individual words is to study the small changes in their small components. In subsequent work, Nation (2013) developed this list and proposed nine “aspects of the word knowledge” that have “a major effect on the eventual amount of learning” (p. 107). Table 2.2 below presents Nation’s (2013) Word Knowledge Framework (p. 49).

These nine aspects are necessary for second language learners to develop fluent and nativelike word-knowledge competence and it is also very important to consider which aspect most deserves attention when focusing on word learning and teaching (Nation, 2013). If the learner has succeeded in mastering these nine types of word knowledge, then s/he should be able to use the word in a fluent and nativelike manner, although not all native speakers have full command of all these aspects (Nation, 2013).

Table 2.2

Nation's (2013) Word Knowledge Framework

Form	Spoken	R	What does the word sound like?
		P	How is the word pronounced?
	Written	R	What does the word look like?
		P	How is the word written and spelled?
	Word parts	R	What parts are recognizable in this word?
		P	What word parts are needed to express the meaning?
Meaning	Form and meaning	R	What meaning does this word form signal?
		P	What word form can be used to express this meaning?
	Concepts and references	R	What is included in the concept?
		P	What items can the concept refer to?
	Associations	R	What other words does this make us think of?
		P	What other words could we use instead of this one?
Use	Grammatical function	R	In what patterns does the word occur?
		P	In what patterns must we use this word?
	Collocation	R	What words or types of words occur with this one?
		P	What words or types of words must we use with this one?
	Constraints on use (register, frequency ...)	R	Where, when and how often would we expect to meet this word?
		P	Where, when and how often can we use this word?

Although Richards and Nation provided a descriptive framework of word development and use, this framework does not “explain either the processes of acquisition for the different kinds of word knowledge or the mechanisms by which they interrelate. This is partially because

there is currently no generally accepted model of how vocabulary is acquired” (Schmitt & Meara, 1997, p. 18).

It is believed that understanding the behavior of these nine aspects of word knowledge will provide us with insights that ‘might’ help to develop a comprehensive model of second language vocabulary acquisition. Also it is believed that understanding the processes of learning these partial aspects of word knowledge provides a clearer picture of “the more global acquisition processes” (Schmitt, 1997, p. 353).

Since the target participants of this longitudinal study are adult intermediate learners (as discussed in later sections), they are not expected to have developed all the nine aspects of word knowledge listed by Nation (2013). For this reason this longitudinal study adopted this framework as a research rationale approach and explored how three of the proposed nine aspects of word knowledge (meaning, written form, and word parts knowledge) develop over time and any possible relationship between them..

2.3.1.1 Receptive and Productive Knowledge

Nation (2013) divided vocabulary knowledge into two types, receptive (passive) vocabulary knowledge and productive (active) vocabulary knowledge. Receptive vocabulary knowledge refers to words learners can recognize while reading and listening. Productive vocabulary knowledge refers to words learners can produce appropriately in speech or writing.

Schmitt (1997) added that “if some type of word knowledge is demonstrated productively, we can be reasonably certain that it is mastered receptively” (291). Therefore, and for the purpose of this study, only productive knowledge of the three aspects of word knowledge

(meaning, spelling, and word part) in Educational and Naturalistic settings will be detected and compared as discussed in more detail in the following sections.

2.3.2 Three Aspects of Word Knowledge

Several research studies (González-Fernández & Schmitt, 2019; Webb, 2005, 2007; Schmitt, 1998) have documented that these three types of word knowledge (meaning knowledge, written form knowledge, and word parts knowledge) might develop before the other six aspects. González-Fernández and Schmitt (2019) found that L2 learners developed knowledge of meaning-form link and grammar before collocation knowledge. It was also argued that knowledge of word form and word meaning are the initial two types of word knowledge that L2 learners need to develop especially in beginning and intermediate levels (Saigh & Schmitt, 2012; Schwarz, 2012).

According to Schmitt & Meara (1997) “L2 learners will also have different mastery of the various kinds of word knowledge, with formal, grammatical and meaning aspects probably learned first, and some other aspects, such as collocational behavior and register, perhaps never being mastered at all” (p. 18).

Moreover, it was found these three types of word knowledge interrelated with other proposed six aspects of word knowledge such as knowledge of the form-meaning link, knowledge of associations, knowledge of concept and reference, and knowledge of spoken form, which gives them priority, especially in the beginning stages of learning (Nation, 2013; Schmitt, 1997; Schmitt & Meara, 1997).

Since participants in this longitudinal study are intermediate adult learners it is believed that they have not developed the necessary level of proficiency typical of having more advanced

types of word knowledge such as collocation knowledge and association knowledge. such as collocation knowledge and association knowledge. In order to explore how learners advance to these higher types of knowledge, this longitudinal study attempts to ascertain / determine whether these three aspects develop in a uniform or regular way, the relationship between them, and how they relate to vocabulary level development.

2.3.2.1 Knowledge of Meaning

Several research studies have reported that knowledge of meaning is “one of the first aspects of lexical knowledge to be mastered” (Schmitt, 2007, p. 748). Young learners begin their vocabulary development by first learning simple words which have one referent such as proper names, advancing later to complex words. First, they learn new words at medium levels of generality and then advance towards more general and specific class names. For example, children may apply the word *dog* to all kinds of animals until they develop a sense of class and types (*cat, goat, pony, etc.*)

First language learners produce their newly learned words even before they develop full adult word meaning (deVilliers & deVilliers, 1978, cited in Schmitt, 1997). Schmitt (1997) added that “this developmental preference for words with an easily-discernable semantic core suggests the importance of core meaning in learning, making it likely that core meaning will be one of the first things learned when acquiring any word” (p. 104). Core meaning is “what is known in common by people using the word” (p. 105).

Similarly, L2 researchers (Ijaz, 1986; Kellerman, 1978 cited in Schmitt, 1997) have also reported that L2 learners acquire the literal meanings of words before metaphorical meanings. For instance, Ijaz (1986) reported that advanced L2 learners developed more basic core meanings

than non-typical meanings. In addition, developing high levels of polysemous words is linked with understanding the most common meanings of these words.

When L2 learners develop knowledge of multiple meanings of words, they first learn core meanings and then gradually develop metaphorical meanings. Core meanings are often not enough to fully use some words and that more contextual knowledge is needed. It was also reported that L2 learners use core meanings as a strategy. When they do not know meanings of encountered words they simplify them to their core meanings (Nation, 2013).

Based on these claims and since participants in this exploratory longitudinal study are intermediate English learners, it was decided that only knowledge of core meanings will be measured as discussed in later sections.

2.3.2.2 Knowledge of Written Form (Spelling)

According to Nation (2013), knowledge of spelling is one aspect of developing familiarity with a word's written form. It is largely "influenced by the way learners represent the phonological structure of the language" (p. 70). L2 learners represent newly learned spoken forms in their memory in several ways such as onsets and rhymes, as whole words, as phonemes, and as letter names.

Several empirical research studies have claimed that the learning burden of a word's written form is largely influenced by the difference between learners' L1 and L2 writing systems as well as learner's knowledge of spoken forms of the L2 vocabulary. For instance, irregularity in the English spelling system was reported to create problems for ESL learners from different L1 backgrounds (Fender, 2003, 2008).

According to Abbas (2011) English and Arabic differ in their linguistic systems. They have differences in phonology, morphology, syntax, and semantics. The English alphabet has 26 letters representing 44 phonemes which are classified into 24 consonants and 20 vowels. The 20 vowels are divided into six short vowels, six long vowels, and eight diphthongs. This complex English classification, especially diphthongization, creates challenges to Arabic learners of English because in Arabic each letter represents only one sound (Fender, 2003, 2008; Ryan & Meara, 1991).

Because Arabic has constant grapheme-phoneme spelling mappings and English has variable grapheme-phoneme spelling mappings, Arabic learners of English face more serious difficulties in acquiring some English phonemes. For instance, they find it difficult to learn the different counterparts of the phoneme /k/: as /c/ in *calendar*, /ch/ in *chute* and *school*, /k/ in *kind*, and /ck/ in *luck*. They also encounter problems developing some English phonemes that don't have a transparent phoneme-grapheme mapping. For example, they find it difficult to process the diphthong /gh/ as /g/ in *aghast*, or as /f/ as in *cough* (Fender, 2008).

Ibrahim (1978) also determined that Arabic learners of English find it difficult to develop their English spelling system because their Arabic dialect doesn't allow initial or final consonant clusters. To overcome this problem, learners tend to insert some vowels between clustered consonants as in *seplit* for *split* and *burstes* for *bursts*.

Ibrahim also found that because Arabic has the transparent voiced consonant /b/ only while English has both the voiceless stop consonant /p/ in addition to the voiced consonant /b/, Arabic learners of English heavily interchange the voiced consonant /b/ with its counterpart voiceless stop consonant /p/ as in *stob* for *stop*. They also interchange the voiceless fricative

consonant /f/ with its counterpart voiced fricative /v/ that doesn't exist in their Arabic system, as in *natife* for *native*.

Arabic learners' use of the English spelling system was also found to be negatively affected by their L1 spelling system, i.e., an example of negative transfer. Figueredo (2006) reported that learners' heavy reliance on their Arabic phonological sound-letter correspondence hindered their English spelling system development. They were found to break down words into letters and write letters that represent these sounds.

According to Saigh and Schmitt (2012), Arabic ESL learners demonstrated more spelling problems compared to other ESL learners, which consequently affected their reading proficiency in general and word recognition ability in particular. This effect was evident in the initial stages of their language development and continued to upper-intermediate levels.

The over-reliance on their phonological processing skills negatively impacted their word spelling knowledge especially as the English language has several irregularities and inconsistencies in its orthography. To overcome spelling problems, (Arabic) ESL learners reported that they avoid words that are difficult to spell, prefer to use words with regular forms, and tend to use a limited number of words.

2.3.2.3 Knowledge of Word Parts

According to Nation (2013) knowing a word receptively involves the ability to recognize its affixes and stem that might occur in other words. For instance, learners should recognize that the word '*irresistible*' is made of the parts *ir-resist-ble* that might be part of other words such as *irregular - resistance - affordable*. They should also be able to recognize the new (and related) meanings formed by combining stems and affixes. Productively, learners need to know spoken

and written changes to the affixes and stems that occur when they form a complex word (e.g., child –*children* and legal-*illegal*).

This is supported by Corson's (1985, 1997) assertion that words that cannot be analysed into parts, have arbitrary sequence of units, and have an opaque relationship between form and meaning are difficult to learn even for native English speakers. For example, he asserted that because Greco-Latin cognates have an opaque relationship between meaning and form native speakers of English often find it difficult to analyse and develop these words.

Sasao (2013) claimed that the word learning process will be easier if the learner is familiar with the target word's parts and affixes. The learning burden of any word depends on learners' familiarity with its parts and the regularity with which its parts fit together. Some words are reformed according to their use. For instance, the word *rearrangement* is not stored as a whole item, but rebuilt from *re-*, *arrange*, and *ment* each time it is produced. This does not mean that "the word is learned in this way. It may be that for some words their whole unanalysed form is learned initially, and it is later seen as fitting into a regular pattern and is then stored differently" (Nation, 2013, p. 72).

Knowledge of word parts in general and word building in particular changes as language proficiency develops. Building new word family members improves language proficiency as for instance knowing the form *arrange* involves knowing the forms *rearrange*, *arranging*, and *arrangement*. Not only is word part a key aspect of word knowledge, it is a vocabulary learning strategy used by most L2 learners to help learn novel vocabulary items (as discussed in later sections). Learners use this strategy to develop an adequate knowledge of the most frequent English affixes to be able to use them more effectively (Nation, 2013).

Nation (2013) proposed six principles for word part learning and teaching:

1. Word part learning starts after learners develop a rich competence of complex words.
2. Word part development follows systematic sequences as proposed by Bauer and Nation (1993).
3. Frequency of stems and affixes should be considered.
4. It is better to deal with one affix at a time.
5. Word parts learning is essentially a creative activity.
6. Patterns should be considered when learning or teaching word parts.

Schmitt (1997) suggests that word parts knowledge is an advanced word knowledge aspect that develops after meaning knowledge and written form knowledge. Based on these suggestions and the discussion above, this longitudinal study attempted to explore the relationship between words parts and vocabulary competence (level). Also, it aimed to explore which word parts are learned first and which are learned last and why.

2.3.3 The Incremental Changes of Word Knowledge

Schmitt (1997) proposed that “words do not jump from being totally unknown to totally known, but are rather learned incrementally” (p. 292). He added that complete mastery of all types of word knowledge simultaneously is not attainable as “certain types are learned before others” (Schmitt, 2007, p. 748).

Several research studies (e.g., González-Fernández & Schmitt, 2019; Schmitt, 1998; Webb, 2005-2007) have documented that developing one or more of these aspects doesn't mean that the remaining aspects are developed. For instance, knowing one form of a word doesn't

necessarily mean that all the word forms are learned, and knowing one meaning of a word doesn't necessarily mean that all word meanings are learned.

Schmitt (2007) summarized that some aspects of word knowledge could be known to learners at different levels regardless the mastery level of the other aspects. Therefore, for this research, it was decided that detecting the incremental changes of some aspect of word knowledge would be more informative to understand how such aspects develop overtime and the relationship between them.

Although several research studies have attempted to explore the 'ultimate' attainment of certain types of word knowledge, only Schmitt (1997) has measured the incremental changes of some types of word knowledge over time

As stressed above, although the theories of second language acquisition discussed contribute to what we know about second language development, this dissertation is largely informed by the empirical research that has been influential in the study of vocabulary development as discussed in more detail in the following sections (Chapter 3).

Chapter 3: Literature Review

3.1 Introduction

It is worth mentioning that Nation's (1990, 2013) word knowledge framework has been adopted by few other second language vocabulary researchers. To the best of my knowledge, only seven studies (Chui, 2006; González-Fernández & Schmitt, 2019; Horst & Collins, 2006; Schmitt, 1997; Schmitt & Meara, 1997; Webb, 2005, 2007) have adopted Nation's (1990, 2013) word knowledge framework to measure incremental changes in some aspects of word knowledge using an extensive battery of tests as discussed below.

3.2 Studies on Aspects of Word Knowledge Development

- **Schmitt (1997)**

The first attempt to investigate the incremental development of vocabulary knowledge was conducted by Schmitt, (1997) as a part of his PhD thesis at the University of Nottingham. In this longitudinal exploratory research study, Schmitt measured the productive gains of five aspects of word knowledge (written form, meaning, grammar, association, and collocation) over a twelve-month period based on Nation's (1990) Word Knowledge Framework.

Schmitt tracked the incremental changes in 11 academic words taken from the University Word List (UWL) (Coxhead, 2000) including two relatively unknown words, four relatively well-known words, and five words in between. Three ESL university students (who had never previously resided in an English-speaking country) from different departments were interviewed individually. A battery of pen-and-paper tests (e.g, spelling test, multiple choice and fill-in-the-

blank) were used to elicit data from student participants. Responses were recorded and transcribed.

Results revealed that while participants demonstrated high levels of written form knowledge, their meaning knowledge was relatively low. Some aspects of word knowledge were also found to interrelate with other aspects at different levels. However, no evidence of a developmental hierarchy for the studied five aspects of word knowledge was detected.

Although this study showed a research methodology that holds interesting prospects and contributed to the limited knowledge of some aspects of word knowledge, it is believed that a single research study cannot give a clear picture of how the nine aspects of word knowledge develop over time and that another longitudinal study that explores other aspects of word knowledge and addresses gaps in this study would be needed (Schmitt, 1997).

- **Schmitt and Meara (1997)**

Schmitt and Meara tracked the incremental changes of two types of word knowledge (grammatical suffixes and word associations) of 20 verbs over one academic year at the receptive and productive levels. Ninety-five secondary and university Japanese students (18-20 years old) who had received five to six years of prior English instruction were recruited to participate in the study. Fill-in-the-blanks, multiple-choice test, TOEFL test, and two vocabulary size tests were used to elicit data from student participants.

Results revealed that although student participants had an average vocabulary gain of 330 words, they were able to produce only 15% of the targeted derivatives. In particular, they developed more receptive and productive inflectional verb suffixes gains than derivational verb suffixes gains. According to the researchers, “this is not surprising because inflectional suffixes can

be generalized because they are rule-based, whereas the relationship of derivative suffixes to individual words is largely idiosyncratic” (p. 26).

Moreover, a strong relationship between knowledge of association and knowledge of morphology was detected although no significant developments in participants’ knowledge of these two types of word knowledge were reported. There was also a strong relationship between these two aspects of word knowledge and participants’ vocabulary size and general language proficiency.

The researchers concluded that knowledge of word associations and morphology are linked in the sense that when knowledge of the newly learned word forms is developed, it is easier to link these forms to new and more word associations. That is, the more morphological forms the word has, the more associations will be made.

- **Webb (2005, 2007)**

In two short pre-post studies, Webb (2005, 2007) used an extensive battery of tests (e.g., Vocabulary Levels Test, Productive Vocabulary Levels Test, fill-in-the-blanks, and multiple-choice tests) to measure the development of five aspects of word knowledge (orthography, form-meaning, association, grammar, and syntax) from very small amounts of exposure at the recall and recognition levels.

Webb (2005) explored the contribution of frequency and task type (reading and writing) on five aspects of word knowledge development: form-meaning link, orthography, association, syntax, and grammatical functions at the receptive and productive levels.

Sixty-six Japanese EFL student participants were recruited and randomly assigned to two experimental groups. They were required to learn ten vocabulary items using a glossed sentence

task and a sentence production task in two experiments. In the first experiment (the reading task), student participants were presented with the target words accompanied along with their L1 glosses in three sentences. In the second experiment (the writing task), student participants were presented with a list of target words with their L1 glosses and were required to create one sentence per target word.

To ensure that the participants had no prior knowledge of all the target words, the researcher selected ten English target words (six nouns and four verbs) and replaced them with ten nonsense words. All the nonsense words were disyllabic words and resembled the English words phonetically and orthographically.

Results revealed that when both groups were given the same time to finish their tasks, the reading group outperformed the writing task group. However, when the writing group were instructed to use as much time as they needed, the writing group significantly outperformed the reading group in the five tested types of word knowledge especially in grammar knowledge. While their mean scores were 10.78 on grammar, 10.04 on orthography, 8.29 on syntax, 9.47 on association, and 8.18 on meaning, the reading task group scores were 8.63, 7.92, 6.55, 6.86, and 4.78 respectively.

The researcher concluded that using the target word in a sentence after receiving its L1 translation led to better second language vocabulary development than reading these three example sentences with their L1 translations. However, although the effect of the reading task was relatively minimal, both reading and writing tasks led to significant gains in the tested five aspects of word knowledge.

In a follow-up study, Webb (2007) used a multi-test approach to second language vocabulary research to assess the effect of 1, 3, 7, and 10 exposures with target words on gains of the

five aspects of word knowledge mentioned above at the recall and recognition levels. Ten target words were selected (six nouns and four verbs). Then, ten nonsense words were created and replaced the target words. All target words were glossed, written in bold, and underlined in the context.

One hundred and twenty-one EFL Japanese students who received seven years of formal instruction were recruited. While eighty-nine of these participants were randomly assigned to four experimental groups, the remaining twenty-three student participants were assigned to the control group. The four experimental groups were required to complete a reading comprehension task. The task consisted of a set of pages. Each page comprised ten sentences and each context contained a different target word. The contexts were arranged from the most informative context to the least informative context.

Thus, each reading of a particular page led to one encounter with each target word. Participants in the four groups encountered the target words differently (1, 3, 7, and 10). That is, while participants in group 1 encountered each target word only once, participants in group (3) encountered each target word three times, and participants in groups (7) and (10) encountered the target words seven and 10 times. The control group student participants did not perform the tasks and never encountered any of the target words.

The results revealed that while the development of all five aspects of word knowledge increased each time the target word were encountered, the development of word meaning knowledge was relatively minimal. Most importantly, although student participants demonstrated significant improvements each time they encountered the target words, a single encounter was enough to provoke word knowledge gains.

The results also showed that three exposures, at least, are needed for second language vocabulary development to take place. After three exposures, participants demonstrated more receptive orthography knowledge than after one exposure. By seven exposures, all the tested five aspects of word knowledge underwent considerable amounts of change with knowledge of grammar at the top.

By ten exposures, student participants were able to recognize the five aspects of word knowledge for seven out of the ten target words. About 77% of these participants were able to write the target words correctly. Webb concluded that, “by ten meetings with a word, there is the possibility that learners will be able to recognize its spelling and words that it is associated with” (p. 62). These results support Nation’s (1999) proposal that there is no set number of encounters that will ensure second language vocabulary development.

Overall, results of both studies indicate that student participants demonstrated higher levels of improvement in the five aspects of word knowledge at the receptive level than the productive level. While grammar and orthography knowledge were the most improved aspects (74%), association knowledge was the least developed (38%). It is worth mentioning that these studies are a good example of the significance of using a multi-test approach to second language vocabulary research. It succeeded in providing a clearer picture of the relationship between the different aspects of word knowledge, especially at the beginning levels of development.

- **Chui (2006)**

Chui (2006) explored the incremental development of four aspects of word knowledge (meaning recall, derivative form production, word class, and collocation recognition) of 20 academic words taken from Coxhead’s (2000) Academic Word List (AWL). One hundred and

eighty-six Hong Kong university ESL students were recruited to take the Productive Vocabulary Levels Test (Laufer & Nation, 1999, cited in Chui, 2006) to determine their vocabulary level. They were required to 1) explain meanings; 2) recognize word class; 3) produce meaningful sentences; 4) identify collocating word; and 5) produce an assigned derivative form.

Contrary to expectations, although student participants in this study were university students who were expected to have large vocabulary size knowledge, data analysis revealed that they had only developed a low vocabulary size of 3,350 word families. Although they had managed to develop a good understanding of high frequency words, they showed a poor understanding of the low frequency words. In particular, they demonstrated relatively low percentages of word knowledge gains: meaning knowledge, 64.5%, word class knowledge, 87.6%, collocation knowledge, 57.4%, and grammar knowledge, 52.3%.

Moreover, a significant correlation between participants' vocabulary size and the tested four word knowledge was detected: .53 for meaning, .53 for word class knowledge, .69 for collocation knowledge, .69 for sentence production knowledge, and .78 for grammar knowledge.

These findings are in alignment with results obtained from other research studies (Laufer et al., 2004; Milton, 2009; Webb, 2008) and suggest that vocabulary size is a good indicator of second language learners' vocabulary knowledge. This study also highlighted the importance of investigating the ultimate development of word knowledge in the field of second language vocabulary teaching and assessment and calls for more empirical research studies especially with regards to the relationship between the different aspects of word knowledge.

- **Horst and Collins (2006)**

Horst and Collins (2006) measured the development of vocabulary of one group of 210 (11-12-year-old) young French-speaking learners of English in Canada over 100, 200, 300, and 400 hours of instruction. The researchers used four measures: a count of word families, Laufer & Nation's (1995) Lexical Frequency Profile, a Greco-Latin cognate index, and a types-per-family ratio to compute an 80,000-word corpus containing narrative texts created by their student participants.

Results revealed that student participants demonstrated better use of high frequency words, especially in the inflectional and derived word forms, and poorer knowledge of low frequency words. That is, no significant productive vocabulary development was evident in student participants' narratives after receiving 400 hours of English instruction.

Although the participants had developed a relatively larger receptive vocabulary size, they still depended heavily on their high frequency words (especially words from the first 1000 words) in their narrative production. Therefore, Horst and Collins called for measures that further differentiate between possible different frequency bands within the first 1000 words band. Moreover, results revealed that student participants in this study used fewer cognates as their proficiency increased. This led the authors to conclude that neither cognate words nor word frequency bands are good indicators of second language learners' proficiency development.

- **González-Fernández and Schmitt (2019)**

In a well-designed cross-sectional research study González-Fernández and Schmitt (2019) examined the order and relationship between four types of word knowledge (derivatives, form-meaning link, collocations and polysemy) of 20 words at the receptive and productive

levels. An extensive battery of tests (e.g., a questionnaire, Vocabulary Level Test, multiple-choice tests, fill-in-the-blanks tests) was used to elicit data from 114 adult Spanish learners of English in Spain and the UK (aged 18-65). All participants had received at least four years of English instruction prior to participating in the study.

Data analysis revealed that participants demonstrated higher receptive word knowledge than productive word knowledge. Correlational analysis showed a strong relationship (.76 - .94) between the tested four aspects of word knowledge. Also, results obtained from the Vocabulary Level Test showed a strong relationship between these four aspects of word knowledge and student participants' overall vocabulary size.

This result confirms results obtained by Schmitt & Meara (1997) discussed above. It was also found that these four aspects of word knowledge “follow a consistent order of difficulty and can be expected to be measured according to an implicational scale” (p. 39). Although these studies highlighted the importance of exploring the ‘ultimate’ gains of several types of word knowledge, several research gaps can be detected as discussed below.

3.3 Research Gaps

1. A few studies have investigated depth of word knowledge (Schmitt, 1997; Schmitt & Meara, 1997; González-Fernández & Schmitt, 2019; Webb, 2005);
2. Only Schmitt (1997) detected the partial development of word knowledge over an extended period of time, with no replication;
3. Most of the studies were cross-sectional studies with only one longitudinal study (Schmitt, 1997);
4. Very few words were measured;

5. Low frequency words were selected (Schmitt, 1997);
6. Nonsense words were selected (e.g., Webb, 2005, 2007);
7. Low number of subjects (e.g., three subjects in Schmitt's, 1997 study);
8. Studies showed only how 'some' types of word knowledge developed over time but did not explain why they developed the way they did, or what facilitated or inhibited their development; and
9. No study explored the incremental gains in the small components of word knowledge resulted from engagement with different vocabulary learning strategies and activities.

Although all these studies claimed deep exploration of word depth knowledge, some of these studies (Chui, 2006; González-Fernández & Schmitt, 2019; Schmitt & Meara, 1997) only explored the 'ultimate' gains of some aspects of word knowledge while other studies (Horst & Collins, 2006; Webb, 2005, 2007) explored the overall development of a set number of vocabulary items.

That is, they have only looked 'quantitatively' at the growth and size of change in some aspects of word knowledge and how much is learned after a short time. They did not answer critical qualitative questions that help us to better understand the nature of depth of word knowledge development, such as: Why do some aspects of word knowledge change the way they do? What is the drive for these changes? Do they involve similar or different processes and practices of learning?

Moreover, these studies revealed conflicting results about the hierarchical development of the nine aspects of word knowledge and the relationship between them as some aspects were found to develop before others. Therefore, the exploratory longitudinal research study reported in this dissertation aimed to fill these gaps and detect the incremental changes of three aspects of

word knowledge (meaning, written form, and word parts) over a six-month period. It attempted to explore whether these three aspects develop in a uniform or regular way, why they develop the way they do, the relationship between them, and how they relate to vocabulary level development.

Additionally, this longitudinal research study aimed to ascertain how and what vocabulary learning strategies and activities were involved in the learning process inside and outside the classroom. It is argued that providing L2 learners with strategies and activities that prime deep word processing leads to successful internalization processes and acquisition processes outcomes (Wood, 2009b, 2010).

Furthermore, understanding type and quality of particular strategies involved in developing certain aspects of word knowledge inside and outside the classroom gives a clearer picture on how and why these aspects of word knowledge develop the way they do (Schmitt, 2014).

Chapter 4: Vocabulary Learning Strategies

4.1 Definition of Vocabulary Learning Strategies

Language Learning Strategies (LLS) are generally defined by Ellis (1994) as conscious behavioral or mental activities related to a particular stage in the overall processes of L2 development and use. Research on L2 vocabulary learning in particular has focused on compiling lists of learning strategies that L2 vocabulary learners were reported using or observed to use. Vocabulary learning strategies (VLS) were defined in different ways by several prominent L2 vocabulary researchers. For instance, VLS were defined as:

1. Efforts made by L2 learners to develop their linguistic and sociolinguistic knowledge in the target language (Tarone, 1981);
2. “Techniques which students use to comprehend, store, and remember information and skills” (Chamot & Kupper, 1989, p. 9);
3. “Special thoughts or behaviors that individuals use to help them comprehend, learn or retain new information” (O’Malley & Chamot, 1990, p. 1);
4. “Actions made by the learner in order to help them to understand the meaning of a word, learning them and to remember them later” (Sokmen, 1997, p. 237); and
5. “The process by which information is obtained, stored, retrieved and used... Therefore vocabulary learning strategies could be any which affect this broadly defined process” (Schmitt, 1997, p. 203).

According to Takac (2008), L2 vocabulary researchers tend to define VLS in alignment with their own foci and research interests and therefore there is no agreement on a particular acceptable definition. The term VLS is loose and in general terms refers to any means that help

learners to develop their vocabulary. Therefore, following Schmitt's (1997) definition, VLS in the present study refers to any step (mental/behavioral) that participants take to facilitate their obtaining, comprehension, retention, internalization, retrieval, and use of new words. The classification of VLS may help to clarify this concept, as discussed below.

4.2 Classification of Vocabulary Learning Strategies

In the literature there are several taxonomies created to describe L2 VLS. There is no agreement between researchers on a particular taxonomy as every researcher classified his/her strategies from different angles using different terms to label them (Nation, 2013). One of the first taxonomies of VLS was developed by Ahmed (1989) who proposed two groups of strategies: macro-strategies and micro-strategies. This basic binary subdivision was later enhanced by Oxford (1990) who classified VLS into four comprehensive categories as discussed below.

4.2.1 Oxford's (1990) classification of vocabulary learning strategies

Oxford classified VLS into four major categories: decontextualized strategies, semi-contextualized strategies, fully contextualized strategies, and adaptable strategies.

4.2.1.1 Decontextualized strategies

Decontextualized strategies refer to removing "the word as completely as possible from any communicative context that might help the learner remember and that might provide some notion as to how the word is actually used as a part of language" (p.10). Learners who use memory decontextualized strategies use different techniques such as word lists, flashcards, and dictionary use.

- **Word lists**

Words lists technique does not involve any role from the teacher. Lists are presented in second language textbooks at the beginning or end of some chapters to the learners (especially at the beginning levels) who are required to memorize all the words in the lists. Learners look up the first language meaning for each word in the list and memorize it by rote. Their understanding of the words is usually measured at every class meeting.

Word lists are easier to learn if the target word and its L1 equivalent word are cognate words, if the learners make their own associations between the target word and its L1 equivalent, if the target word is easily pronounceable, or if the target word is a familiar part of speech (Oxford, 1990). However, Oxford argued that word lists are not very useful as a strategy because no context is offered and add that even if learners succeeded to memorize the words they will not be able to use them in communicative events.

- **Flashcards**

Flashcards strategy is a very popular strategy with L2 learners and more effective than word list strategy. Learners use this strategy to write down the target word on one side of a card and write its L1 meaning on the other side and then use the card to familiarize themselves with the target word and its meaning. Creative learners can add context by writing the target words in full grammatical sentences, attaching a relevant picture to the card, and arranging cards in a kind of semantic map. Unlike word lists strategy, flashcards strategy is considered a flexible strategy as learners can integrate their flashcards freely (Ellis, 1999; Oxford, 1990).

- **Dictionary Use**

Vocabulary learners usually use this strategy when they have no way to know the meaning of the target word especially at beginning and intermediate levels. Looking up the word from

a reference book “somehow helps learners remember the meanings” (Oxford & Crookall, 1990, p. 13). Some ESL teachers encourage their students to look up new words as they feel such strategy promotes reading comprehension in general and vocabulary development in particular.

However, it was argued that dictionary use strategy is not an effective strategy as readers do not use their existing word knowledge or the available context to guess the word meaning. Moreover, learners who depend heavily on dictionary use strategy most likely will not be able to think in the target language as they are not aware of the links between the target language and their L1 (Oxford, 1990).

4.2.1.2 Semi-contextualized Strategies

Semi-contextualized strategies allow “some degree of context but fall short of full contextuality; thus, new words may be linked with something that is meaningful to the learner, but they are not used as part of naturalistic communication” (Oxford, 2010, p.10). Second language learners use a set of semi-contextualized strategies such as word grouping, word association, keyword, aural imagery, visual imagery, physical response, and semantic mapping.

- **Word grouping**

One of the most popular vocabulary learning strategies among second language learners is word grouping strategy. In word grouping strategy, a relatively long word list is divided into shorter lists based on particular characteristics (e.g., word type, grammatical form, topic, and meaning) and thus different levels of contextuality is generated. Creative second language vocabulary learners usually label the new lists to elaborate contextuality (Oxford, 1990).

- **Word Association**

The word association strategy consists of creating meaningful (simple or complex) associations between the target words and words that already exist in a learner's schemata. It can be used to facilitate other vocabulary learning strategies such as the word list strategy discussed above. Learners divide long lists according to particular associative attributes such as sound similarity or personal experience. Such associations are believed to create some degrees of contextuality that might help the learner to infer word meaning faster (Oxford, 1990).

- **Visual imagery**

Second language words can better be represented in the learner's memory by using the visual imagery strategy. In this strategy, learners create associations between the target words and pictures, such as no-smoking signs in a hospital and yield signs on road intersections. The association processes between the picture and sound of the word entitles activation of several parts of the brain and stimulates the learner's schemata in several ways. It provides a semi-context for the learner and a link with existing vocabulary.

Learners not only use visual imagery to learn concrete words such as school and car, they use it to learn abstract words as well. Abstract words such as danger and evil can be learned by associating them with pictures or visual symbols of concrete objects such as crossbones and a bloody knife.

- **Aural imagery**

Second language learners use aural imagery strategy by associating sounds of the target words with familiar sounds. They might use spelling or accent marks to remember a newly learned word especially if the target word and the familiar word have a similar meaning. However, recent research studies have documented that second language vocabulary learners engage

with more visual activities such as watching TV and computer games than aural activities to enhance their vocabulary development. However, studies showed that or demonstrated greater success by engaging with visual activities or a mixture of visual-aural activities than engaging in aural activities only (Pearson, 2004; Sundqvist, 2009, 2011).

- **Keyword**

The keyword strategy combines the aural imagery strategy and the visual imagery strategy. Although some target words do not fully sound like the familiar word in learner's L1, it was found that newly learned vocabulary items are better learned if meaningful auditory and visual links are created. Learners identify a familiar word in their L1 that sounds like the target word and then create visual images of some relationship between the target word and a familiar word (Oxford, 1990).

- **Physical Response**

The physical response strategy was popularized by Asher's (1966) Total Physical Response (TPR) method for second language teaching. Asher argued that associating new vocabulary items with physical motions activates certain parts of the brain and thus enhances their learning. However, Oxford and Crookall (1990) claim that physical response is not a very effective way to learn abstract words and it can only be significant for beginner and intermediate learners.

- **Semantic mapping**

This strategy draws upon the word grouping strategy, the word association strategy, and visual imagery strategy. It was defined as an organizational technique that shows visually and graphically the relationships between words and ideas (Pearson & Johnson, 1978). It can for

instance involve the recall of a recent current event, a previously read story, a unit of study, a film, or a learner's general knowledge of a topic.

Cognitive thinking and active discussions between students and teacher during semantic mapping activity are the drive for second language vocabulary development in general and word productive knowledge in particular. Such discussions make students notice gaps between their existing word knowledge and what they need to know about it (Nation, 2001, 2013).

4.2.1.3 Fully Contextualized Strategies

Fully contextualized strategies involve the embedding of target words in rich communicative contexts. Rich communicative contexts can better be achieved by participating and practicing the four language skills: listening, reading, speaking, and writing (Oxford & Crookall, 1990).

- **Reading and Listening Practice**

Second language vocabulary learners develop high levels of vocabulary development and retention through extensive reading of different types of materials such as advertisements, letters, magazines, TV, newspapers, articles, and books outside classrooms (Kafipour & Naveh, 2011; Krashen, 1982; Pigada & Schmitt, 2006; Pellicer-Sanchez & Schmitt, 2010; Rodgers & Webb, 2017; Vidal, 2011; Waring & Takaki, 2003). Creative learners make use of all available cues and context to guess the meaning of any unknown word being read (Nation, 2013).

However, it was argued that reading several types of materials with limited number of encounters cannot ensure successful and complete vocabulary development unless learners were able to infer meanings from the text using available contextual clues (Anderson & Larsen-Freeman, 2011; Oxford, 2011; Pearson, 2004). Even if learners developed high levels of receptive

vocabulary development they might not be able to use the newly learned words productively (Swain, 1985, 2001; Swain & Lapkin, 1995).

Several conditions have been proposed for successful L2 vocabulary development from reading different materials: interest in the content of the story, comprehension of the story, understanding of the unknown words and retrieval of the meaning of those not yet strongly established decontextualization of the target words, and thoughtful generative processing of the target vocabulary (Oxford, 2011).

Pavia et al., (2019) explored the effect of listening to songs on second language vocabulary development and concluded that listening to songs repeatedly contributes to better vocabulary learning gains. In a related study, Mason and Krashen (2004) compared the effect of listening to stories and vocabulary-building exercises, concluding that vocabulary learning from listening to stories was more powerful than vocabulary-building exercises.

- **Speaking and Writing Practices**

According to Milton and Meara (1995), one of the most effective ways to develop high levels of second language vocabulary development is to live in a native speaking country for long periods of time. The researchers reported that learners increased their vocabulary size (1326 words) after a six-month stay in the UK.

This assertion is supported by Cummins's (2000) Basic Interpersonal Communication Skills (BICS) framework in which he proposed that spoken language (speaking) is less demanding cognitively and requires less vocabulary (cited in Douglas, 2010). Douglas (2010) added that talking to a competent user of the target language, engaging in small discussion groups, and even gaming could support the development of high levels of both spoken and written language.

The importance of practicing newly learned vocabulary items in communicative events was supported by the communicative approach to language teaching. Producing language in communicative events forces learners to access existing knowledge and rapidly or systematically put it into production. Moreover, through production learners notice gaps between what they want to produce and what they actually can produce and thus enhance their existing linguistic knowledge (Schmitt, 1990; Swain & Lapkin, 1995).

4.2.1.4 Adaptable Strategies

Adaptable strategies are based on the principles of language memory that emphasize the importance of duration, primacy, linking, pacing, and spacing, (Oxford, 1990). They refer to strategies that reinforce other strategies “at any part of the contextuality continuum: decontextualizing, semi-contextualizing, and fully contextualizing” (p.10). No matter which strategy the learner uses, adaptable strategies help learners create structured schedules to review their newly learned vocabulary items.

Learners who use adaptable strategies review their newly learned vocabulary items at different intervals (once a day, a week, a month, etc.) until they become available for automatic use. Unfortunately, although adaptable strategies are effective strategies in L2 vocabulary development, they were neglected by L2 vocabulary learners, researchers, teachers, and syllabus designers and have not been used to their full potential (Oxford, 1990).

Although Oxford (1990) was the first researcher to classify vocabulary learning strategies in a hierarchy, her classification did not distinguish between strategies of language learning and language use (Ellis, 1994). Schmitt (1997) added that Oxford’s taxonomy did not include a type

of strategy learners use to discover meanings of new words without the help of other people which he labelled as ‘determination strategies, as discussed in the following section.

4.2.2 Schmitt’s (1997) Taxonomy of Vocabulary Learning Strategies

Based on Oxford’s (1990) taxonomy which was created to describe strategies of language learning in general, Schmitt (1997) developed a more comprehensive taxonomy for L2 vocabulary development based on a study using Japanese L2 learners. The proposed taxonomy consists of two main strategies: consolidation strategies and discovery strategies. Discovery strategies are used to discover encountered words’ meanings. They include memory strategies, social strategies, cognitive strategies and metacognitive strategies. Consolidating strategies are used to consolidate the target words once they have been encountered and include determination strategies and social strategies.

4.2.2.1 Discovery Strategies

Schmitt (1997) classified discovery strategies into four main categories:

- Social strategies: involve interaction with other people to improve language learning, such as:
 - ask the teacher for a synonym, paraphrase, or L1 translation of a new word;
 - learn and practice new words with a study group; and
 - interact with native-speakers.
- Memory strategies (traditionally known as mnemonics): involve relating new words to previously learned knowledge, using some form of imagery or grouping, such as:
 - Use semantic maps; and
 - Use the keyword method.

- Cognitive strategies: entail manipulation or transformation of information about words to be learned, although they are not so specifically focused on mental processing as memory strategies.

For example:

- Use written repetition;
 - Keep a vocabulary notebook; and
 - Put English labels on physical objects.
- Metacognitive strategies: involve a conscious overview of the learning process and making decisions about planning, monitoring, or evaluating the best ways to study. for example:
 - Use spaced word practice (expanding rehearsal);
 - Test oneself with word tests; and
 - Continue to study word over time.

4.2.2.2 Consolidation Strategies

Determination strategies are used by an individual when faced with discovering a new word's meaning without recourse to another person's expertise. For example:

- Analyze any available pictures or gestures;
- Guess meaning from textual context;
- Use a dictionary (bilingual or monolingual); and
- Associate a new word with its already known synonyms and antonyms. (Schmitt, 2007).

A more recent taxonomy matrix of VLS based on Oxford's (1990) and Schmitt's (1997) taxonomies of VLS was developed by Nation (2013) as discussed below.

4.2.3 Nation's (2013) Taxonomy Matrix of Vocabulary Learning Strategies

In this theoretically-oriented taxonomy matrix, Nation (2013) made a distinction between the different aspects of word knowledge from learning processes and from the sources of vocabulary knowledge; hence, three broad categories: planning, processes, and sources each covering a set of key vocabulary learning strategies (p. 328), are shown in Table 4.1 below. Planning category involves deciding on how and where to focus attention on certain words. It contains strategies for choosing aspects of word knowledge, choosing words, planning repetition, and choosing strategies. Process category refers to establishing word knowledge through retrieving, noticing, and generating strategies.

Table 4.1

Nation's (2013) Taxonomy on Types of Vocabulary Learning Strategies

General class of strategies	Type of strategies
Planning: choosing what to focus on and when to focus on it.	Choosing words
	Choosing the aspects of word knowledge
	Choosing strategies
	Planning repetition and spending time
Sources: finding information about words	Analysing words
	Using context
	Consulting a reference source in L1 or L2
	Using parallels in L1 and L2
Processes: establishing knowledge	Noticing
	Retrieving
	Generating (creative use)
Skill in use: enriching knowledge	Gaining in coping with input through listening and speaking
	Gaining in coping with input through reading and writing
	Developing fluency across the four skills

A good illustration of this taxonomy matrix is consulting a reference source in L1 or L2 for information about a word or any aspect of the word knowledge. Another example is ‘noticing’ that can be used as a learning process and/or to establish knowledge of any aspects of the word. In contrast to the taxonomies of VLS discussed above, this taxonomy matrix separates the nine aspects of word knowledge from the different sources of vocabulary knowledge and the learning processes involved.

With observed inconsistencies in how VLS were classified, this longitudinal research study keeps all general classifications discussed above in mind and relies on Schmitt’s (1997) VLS classification, as it clarifies which LLS are particularly VLS. After clarifying the concept of vocabulary learning strategies, it is important to review related literature on vocabulary learning strategies and vocabulary development.

4.3 Studies on Vocabulary Learning Strategies and Vocabulary Development

Several research studies have explored the use of VLS (e.g., Ahmed, 1989; Schmitt, 1997) as well as their effect on L2 vocabulary development (e.g., Arden-Close, 1993; Gu & Johnson, 1996; Hulstijn et al., 1996; Kojic-Sabo & Lightbown, 1999). In a large-scale research study, Ahmed (1989) examined VLS use among 300 Sudanese English learners. Individual interviews, observations, a think-aloud procedure, and questionnaires were used to collect data from participants.

Data analysis revealed two groups of learners (good and poor). Although no differences were detected between the two groups in their macro-strategies use (e.g., memorization, note-taking, practice, and dictionary use), only the good learners’ group was reported to use more micro-strategies (e.g., using words in context and testing oneself while practicing).

Schmitt (1997) administered 58-item questionnaire to 600 young and adult Japanese English learners to explore their preferred VLS strategies and strategies they found most useful. Participants reported using different VLS, such as dictionary use, rote strategies, guessing from context, reading aloud, and studying the spelling. They also reported that they found these strategies as the most useful strategies. Deeper data analysis revealed changes in their strategy use in relation to age. While younger participants preferred flashcards, focus on form, oral repetition, and word lists, adult participants preferred strategies involving more cognitive processing such as word association, imaging, and word part analysis

Arden-Close (1993) examined the use of guessing from context strategies among poor, average, and good readers. The researcher found that the stronger the reader, the more strategies s/he applied. While stronger readers were found to use wide context, grammatical strategies, and syntactical strategies to infer meanings of unknown words, weaker readers were found to use only sentence context to infer meanings of unknown words.

The latter readers were also found to lack knowledge of strategies and used their inferring strategies inappropriately. Although they paid more attention to unknown words and used word parts strategy, they did not consider the context to infer meanings. Arden-Close concluded that learners should be helped to improve their strategies use and knowledge of strategies.

In another study conducted by Gu and Johnson (1996), the researchers explored how 850 Chinese university students combined different VLS and then explored the relationship between their combined VLS and their general language proficiency and vocabulary size. Results showed that participants used a wide range of VLS: dictionary use, metacognitive strategies, contextual guessing, word formation, note-taking, and contextual encoding which were strongly correlated

to their general language proficiency and vocabulary size. Vocabulary size was also found to positively correlate with general language proficiency.

However, a negative correlation was detected between visual repetition and imagery and participants' vocabulary size and general language proficiency. In particular, VLS aimed at word retention, such as semantic encoding and wordlists were found to positively correlate with vocabulary size but not with general language proficiency.

Deeper data analysis revealed five groups of learners based on participants' test scores. The highest test score group preferred using reading and guessing strategies but not rote strategies. The following best group preferred using newly learned words, careful study, and memorizing words. However, the group with lowest English test scores preferred rote strategies only.

Kojic-Sabo and Lightbown (1999) explored the relationship between vocabulary knowledge development and vocabulary learning strategies use in ESL and EFL settings. One hundred ESL learners in Canada and EFL learners in Yugoslavia were asked to respond to a questionnaire and a vocabulary size test. Similar to results obtained by Gu and Johnson (1996), results in this study showed that participants in both settings used a similar set of strategies: dictionary use, metacognitive strategies, contextual guessing, word formation, note-taking, and contextual encoding.

The results also showed two groups of learners, namely top and poor, based on participants' strategy profiles. Good participants in both settings were found to use similar VLS, such as out-of-class strategies, independent reading, note-taking, and dictionary use. However, poor participants in both groups were found to use very limited number of strategies (rote strategies and dictionary use).

Hulstijn et al., (1996) explored the effect of reading strategies with the help of different reference sources on incidental vocabulary learning. Results revealed that reading strategies, dictionary use, and glossing strategies improved participants' incidental vocabulary learning. The researchers explained that when marginal glosses and/or dictionaries are provided to look up the meaning of new words, learners are given more opportunities to encounter the new words and thus enhance the connection between word meaning and word form.

However, the researchers reported that reading for general meaning only may not lead to successful vocabulary development. Learners need also to pay attention to unknown words. Much like Arden-Close's (1993) conclusion, the researchers in this study found that learners need to be trained and encouraged to use the different VLS strategies and pay more attention to unknown words. It is worth mentioning that these results confirm Schmidt's (1990) Noticing Hypothesis and the role of noticing in L2 vocabulary development.

Overall, the studies cited above have revealed that the more proficient the learner the more strategies they use. More proficient learners are more flexible in their strategy use and have a larger strategy repertoire. However, inconsistent results were obtained in terms of the number and type of strategy used among learners from different educational backgrounds. Also, a mismatch was detected between VLS participants reported using and the ones they actually used..

Although these studies highlighted the role of VLS in L2 vocabulary development and general proficiency, they did not explore their effect on the incremental changes of aspects of word knowledge in particular. They did not report on the relationship between VLS and aspects of word knowledge. That is, little is known about which VLS is involved in the development of certain aspects of word knowledge.

In addition, these studies depended on self-reports to explore learners' VLS use. Hence, more research with improved methods is needed to deeply explore VLS use inside and outside the classroom. Therefore, this longitudinal research study attempts to fill this gap and deploy improved research methods such as questionnaires, class observation, and interviews to explore the role of VLS on the incremental changes of three aspects of word knowledge (meaning, written form, and word parts).

Having clarified the concept of VLS and their effect on vocabulary development inside the classroom, it is important to look at VLS and activities outside the classroom as well. It has been argued that out-of-class learning activities and sources (e.g., watching TV, reading newspapers, media, work place, and private English courses) are strongly associated with second language development (Benson, 2011; Inozu et al., 2010; Sundqvist & Wikstrom, 2015), as discussed in the following section.

4.4 Out-of-class Vocabulary Learning Activities

4.4.1 Definition of Out-of-class Activities

Out-of-class activities are defined as any type of language learning that takes place out-of-class and includes naturalistic learning self-instruction or self-directed naturalistic learning (Benson, 2001). Out-of-class activities were distinguished from the learning strategies discussed above as the former “entails conscious planning, cognition and even a rationale” (Doyle & Parrish, 2012, p. 197).

4.4.2 Studies on Vocabulary Learning Strategies outside Class

Extensive research in the past few decades has mainly focused on learning process inside the classroom (Nation, 2013; Schmitt, 2010). White (1995) argues that “our understanding of the

varied means learners use to learn a second or foreign language has been artificially limited by an almost exclusive focus on learners in conventional classroom environments” (p. 218). We know more about what teachers and learners do in classrooms than what individual learners do outside the classrooms to develop their language attainment (Pearson, 2004).

Detecting learners’ language development in the classroom only is not sufficient to have a clearer picture of second language learning processes and practices. It is important to detect learners’ processes and practices of learning outside the class as well (Benson, 2017). The first research study that explored language learning out of class was conducted by Seliger in 1977. Seliger explored the learning practices of six intermediate adult ESL learners. In addition to tests, he developed a self-report survey called the Language Contact Profile (LCP) to collect data from participants about their in- and out-of-class English use.

Tests analysis showed two groups of learners: high input generators (active learners inside and outside class) and low input generators (passive learners inside and outside class). High input generators group generated more linguistic input and demonstrated higher levels of language proficiency than low input generators group. Correlational analysis revealed significant correlation between field dependence performance and group membership. In particular, a significant correlation between general language proficiency and out-of-class contact was found.

Another important study that investigated the learning practices that L2 learners engage with outside the classroom was conducted by Pickard (1996). Twenty German learners of English in Germany were interviewed individually and were asked to respond to a questionnaire on their uses of English outside the classroom. Participants revealed that they prefer to engage in oral activities and read newspapers and books. They indicated that they like to engage with activities they like but not with the ones the teacher recommended them to engage with.

Another study which intended to verify and document what L2 learners do outside the classroom was conducted by Hyland (2004). Hyland explored out-of-classroom learning activities used by 228 Chinese ESL teachers using a questionnaire. Questionnaire analysis showed that teacher participants were most frequently engaged in five independent activities: exchanging emails, reading newspapers, surfing the Internet, watching TV programs, and listening to music.

Similar results were obtained by Pearson (2004) who investigated out-of-classroom learning habits of Chinese students enrolled in an English for Academic Purposes (EAP) course in New Zealand. The researcher recruited 106 students and asked them to respond to a questionnaire about their preference of out of class activities. Results showed that participants were most frequently engaged in four activities: watching TV programs or movies, studying in the library, reading newspapers; and listening to music or radio. Moreover, participants indicated that they consider these four activities as enjoyable and lead to more L2 learning than formal classroom activities.

Although these studies highlighted L2 learners' motivation and preferences for out-of-class learning activities, they did not explore the role of these activities in language development in general and vocabulary development in particular. To fill this gap, Sundqvist (2009) explored the relationship between the amount of time L2 learners spend on five types of out-of-class activities (playing video games, watching TV/films, listening to music, reading, and surfing the internet) and their vocabulary size and oral proficiency development.

Eighty-two Chinese learners of English were asked to report on their engagement in these five activities and respond to questionnaires. The researcher also used five speaking tests and two written vocabulary tests to collect data from her participants. Results revealed that out-of-

class learning was significantly correlated with participants' vocabulary size (0.36) and oral proficiency (0.31).

Also, the results showed that the time participants spent on out-of-class learning positively correlated with their self-efficacy in English. Participants engaged in productive activities that required them "to rely heavily on their language skills" (p. 114) such as reading books, reading newspapers, and surfing the Internet. These activities were found to be better predictors of participants' vocabulary size and oral proficiency than passive activities such as watching TV and listening to music.

Along the same lines, in a recent research study on L2 vocabulary development resulting from watching episodes of L2 television programs outside the classroom, Rodgers and Webb (2017) investigated 372 adult Japanese learners' comprehension of ten 42-minute episodes of L2 television program with and without captions.

Participants were required to complete comprehension tests (true/false, multiple-choice, and sequencing item test) while viewing the episodes. Rash analysis revealed that participants demonstrated high levels of comprehension after viewing the 10 captioned episodes. In particular, the analysis demonstrated that their comprehension was significantly different on the most difficult three episodes. The researchers concluded that "captions can significantly assist comprehension, particularly when the episode is comparatively difficulty" (p. 23).

In a follow-up study, Rodgers and Webb (2017) explored incidental vocabulary learning resulting from watching 10 episodes of the American drama 'Chuck' and the relationship between frequency of occurrence of unknown words within these 10 episodes and incidental vocabulary learning. Japanese university EFL students (N = 260) were randomly assigned to either an experimental group or a control group. Both groups were required to complete two multiple-

choice tests and Vocabulary Levels Test (VLT). Only experimental group participants watched the 10 videos.

It was found that “L2 incidental vocabulary learning does occur through watching successive episodes of a television program, and that gains may be similar to those made through reading” (Rodgers and Webb, 2017, p. 22). It was also found that frequency of occurrence of unknown words within the 10 episodes and vocabulary development “may have the same medium-sized relationship in television and reading” (Rodgers and Webb, 2017, p. 22).

The researchers concluded that incidental vocabulary learning through watching TV is a gradual process dependent on frequency of occurrence of unknown words in the context. This conclusion is in accordance with a series of research studies conducted by Douglas (2013a, 2013b, 2015) who highlighted the importance of frequency of occurrence in facilitating learners’ vocabulary development and writing quality.

However, contrary results were obtained by Doyle and Parrish (2012) who found that most of their Japanese university participants engaged in “traditional ways of using English outside of class” (p. 200) such as preparing for exams, and that very few participants engaged in “creative and resourceful” (p. 200) activities such as singing in English and talking to themselves in English.

To conclude, informants in most of these studies favoured simple learning strategies such as watching TV and surfing the internet over complex strategies such as inferencing, forming associations, imagery, and keyword search/focus although the latter led to more vocabulary gains and retention. Although these studies have explored learners’ preferences for out-of-class activities (Doyle & Parrish 2012; Hyland, 2004; Pearson, 2004) and the effect of a single activity on their language development (Rodgers & Webb, 2017), no study had examined why learners used

particular types of activities and how they learned and used language (and vocabulary in particular) to perform such activities (Benson, 2017).

Therefore, this longitudinal study aims to fill these gaps and explore participants' preferences for out-of-class learning activities and effect of these tasks on some aspects of word knowledge development. Understanding the nature of these activities and their effect on learners' language development would guide teachers on how to make use of these activities and support their students to maximize their language development (Benson, 2017).

Benson (2017) also argued that within these studies, their framework and scope of research was not well defined and sometimes lacked sound structure. Benson's observations along with Haas's (1994) research study inspired me to fill previous research gaps and construct a study that focuses on the amount and type of outside class environments that learners may encounter, how they create opportunities to learn from those environments, as well as the ways and strategies they use in participating in those environments.

Overall, most of these studies have only looked at the quantity and type of vocabulary learning strategies and activities (Hyland, 2004, Pearson, 2004), their effect on general language proficiency (Cole & Vanderplank, 2016), their effect on incidental learning (Rodgers & Webb, 2017), or their effect on language comprehension (Rodgers & Webb, 2017), but no study has looked into the incremental changes in the small aspects of word knowledge and their relationship with these types of VLS strategies and activities. Therefore, this thesis has adopted an innovative research design and research method to fill this gap. This will be discussed in more detail in the following chapter.

Chapter 5: Methodology

5.1 Introduction

The opening chapters of this dissertation were devoted to the theoretical or conceptual framework upon which it is based, and related research studies which informed it. This chapter discusses the longitudinal case study method employed in the qualitative study which is the focus of the dissertation. This chapter begins by reintroducing the research questions used to guide the study. These are followed by a detailed discussion of overall research design, including, ethics clearance approval, participants, instrument design and validation, procedures, and data analysis.

5.2 Guiding Research Questions

As this research explores a single phenomenon (second language vocabulary development) in different sittings, this longitudinal case study was conducted based on the following research questions:

1. How does knowledge of individual vocabulary items develop over time in educational settings?
 - Are they learned in a developmental sequence?
 - Do they develop at a similar rate? Why?
 - What facilitated or inhibited their development?
2. What types of vocabulary learning strategies and activities do learners engage in to learn the three measured aspects of word knowledge?
3. Is there a relationship between learners' word knowledge development and vocabulary level development?

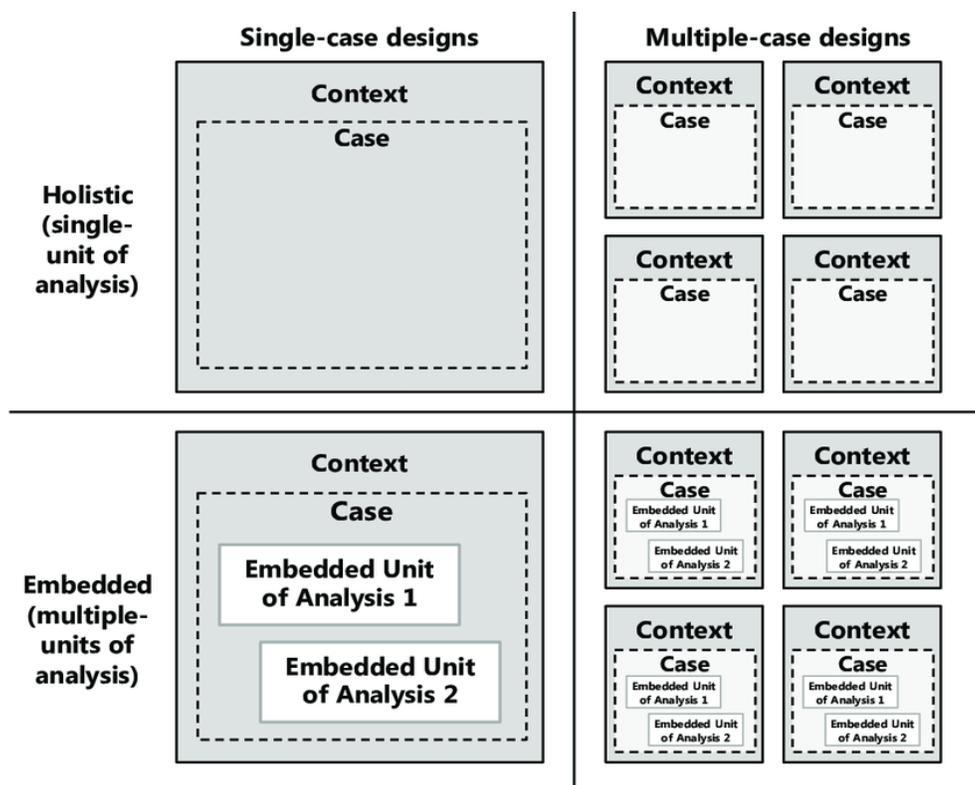
5.3 Research Method

Yin (2014) suggested that when *what*, *how* and *why* research questions are asked and several data collection measures (e.g., interviews, observations, and documentations) are incorporated, research questions may be best addressed with case studies.

To decide on the case study and the type of case study to be implemented, Yin (2014) proposed two types of case studies: single-case study and multiple-case study as shown in Figure 5.1 below. While single-case studies include a single case implemented in a single context, multiple-case studies include multiple cases implemented in multiple contexts.

Figure 5.1

Case Study Type Design (Yin, 2014)



Single-case studies might have more than one embedded unit of analysis. An embedded unit of analysis is defined as any unit of analysis that is “lesser than the main unit of analysis,

from which case study data also are collected” (Yin, 2014, p. 238). When a unit of analysis is the case explored, it is called a holistic single-case study, and if there is one or more embedded units of analysis, it is called single-case study with embedded units of analysis.

As this study includes one main case (vocabulary development) and two units of analysis (participants’ accounts in the interviews and test performance analysis), it was decided that the overall design of this longitudinal study is a single-case study with two embedded units of analysis with qualitative and statistical data analysis.

To ensure validity and reliability, Yin (2014) recommended several tactics researchers need to adopt to maintain their research’s validity and reliability. Table 5.1 below outlines those relevant to this this study.

Table 5.1

Tactics for Testing Case Studies Adapted from Yin (2014)

Test	Tactics	Phase of this study
Construct validity	Establishing numerous sources of evidence	Data collection phase in Study 1 and Study 2
	Member/informant checking	The main findings were presented to two of the participants and the class teacher.
External validity	Use theory	Socio-cognitive theories and Nation’s (2013) word knowledge framework were used.
Reliability	Use case study protocols and database; check thematic coding through inter-coder reliability checks; Cohen’s kappa	Data collection phase in Study 1 and Study 2

To test for construct validity, Yin (2014) recommended that researchers need to define their concepts and relate them to objectives of the study in addition to identifying proper operational measures for those concepts. To achieve these goals, he recommended establishing numerous sources of evidence and checking with participants for appropriate and unbiased conclusions.

In the current study, several sources of evidence were used including tests, questionnaires, interviews with participants, casual talks with teachers, and field notes. Data collected from questionnaires and interviews were compared with field notes to discover key points and themes. At the end of this process results were reviewed by two of the participants and the class teacher.

To test for external validity or the extent to which the study's findings can be transferable, Yin (2014) recommended seeking analytical generalizations with the aid of specific research questions concerning *why* and *how*. Answering research questions in the current study not only helped explain the development of certain aspects of the word among newcomers to Canada, but also the global phenomenon of vocabulary development which has wider applicability than the current study.

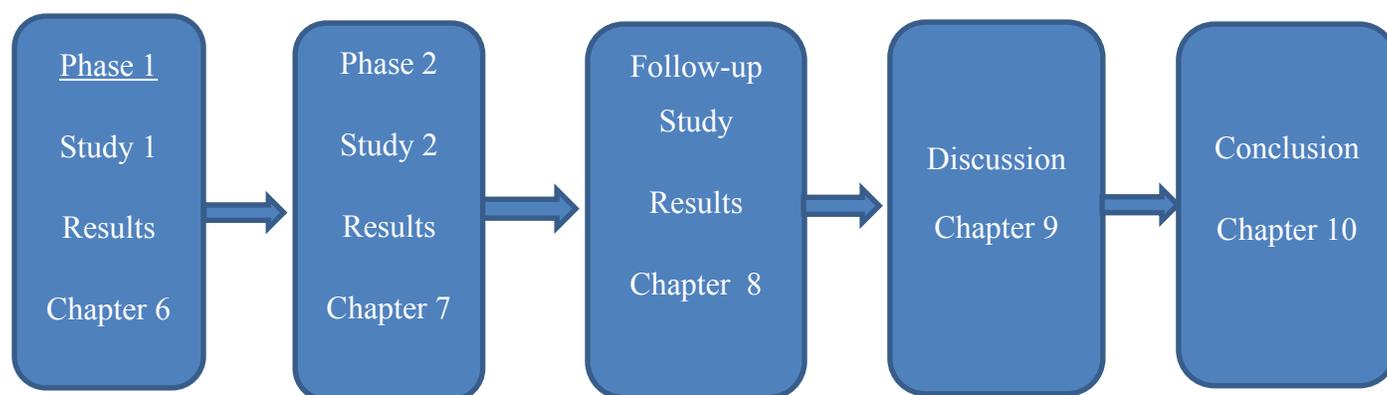
To maintain study reliability (i.e., whether similar research results would be obtained if a similar study were to be conducted), the researcher made methodology and results sections as descriptive as possible. In addition, inter-coder reliability was conducted to maximize reliability. The principle thesis supervisor reviewed a section of the qualitative data of this study.

Cohen's kappa was run to determine if there was an agreement between our judgements. There was a satisfactory agreement at .83 and a significance of $p < .05$. Peat (2001) which showed that while .5 to .7 Kappa is a moderate agreement, .7 to .8 is good agreement. A value of .8 and above is very good agreement.

5.4 Overall Research Design

As discussed in the preceding chapters, although several second language vocabulary research studies have examined the ultimate gains of some aspects of word knowledge at a single point of time, the uniqueness of this case study lies in detecting and comparing the productive incremental changes of three aspects of word knowledge (meaning knowledge, spelling knowledge, and word part knowledge) in Educational (e.g., school) and Naturalistic settings (e.g., home and workplace) at different time intervals over a 24-month period as shown in Figure 5.2 below.

Figure 5.2
Overall Research Design



As shown in this figure, this longitudinal case study is comprised of three-phases. In phase 1, a 6-month longitudinal study (Study 1) was conducted from January 2018 to June 2018. In phase 2, an 8-month longitudinal study (Study 2) was conducted from September 2018 to May 2019. In phase 3, a one-time Follow-up Study was conducted in January 2020.

It is worth mentioning that the same data collection instruments (questionnaires, paper-based tests, VLT, and semi-structured interviews) were used in the three studies (Study 1, Study 2, and the Follow-up Study). Once ethics approval was received from the University Research Ethics Board (see Appendix B for Ethics Certificate), participants were invited to voluntarily participate in the two main studies and the follow-up study as discussed below.

All participants who voluntarily agreed to participate in the two main studies (Study 1 and Study 2) and the Follow-up study signed informed consent forms (Appendix C) at the beginning of each study and before every session (interview).

5.5 Participants

5.5.1 Study 1 Participants

The target participants for this longitudinal study were adult newcomers to Canada. Due to practical constraints, only five Arabic-speaking learners from the CLB5 class (upper-intermediate level) were recruited to participate in the study. It was decided that the target participants should have reached the secondary school level prior to coming to Canada to ensure that they have an adequate literacy background. They also should be from the upper-intermediate level or above at the LINC programme as learners in the beginning levels only receive basic language training. Table 5.2 below shows Study 1 participants' profile.

All interviews in Study 1 took place in a private and distraction-free room in LINC program school. Participants were asked to answer 60 productive questions on their understanding of their newly learned words. It is important to note that an ethics clearance was obtained from the University Office of Research Ethics at Carleton University (Appendix B) before the recruitment stage.

Table 5.2

Study 1 Participants' Profile

	Fatima	Mohamad	Sara	Ibrahim	Laith
Age	27	32	26	30	33
Native country	Syria	Syria	Syria	Yemen	Iraq
Arrival in Canada	25 months	25 months	25 months	28 months	30 months
Literacy	Certificate in nursing	Secondary school	Secondary school	Grade 10	Secondary school
Work	No	Part time	No	Part time	Part time
Workplace lan- guage	Arabic	English	Arabic	Arabic & English	English
Formal E instruc- tion prior to com- ing to Canada	Zero	Zero	Zero	Zero	Zero
Formal E instruc- tion in Canada	23 months	23 months	26 months	25 months	27 months
Preferred skills	Reading and speak- ing	Listening and reading	Reading	Speaking	Reading

5.5.2 Study 2 Participants

Two Arabic-speaking learners from the CLB6 class (advanced level) were recruited to participate in Study 2. It was decided that the target participants should have reached the secondary school level prior to coming to Canada to ensure that they have an adequate literacy background. They also should be from the advanced level at the LINC programme. Table 5.3 shows Study 2 participants' profile.

Table 5.3

Study 2 Participants' Profile

	Anas	Noor
Age	38	35
Nationality	Syria	Syria
Native language	Arabic	Arabic
Time in Canada	35 months	35 months
Literacy	Secondary school	Secondary school
Work	Part-time	No
Workplace	English	None
Other languages	None	None
Formal E instruction prior to coming to Canada	Zero	Zero
Formal E instruction in Canada	26 months	26 months
Current level	CLB 6	CLB 6
Preferred skill(s)	Speaking	Speaking and reading

All interviews in Study 2 took place at participants' homes according to participants' preference as discussed in previous sections. Participants were asked to answer 60 productive questions on their understanding of their newly learned words. An Ethics clearance was obtained from the Office of Research Ethics at Carleton University (Appendix B) before the recruitment stage.

5.5.3 Follow-up Study Participants

All participants of both studies (Study 1 and Study 2) were invited to voluntarily participate in this Follow-up Study. Only three participants from Study 1 (Ibrahim, Mohamed, and Sara) and both participants of Study 2 (Anas and Noor) agreed to participate. It is important to

note that the three participants Ibrahim, Mohamed, and Sara from Study 1 dropped out school at the end of Study 1 and the two Study 2 participants, Noor and Anas, continued receiving their formal language instruction to the date of this Follow-up Study.

Based on participants' preference, four participants (Mohamed, Sara, Anas, and Noor) were interviewed individually at their homes and the participant Ibrahim was interviewed in a private and quiet room at Carleton University. All participants signed student consent forms (Appendix C) at the beginning of every interview. Ethics clearance was obtained from the Office of Research Ethics at Carleton University (Appendix B) before the recruitment stage.

5.6 Case Data Eliciting Instruments

As discussed above, the same data elicitation instruments were used to obtain data from participants in the two main studies (Study 1 and Study 2) and the Follow-up Study. These instruments include vocabulary tests, vocabulary level tests, questionnaire, interviews, and class materials as discussed below.

5.6.1 Vocabulary Tests

Due to time constraints and practicality, and based on Schmitt's (1997) assertion that "if some type of word knowledge is demonstrated productively, we can be reasonably certain that it is mastered" (291), it was decided that only participants' productive knowledge would be measured using paper and pencil tests. Also since the participants were supposed to be exposed to most of the target words several times before the tests, they were assumed to be developing some receptive knowledge. This supposition is supported with findings from Webb (2005, 2007) who reported that even a single exposure is enough to provoke some receptive word knowledge gains.

During the three tests and four post-tests, participants were presented with oral Arabic equivalent of the target words and were required to tell their English meanings, provide their written forms, and provide three new word classes different from the form presented as in the following example.

What doesطولة..... mean in English?	Answer
Does it have other meaning or meanings?	Answer
Can you write it?	Answer
Can you write its verb? adverb? adjective?	Answer

5.6.1.1 Meaning Knowledge Test

According to Schmitt (1997) “one way of measuring incremental meaning knowledge is to measure the acquisition of different meaning senses” (p. 288). During the tests, and as illustrated in the example above, participants were asked to explain different core meanings for each target word. They were allowed to use any method they felt comfortable with to convey their understanding of the different meanings. They could for instance, give an example(s), use their L1, draw a picture, describe, gesture, and/or give a definition.

When the researcher was satisfied that a core target meaning was known, it was marked as ‘correct meaning’. When the participant demonstrated an overly broad or inaccurate understanding of the meaning it was marked as ‘partially correct’. When no meaning sense was attempted it was marked as ‘unknown’. It is important to acknowledge that there was a degree of subjectivity in deciding whether a target meaning was known or not. To increase reliability, a second inter-coder was employed for interrater reliability, as discussed above.

5.6.1.2 Written Form Knowledge Test

Contrary to previous research studies (e.g., González-Fernández & Schmitt, 2019; Webb, 2005, 2007) that only considered correct answers to measure knowledge of written form, in this longitudinal study, partially correct answers were considered as well. When no word was provided or the provided word form couldn't be recognized it was marked as 'unknown'. When the provided word form was incorrect but recognizable and close to the correct form (e.g., "abilite" for ability or "constracion" for contraction) it was marked as 'partially correct'. When the provided word was correct it was marked as 'correct'. A second rater was employed to check participants' answers and increase reliability.

5.6.1.3 Word Part Knowledge Test

Participants were instructed in the concepts of word parts in the first interview. Word part test in this study took the format used by Schmitt and Meara (1997), Schmitt (1998), and Ishii and Schmitt (2009). If participants were able to provide meaning of the target word, they were asked to provide three word parts other than the target word part as in the following example: Example: Provide three new word classes different from the form presented as in the following example.

- a) Can you write its verb? Adverb? Adjective? Answer

Scores for each target word ranged from 0 to 4 depending on the number of written word classes. Target word classes were marked as 'known' when the target suffixes needed were written correctly, and were marked as 'partially known' when the target affixes needed were written with minor error(s) as, for example, the form "relevanse" for relevance or the spelling "communicasion" for communication. Misspellings in the base word were not considered as they were considered

within the area of knowledge of written form. Participants were credited when they were able to indicate that no word class existed in the case of infrequent word classes or when certain word class(s) didn't exist. A second inter-coder coded a sample of the three tests to increase reliability.

5..6.1.4 Updated Vocabulary Levels Test (uVLT)

As noted above, Sasao and Webb (2017) believed that vocabulary level could play an important role in some aspects of word knowledge development. Therefore, it was decided that measuring participants' vocabulary level alongside their knowledge of some aspects of word knowledge is important. In particular, two versions of Webb et al.'s (2017) Updated Vocabulary Levels Test (uVLT) (Appendix D) were used in this study to measure participants' vocabulary levels and explore the relationship between the three measured aspects of word knowledge and their vocabulary level development.

The uVLT is a diagnostic test that can be used to determine whether learners have learned the high frequency words and where they are in the learning of these words. It doesn't measure how many words someone knows but it indicates whether learners need to be focusing on high, academic or mid-frequency words. It helps teachers determine what kind of vocabulary work their students need to do (Webb et al., 2017).

Each level measures knowledge of thirty words, with each level presenting ten clusters of six words (three key words and three distractors) as well as three definitions. Test takers need to choose the right target word to go with a corresponding synonym or meaning. For the purpose of this research, the same two versions (A and B) of the updated VLT (Webb et al., 2017) were used in the two main studies (Study 1 and Study 2) and the Follow-up Study no following Araya-doust and Fox (2016) and Fox et al., (2016). Every participant was asked to respond to one

version of the test in the first interview and to the other version in the last interview to avoid potential test retake effect.

5.6.2 Individual Interviews

Four semi-structured interviews (with a one-month interval between sessions) were conducted to elicit data from participants. In these four interviews, participants were engaged in a friendly conversation with the researcher about their experience of vocabulary learning inside the classroom. Although a prepared script (please refer to Appendix E) was used, as a base, the interviews were allowed to evolve organically to allow participants to expand or clarify their answers. All interviews were conversational, friendly, and informal.

Although there were no time constraints during the interviews, two hours were usually adequate to complete all components of the interviews. Participants were asked not to discuss their experience in all interviews and tests with the other participants and classmates until the end of the study. In addition, the researcher had several informal talks with the class teacher about participants' learning practices in the classroom.

5.6.3 Classroom Observations

Two classroom observations were conducted during the course of the first main study only (Study 1) to document participants' learning behaviour and teacher's practices in the classroom.

5.6.4 Questionnaire

As noted in Chapter 2, in the late 1980s and early 1990s several SLA researchers shed more light on learners' processes of learning. Learners were viewed as active processors of input and are responsible for the success of the learning process (Long, 1985-1996). The different

language learning strategies and techniques learners use can explain some of the underlying learning processes.

Schmitt (2007) asserted that exploring language learning strategies learners use inside and outside class helps teachers and researchers understand language learning processes their learners and participants are involved in. Therefore, Schmitt's (2007) Vocabulary Learning Strategies were used in the current study to elicit data from participants (Appendix F). Questionnaire items were translated and explained thoroughly to the participants in both studies.

5.6.5 Student/Class Materials

The researcher collected documentation in the form of participants' classroom materials as part of the study (Appendix A). The documentation included participants' class notes, texts, and books collected once a month. These materials were analyzed to uncover possible learning processes and learning strategies used by participants to develop their vocabulary knowledge in general and the three measured aspects of word knowledge in particular.

5.6.6 Word Selection Criteria

The following criteria were used as a guideline to determine the target words:

1. words should be taken from different degrees of frequency to track and compare the development of words at different levels;
2. at least, one of the target words should be unknown to participants to allow for detecting beginning stages of word development;
3. each word should have (at least) two different meanings to allow for detecting the different meaning senses of the target words;

4. each word class should have different grammatical forms (e.g., interact – interactive –interaction);
5. each word most likely will be encountered several times during the course of study; and
6. each word should be a key word that can be applied to a variety of contexts.

Regarding exclusion criteria, the following words were excluded in determining the target words:

1. cognate words;
2. compound words as some parts might give an indication of the meaning; and
3. easy-to-spell words.

Three learner dictionaries (Oxford Advanced Learners Dictionary, COBUILD English Dictionary, and Longman Dictionary of Contemporary English) were consulted for the different meanings, forms, and word parts of the target words. Webb et al's (2017) BNC/COCA Word Level List was consulted for word frequency levels.

5.7 Procedures

5.7.1 Instrument Validation

After determining case data instruments, an instrument validation stage was implemented to validate all instruments (questionnaires, interview questions, pen and paper tests, and VLT). It aimed to check whether the test items could be correctly answered and also to get an estimation of the time required to complete tests and interviews. To achieve this aim, ethics clearance was obtained from the Research Ethics Board at Carleton University (Appendix B).

Just after obtaining the ethics clearance, the researcher invited students in CBL5 class to voluntarily participate in the validation stage. He made the format and purpose of the study as well as interview procedures clear to all invited participants ahead of time. Two non-student

participants from the CLB5 class agreed to participate in the instrument validation stage. They were asked to provide the meaning, written form, and word parts for 20 words they encountered in the preceding level (CLB5).

Results revealed both of these participants felt comfortable with the test and interview procedures and that they did not find any difficulty in comprehending and answering the test items and interview questions. Each needed less than two hours to complete the test and interview (including reviewing and signing consent forms). After instruments were validated, target words were determined as discussed below.

5.7.2 Study 1 Target Words

Laufer and Nation (2012) noted that “it is impossible to measure many aspects of depth of knowledge when a large number of words are tested” (p. 165). Therefore, the development of 60 prompt words (Appendix G) was explored over a six-month period. Since this longitudinal study aimed to detect and compare the incremental changes of three types of word knowledge in an Educational setting, half of the target words (30 words) were taken from words the teacher focused on in the class and 30 Matching Words participants met only incidentally during reading or listening.

The 30 Thematic Words were chosen from study themes which the class teacher planned to cover in her class while the study was underway. The 30 Matching Words were chosen from the same study themes but occurred only incidentally in reading or listening. They were from the same frequency band as the Thematic Words.

5.7.3 Study 1 Timeline

During the course of this longitudinal study, five participants were asked to sit for three tests (test 1, test 2, and test 3) and sit for four ‘post-tests’ (post-test 1, post-test 1+2, post-test 1+2, and post-test 3) as shown in Table 5.4 below.

Table 5.4

Study 1 Timeline

Month	Procedure
January	Test 1 & VLT & material collected
February	Test 2 & post test 1 & class observation & material collected
March	Test 3 & post-tests 2+1 & material collected
April	Post-test 2 & post-test 2+3 & material collected
May	Post-test 1 & post-test 2+1 & material collected
June	Post-test 3& post-test 2+1 & VLT & questionnaire

In each test administration (test 1, test 2, and test 3), participants were asked to answer sixty productive questions on their understanding of ten new Thematic Words and ten Matching Words taught in the language class that they were attending at the time. Due to time constraints, test 3 was conducted during the third interview. Participants also sat for these three tests again in following four post-tests (post-test 1, post-test 1+2, post-test 1+2, and post-test 3) to detect their incremental knowledge of the tested 60 words over time.

5.7.4 Study 2 Target Words

As in Study 1, incremental changes in three types of word knowledge in Educational and Naturalistic settings were investigated in Study 2. The development of total 90 words (Appendix H) was investigated over an eight-month period. The 90 words consist of: 1) 30 Educational

words both participants learned in class; and 2) 30 Naturalistic words elicited from each participant (i.e., 30 words from participant 1 and 30 words from participant 2), which they had learned outside class.

For the 30 Educational words, ten words were chosen every month (September-November) from those the class teacher had covered in her class 30 days before each interview and/or those she would be covering in the coming few classes. Both participants were tested on their understanding of the same 30 words.

To decide on the 60 target Naturalistic words, the researcher met with each participant individually on a weekly basis and asked them for the words they had learned outside class in the previous days. Eventually, 30 words learned in Naturalistic settings were elicited from each participant. Each participant responded to the 30 words they had provided in addition to the 30 Educational words both had learned in class.

It is important to note that from the first day of the study the researcher did not ask participants to keep notes on the words they had learned or they are going to learn in Naturalistic settings as this might have affected the nature of the development of these words.

5.7.5 Study 2 Timeline

Based on results and recommendations from Study 1, an 8-month longitudinal study was conducted to detect and compare the productive incremental changes of three aspects of word knowledge (meaning, word form, and word parts) in Naturalistic and Educational settings. The same data elicitation instruments used in Study 1 were used to elicit data from participant in this study (Study 2) as shown in Table 5.5 below.

Table 5.5

Study 2 Timeline

Month	Procedure
September	Test 1 and VLT
October	Test 2 and post test 1
November	Test 3 and post-Tests2+1
December	Post-Test 2 and post-Tests1+3
January	Post-Test1 and post-Test2+3
February	Post-Test3 and post-Test2+1
March	Post-Test3 and post-Test2
April	Post-Test3 and VLT & questionnaire

Although the researcher offered several places as a research site (e.g., researcher's home, participants' home, public library, Carleton University), participants preferred their home as a research site. Therefore, all eight individual interviews (sessions) took place at participants' home. In the first three sessions (September-November) participants were asked to sit for three tests (Test 1, Test 2, and Test 3) aimed to measure their gains of 60 words (30 Naturalistic words and 30 Educational words).

In every test, their understanding of 10 new Educational words learned in class and 10 new Naturalistic words learned outside the class in the past 30 days was measured. They were also asked to sit for five subsequent post-tests after each test.

5.7.6 Follow-up Study Target Words

Due to practical constraints, it was decided that only 20 target words would be measured. The three participants Ibrahim, Sara, and Mohamed from Study 1 were tested on their understanding of 20 words (10 Thematic Words and 10 Matching Words) selected randomly from the

60 target words used in Study 1 (Appendix I). The two participants Noor and Anas from Study 2 were tested on their understanding of 20 words (10 Educational words and 10 Naturalistic words) selected randomly from the 60 target words used in Study 2 (Appendix I).

5.7.7 Follow-up Study Timeline

A one-time Follow-up Study with each participant was conducted between January 8, 2020 to January 10, 2020, that is, 18 months after Study 1 and 6 months after Study 2. As indicated above, based on participants' preferences, the four participants (Mohamed, Sara, Anas, and Noor) were interviewed individually at their homes and the participant Ibrahim was interviewed in a private room at Carleton University. All participants signed student consent forms (Appendix C) at the beginning of every interview.

5.7.8 Vocabulary Levels Test Administration

In both studies (Study 1 and Study 2), some participants took version A of the VLT test and other participants took version B in the first interview. In the last interview, participants who took version A in the first interviews were asked to take version B of the test, while participants who took version B of the test in the first interviews were asked to take version A. In the Follow-up study, and because it was one-session interview, participants responded to the updated Vocabulary Levels Test (uVLT) at their convenience and copies were collected three days after the interviews. To reduce potential test retake effect, participants didn't take the version they took in the first interview of the main study they had already participated in.

5.8 Data Analysis

The qualitative data in this longitudinal study included field notes, interviews, student materials, and informal talks with teachers. Several traditional methods of data analysis such as the collection and assessment of sticky notes, paper-size posters, and file folders were used in addition to Microsoft Word and Excel spreadsheets to help analyse qualitative data. Qualitative data were principally analyzed using first cycle coding and top down coding method in particular (Saldaña, 2013). Coding has been defined as “primarily an interpretive act” (p. 4) that requires researchers to look for consistencies or repetitive patterns within their data (Saldaña, 2013).

Saldaña (2013) classified coding into three types: First Cycle coding, Second Cycle coding, and Third Cycle coding. First Cycle coding methods are simple and direct. They happen during the first stage of data coding and are classified into seven categories: grammatical, affective, elemental, literary and language, procedural, exploratory, and a final profile entailed theming the data.

In the current study, only elemental methods were used to code qualitative data. Saldaña (2013) divided elemental methods into five categories: initial, in vivo, descriptive, process, and structural coding. Initial coding refers to breaking down the data into separate parts to help closely explore and compare them for potential similarities and/or differences. In vivo coding refers to using single words or short phrases produced by participants.

Descriptive coding refers to assigning single words or short phrases to summarize the primary topic of a passage. Process coding refers to using single words (mostly gerunds) to connote actions in the data. Structural coding refers to coding based on research questions or topics of inquiry. As discussed above, a second inter-coder was deployed to check for coding consistency and maximize reliability (see Appendix J for examples of data coding).

As discussed above, qualitative results were used to help understand participants' performance on vocabulary tests. They were also used to help understand what facilitated or inhibited development of the three measured aspects of word knowledge (meaning, spelling, and word parts) as discussed in the following chapter.

Chapter 6: Results and Discussion for Study 1

Study 1 was conducted to detect the incremental changes of three aspects of word knowledge (meaning, spelling, and word parts) in educational settings. It entailed a six-month longitudinal study to address the following research questions:

1. How does knowledge of individual words develop over time in Educational settings?
 - Are words learned in a developmental sequence?
 - Do they develop at a similar rate? Why?
 - What facilitated or inhibited their development?
2. Is there a relationship between word knowledge development and vocabulary level development?
3. What types of vocabulary learning strategies and activities do learners engage in to learn the three measured aspects of word knowledge?

Each of these questions is addressed below in separate sections

6.1 Results for Research Question 1

In answer to the first research question that addressed how knowledge of vocabulary develops over time, participants' performance results on the vocabulary tests that measured three aspects of word knowledge for the 60 target words (Appendix G) developed over the six-month period are summarized in Tables 6.1, 6.2 and 6.3 below. Table 6.1 summarizes participants' performance on the first 20 words (January Words) which included 10 Thematic Words and 10 Matching Words and were remeasured in the following five months.

Overall, scores recorded for each of the vocabulary tests suggest that all the 30 Thematic Words and the 30 Matching Words were known to the participants, but in varying proportions. By the last session (S6), the five participants succeeded to obtain the maximum score (10) for basic meaning senses of the Thematic Words. However, although their scores on the basic meaning senses of Matching Words varied, no word was completely unknown to any of the participants.

A developmental hierarchy was detected among three measured aspects of word knowledge (meaning knowledge, spelling knowledge, and word part knowledge) with meaning knowledge developed first followed by spelling knowledge and word part knowledge, respectively. Vocabulary knowledge development does not appear to be continuous or linear as there were both periods of attrition and stability in the scores recorded. The largest increases in vocabulary knowledge took place across the first two sessions (S1-S2) and decreased in subsequent sessions to very little or no change in the last two sessions (S5-S6).

6.1.1 Knowledge of Meaning

As shown in Tables 6.1 through 6.3 knowledge of meaning of the target words for both the Thematic Words and Matching Words was the word knowledge aspects that developed the most. More specifically, the development of meaning knowledge of Thematic Words was always higher than the development of meaning knowledge of Matching Words.

All participants progressed steadily across the sessions especially the three participants Fatima, Mohamed, and Sara. They succeeded in doubling knowledge of meaning of their Thematic Words on the second session (S2) and fully developed it in the following two sessions (S3-

S4). That is, meaning knowledge of thematic words only needed approximately two months to move from knowledge score of 50% to a knowledge score of 100%.

However, it also appears that the development of meaning knowledge of Matching Words was relatively slow in all six sessions. Even after studying their Matching Words for six months incidentally, none of the five participants was able to fully grasp all basic meaning senses of his/her Matching Words except in one single case. Participant Fatima was able to show knowledge of all basic meaning senses of the 10 Matching Words of February Words (see Table 6.2). Two participants, Ibrahim and Laith succeeded in developing only 70 % and 80 % of basic meaning senses of their Matching Words.

The biggest change in the development of basic meaning senses of Matching Words took place after the basic meaning senses of Thematic Words fully developed. This might signify that in the first sessions, participants' attention was focused on Thematic Words and once these were learned the focus shifted towards their Matching Words. This might be related to the importance the class teacher gave to the Thematic Words over Matching Words as the former were focused on and explicitly taught in class and the latter were only met incidentally, while reading or listening.

It is interesting also to note that there were only eight cases of attrition among the 150 cases of basic meaning knowledge development. Most interestingly, while six attrition cases were detected among Thematic Words, only two attrition cases were detected among Matching Words before they returned to full knowledge again. These few attrition cases indicate that basic meaning knowledge improved more than it deteriorated and that maintenance of the basic meaning sense is relatively stable once it is learned.

Overall, although the participants were intermediate ESL learners, they demonstrated good control of basic meaning senses of both types of words (Thematic and Matching). This result contradicts results obtained by Schmitt (1998) who reported that although his participants were advanced learners, they demonstrated a low level of meaning knowledge and that none of them was able to develop all basic meaning senses or polysemy of the target words.

The three tables above (6.1-6.3) also show that the development of polysemy knowledge was similar to the development of basic meaning knowledge. Participants demonstrated good control of polysemy knowledge of Thematic Words and lower control of polysemy knowledge of Matching Words. For instance, by S3-S4, the three participants Fatima, Mohamed, and Sara succeeded in fully developing the four target meaning senses of the 30 Thematic Words.

That is, after fully developing all basic meaning senses of their Thematic Words, participants needed only one more session (a month later) to fully develop all polysemy senses of those Thematic Words. However, the two participants (Ibrahim and Laith) needed two to three more sessions (months) to fully develop their understanding of four target meaning senses of their Thematic Words

Moreover, participants seemed to face more serious problems developing polysemy knowledge of their Matching Words. None of the five participants was able to provide all 10 meaning senses of their Matching Words. By the last sessions (S6), even the three participants (Fatima, Mohamed, and Sara) who always outperformed the other two participants were only able to provide about 30% (3 out of 10) of the target polysemy senses of their Matching Words. The two participants (Ibrahim and Laith) succeeded only to provide 10- % (1 out of 10) of the target polysemy senses of their Matching Words on the last sessions (S6).

Such poor performance related to polysemy knowledge might not be surprising as the participants demonstrated relatively low control of basic meaning knowledge of their Matching Words, as discussed above. This finding seems not to be limited to participants of this study, as several researchers reported their participants having more problems with polysemy knowledge than with basic meaning knowledge (González-Fernández & Schmitt, 2019; Schmitt, 1998).

For instance, González-Fernández and Schmitt (2019) reported that knowledge of word multiple meanings is “a more difficult component to acquire and harder than previously thought” (p.20). It was the least developed word knowledge type among the measured four knowledge types (form-meaning link, collocations, derivatives, and multiple meanings) in their study.

The difference between participants’ performance on basic meaning knowledge and polysemy knowledge could be related to the fact that basic meaning senses are generally universal (Nation, 2013). It could also be related to differences between Arabic and English language systems since in the Arabic language system every single word is used to convey one meaning but in English single words can be used to convey several different meanings.

For instance, the word *bank* in Arabic only means a place where people keep their money in, but in English it can mean a place where people keep their money in, the land alongside a river, and the mass of a substance. Such factors seem to add an extra burden onto the learners, especially when learning words incidentally as in the case of learning Matching Words in the current study.

The participant Ibrahim revealed that learning one or more meaning senses other than the basic meaning sense requires him to expend more effort and time. He also complained about the problem of forgetting these polysemy senses and the problem of not knowing their proper use in speech and writing “*I do memorize all the meaning senses but the problem I forget them quickly,*

I have them in my memory but when you ask me for them I can't recall them that moment but if I heard or read them most probably I recall them".

This result is in line with previous research results (e.g., González-Fernández & Schmitt, 2019) and indicates that polysemy knowledge is an advanced knowledge which only develops at later stages of L2 acquisition. It also indicates that more effort is required from both the learner and the teacher to successfully develop this type of word knowledge.

Teachers can, for instance, create more opportunities for exposure to these words in different settings to reinforce knowledge of the meaning sense. This suggestion is supported by the participants' poor performance on polysemy knowledge of Matching Words which they encountered only incidentally and with their better performance on polysemy knowledge of Thematic Words which they encountered explicitly several times in class.

Teachers can also instruct their learners about different types of meaning learning strategies and techniques. Qualitative data analysis on the ways participants were learning their newly learned words showed that participants created word lists in which they included all new words they learned in class and sometimes words they learned outside class as the participant Sara put revealed: *"I have a list in which we include all the new words we take yes also sometimes words I learn outside school"*.

However, only three participants (Fatima, Mohamed, and Sara) revealed that they frequently review their word lists at home orally and orthographically to memorize their meanings and spelling. The other two participants Ibrahim and Laith revealed that they only sometimes review their newly learned words orally in the class.

The difference in the quality of word revision among participants might explain some of the differences in their attainment of basic and polysemy meaning knowledge. This supposition

is supported by Horst (2013) who proposed that for successful word development learners need to review and encounter their newly learned words repeatedly and in different contexts.

Not only can repeated exposure to newly learned words can enhance meaning knowledge development, results from this study also showed that the three participants (Fatima, Mohamed, and Sara) who reported reviewing their newly learned words orally and orthographically demonstrated higher spelling knowledge gains than the other two participants (Ibrahim and Laith) who reported repeating their newly learned words orally only. That is, oral word repetition might lead to successful basic word meaning knowledge development but not to word spelling knowledge development, as discussed in the following section.

6.1.2 Knowledge of Spelling

The three tables above (6.1 to 6.3) indicate/show that word spelling knowledge development was the second most developed word knowledge type. It seemed to be more difficult than basic meaning knowledge and polysemy knowledge development discussed above. Although they developed gradually throughout the six months, spelling knowledge development was at a relatively slower rate. Every increase in the development of meaning knowledge was accompanied by a smaller increase in the development of spelling knowledge.

A closer look at the three tables above clearly shows that the biggest change spelling knowledge enjoyed was in the first three months (S2-S4), but in the last three months (S4-S6) declined to very little or showed no change. All five participants seem to face problems in spelling their Thematic Words and Matching Words. It seems that the good control they demonstrated on meaning knowledge did not help their spelling knowledge development, especially the spelling of their Matching Words.

Participants were able to spell only 80 % of their Thematic Words and 60 % of their Matching Words. By the last sessions (S6), the three participants (Fatima, Mohamed, and Sara) succeeded to attain the 10.0 proportion for 10 out of the 30 target thematic words. The other proportions fell between 8 and 9.5. Only in one session (S5), the participant Laith succeeded to provide the correct spelling of all 10 February thematic words.

None of the five participants was able to attain the 10.0 proportion for any word of the 30 target Matching Words. While in only one instance the participant Fatima was able to attain a proportion of 8.5, most of the instances varied from 3.0 to 7.0. Such poor spelling ability is not limited to participants of this study as similar results were reported with adult Arab learners of English who demonstrated more serious spelling problem compared to learners from other L1 backgrounds (Fender, 2003, 2008; Ryan & Meara, 1991).

It is also interesting to note that spelling knowledge in the current study improved more than it deteriorated. Participants demonstrated very low rates of forgetting spelling knowledge. Out of the 75 development instances where spelling knowledge progressed, there were only 3 instances of attrition. This signifies that spelling knowledge is difficult to develop, and also hard to forget once it's developed.

More interestingly, none of the five participants in the current study was able to provide any word spelling when no word meaning was provided. This result contradicts previous research results obtained by Schmitt (1998) and González-Fernández and Schmitt (2019), who reported that their non-Arabic speaking participants were able to provide spelling of the target words even without developing knowledge of basic meaning sense of those words.

Apart from the differences between Arabic and L1 of participants in these two studies, it is important to note that participants in these two studies were relatively advanced learners of

English. Therefore it is not surprising that they were able to provide spelling of unknown words as they are expected to develop advanced spelling and writing skills.

Qualitative data analysis also revealed several factors that might have negatively affected participants' word spelling attainment in this current study. For instance, the class teacher was focusing more attention on reading and speaking skills than on writing (spelling) and listening skills. Most of the class time was devoted to reading different passages usually followed by different sets of exercises to verify learners' understanding of what was being read.

These exercises include (but are not limited to) comprehension questions, multiple-choice questions, fill in the gaps, and open questions. Writing exercises were the least used in class. The attention speaking and reading skills receive over writing skills could be explained by the nature and the aims set by Language Instruction for Newcomers (LINC) programs to help adult newcomers to Canada learn English necessary for settlement and work in most parts of the country.

In addition, the length of the word was also found to affect participants' spelling performance by large. Although participants demonstrated relatively good spelling control on Thematic Words, long Thematic Words were evident only in later sessions (S5-S6). Even on the last sessions (S6), all participants demonstrated problems in providing the correct spelling of long words, and those of their Matching Words in particular. This indicates that long words need special consideration by teachers and syllabus designers, at least for this type of learners.

Deeper qualitative analysis of participants' spelling performance on the measured 60 target words revealed that their first language (Arabic) negatively affected their spelling performance on Thematic Words and Matching Word alike. In particular, their reliance on the so-called Arabic phonological sound-letter correspondence (Figueredo, 2006) has hindered their

spelling knowledge development especially for those participants with the lowest spelling gains (Ibrahim and Laith).

Both participants revealed that when they approach the spelling of any long word they always break it down into its component sounds and write the letters that represent these sounds. Teachers can reduce such negative effect on spelling knowledge by deploying different spelling and writing activities in their classes and explicitly explaining the differences between their learners' L1 spelling system and the target language's spelling system.

This should include an explicit explanation of the differences in their sound systems as well. All five participants in this study shared that they lack knowledge of the differences between Arabic and English sound system. This was also evident in their poor performance on wrongly spelled words driven by a confusion of English short vowels.

Participants demonstrated more problems with short vowels than with long vowels. For instance, sometimes they confused and substituted some short vowels as in "polootion" for pollution, "apper" for appear and "infloonce" for influence. They also inserted some short vowels in word-different position as in "atteract" for attract, "harmuful" for harmful, and "equipemeant" for equipment. Other times they deleted some short vowels as in "proft" for profit, "intract" for interact, and "frquently" for frequently.

Wrongly spelled words analysis also revealed heavy reliance on consonants which could be related to the importance the Arabic orthographic system gives to consonants over vowels (Fender, 2008). Although the participants seemed to have fewer problems with English consonants in general, they confused and substituted some consonants that do not exist in Arabic such as the two consonants /p/ and /v/.

In some cases, they used the voiced consonant /b/ and its counterpart the voiceless stop consonant /p/ interchangeably as in “responsible” for responsible, “equipment” for equipment, and “subject” for subject. In other cases, they used the voiceless fricative consonant /f/ with its counterpart the voiced fricative consonant /v/ interchangeably as in “recover” for recover, “harmful” for harmful, and “believe” for believe.

To overcome such problems and enhance spelling knowledge development, Fender (2003, 2008) recommended several techniques and strategies including flash cards, rhymes, filling blanks, and finding silent letters. The researcher also suggested that Arabic learners of English need to repeat their newly learned words orthographically several times and learn the most important English spelling patterns and rules to enhance their spelling ability.

This finding / point of view is also supported with differences found in this study between the spelling performance of the five participants, as the three participants (Fatima, Mohamed, and Sara) who reported reviewing their newly learned words orally and orthographically outperformed the two participants (Ibrahim and Laith) who reported reviewing their newly learned words orally only.

In a series of related research studies, Webb and Rodgers (2009a, 2009b, 2015, 2016) recommended using strategies that can provide learners with a combination of visual and aural input to enhance the link between meaning and spelling knowledge, such as watching a series of television episodes and movies with captions. They claimed that viewing repetitive captioned videos “may be conducive to incidental vocabulary learning” and “provide significant amounts of authentic input to language learners” (Rodgers & Webb, 2017, p. 19).

Although two participants (Ibrahim and Laith) reported watching translated movies occasionally, they demonstrated the lowest spelling attainment rates. It seems that watching translated

movies occasionally did not help them much to improve their spelling ability. This could be related, according to Webb and Rodgers, to the type and nature of the program viewed, program level difficulty, pre-exposure to the target words, and a number of word encounters. Both participants shared that they are not trained to learn language from watching English movies and that they rarely watch pedagogically oriented movies in class.

Therefore, to enhance spelling attainment from watching TV programmers, LINC teachers need to implement viewing approaches in their classes. Rodgers and Webb (2011) recommended two ways. First, “through self-study, where television would be used in the same way books are used in extensive reading programs” (p. 711). This would allow learners to “have access to full seasons of television in a range of titles and genres” (p. 711). Second, improved spelling would be an incidental benefit as part of a teacher-led course in which watching episodes is accompanied by a variety of explicit instructional activities related to what is being watched.

Nation (2013) added that learners also need to be explicitly taught and trained to use more cognitive vocabulary learning strategies such as word part strategy. This strategy helps learners develop more functional understanding of the most frequent English stems and affixes and consequently improve their writing and spelling abilities.

Although all participants in this study reported using this strategy to improve their spelling and meaning knowledge, it seems that they did not benefit much as their general spelling knowledge was relatively low in comparison with their meaning knowledge. Moreover, their word part knowledge was even lower than their word meaning knowledge and word spelling knowledge, as discussed below.

6.1.3 Knowledge of Word Part

The three tables above (6.1-6.3) clearly show that word part knowledge enjoyed the lowest attainment rates among the three measured aspects of word knowledge (meaning, spelling, and word part). They also show that it developed concurrently with meaning and spelling knowledge, with meaning knowledge enjoying the highest gains followed by spelling knowledge and word part knowledge respectively.

Even after six months of studying the 60 target words incidentally and explicitly, none of the five participants succeeded in providing all target word parts of his/her Thematic or Matching words. Although the development of word part knowledge of Thematic Words outpaced the development of word part knowledge of Matching Words, it was slower than the development of meaning knowledge and spelling knowledge of Matching Words.

The average development of word part knowledge of Thematic Words was generally less than 60%. In no case, was the score 10.0 attained in any of the 75 progression cases. In only one instance, for the participant Fatima, the proportion 8.0 was attained and most of the other instances fell between 2.0 and 7.0. That is, even the three top scoring participants Fatima, Mohamed, and Sara found it difficult to fully develop word part knowledge of their thematic words. In one instance only, for the participant Fatima, the proportion 8.0 was attained and most of the other instances fell between 2.0 and 7.0. That is, even the three participants, Fatima, Mohamed, and Sara found it difficult to fully develop word part knowledge of their thematic words.

Moreover, the development of word part knowledge of their Matching Words was even slower and they managed to produce only 30% of the target word parts of their Matching Words. Most of the developmental instances fell between 2.75 and 4.75. González-Fernández and Schmitt (2019) reported similar results as their 144 Spanish-speaking participants succeeded in

developing only 51% of the target English word parts. The researchers concluded that attaining accurate word part knowledge is more challenging than mastering other word knowledge aspects and so is achieved at relatively later stages. Chui (2006) also reported that his 186 Chinese-speaking participants were only able to provide 52.3% of the target word parts.

These results in addition to the results obtained from the current study, confirm that word part development problems are universal and are not limited to participants of this study or the Arab learners of English in general. However, participants in the current study were able to tell when words do not have a particular word part(s). Participants revealed that they usually consult their Arabic word part system when they come to produce newly learned English word parts.

Results also revealed no easy or difficult word part. It was found that the word part most encountered by the participants was the most developed word part. This is evident in participants' high performance in demonstrating their understanding of word parts of Thematic Words which were taught explicitly in class and their low performance on Matching Words which were met only incidentally while reading or listening, as discussed in previous sections.

This is supported by Nation's (2013) assertion that learners need to be explicitly taught the different patterns and rules of English word part system to overcome word part development problems. These patterns and rules "can be from the first language, from knowledge of other languages, and from previous knowledge of the second language" (p.37).

However, Schmitt (1998) reported counter results where his participants knew some word parts better than others. The researcher concluded that "nouns and verbs were the best mastered word classes; adjectives and adverbs appear to be learned at a later stage" (p.307). One possible explanation of the differences between results of the two studies might be the medium of word presentation as the target words in Schmitt's study were presented to participants in the form of

nouns and verbs. It could also be related to the level of proficiency of his participants who were advanced post-graduate students situated in exposure-rich environment.

The correlation between the level of proficiency (including vocabulary level) and word part knowledge was also reported by González-Fernández and Schmitt (2019) who detected a strong correlation between their advanced participants' vocabulary level and the development of their word part knowledge.

6.2 results for Research Question 2

To address the second research question or: that is, to explore the relationship between the three measured aspects of word knowledge and participants' vocabulary level development, two versions of Webb et al's (2017) Updated Vocabulary Levels Test (uVLT) were used before and after treatment. Results obtained are summarized in Table 6.4 below.

The table shows that participants demonstrated very limited receptive knowledge of their K3, K4, and K5 word levels. Even after six months of receiving intensive English classes, the development of intensive English classes, the development of their lower frequency words remained markedly poor, especially at the K4 and K5 word levels. This is not unexpected if we look at the level of the words participants were learning in class: 25 words (41.6%) out of the 60 target words were from the K1 word level, 18 words (30%) were from the K2 word level, 10 words (16.6%) were from the K3 word level, and 7 words (11.6%) from the K4 level.

Table 6.4

Participants' Performance on uVLT Before and After Treatment

	K1		K2		K3		K4		K5	
	Before	After	Before	After	Before	After	Before	After	Before	After
	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)
Fatima	23 (76.6)	30 (100)	14 (46.6)	17 (73.3)	8 (26.6)	11 (36.6)	3 (10)	3 (10)	2 (6.6)	6.6)
Sara	22 (73.3)	30 (100)	14 (46.6)	24 (80)	6 (20)	8 (26.6)	2 (6.6)	3 (10)	0 (0)	0 (0)
Mohamed	24 (80)	30 (100)	15 (50)	25 (83.3)	8 (26.6)	10 (33.3)	3 (10)	4 (13.3)	1 (3.3)	1 (3.3)
Ibrahim	19 (63.3)	30 (90)	11 (36.6)	20 (66.6)	5 (16.6)	6 (20)	0 (0)	2 (6.6)	1 (3.3)	0 (0)
Laith	20 (66.6)	29 (96.6)	12 (40)	20 (66.6)	5 (16.6)	9 (30)	2 (6.6)	2 (6.6)	0 (0)	1 (3.3)

The table shows that participants demonstrated very limited receptive knowledge of their K3, K4, and K5 word levels. Even after six months of receiving intensive English classes, the development of intensive English classes, the development of their lower frequency words remained markedly poor, especially at the K4 and K5 word levels. This is not unexpected if we look at the level of the words participants were learning in class: 25 words (41.6%) out of the 60 target words were from the K1 word level, 18 words (30%) were from the K2 word level, 10 words (16.6%) were from the K3 word level, and 7 words (11.6%) from the K4 level.

That is, the good control participants had of high frequency level words seems to be supported by the greater focus and attention the class teacher gives to the words at these levels over those with lower frequency levels. This might be explained by the fact that the goal of LINC programmes is to help newcomers to Canada receive basic language training needed to settle and work in Canada. Douglas (2010) also claimed that these particular word levels are of great importance for this particular group of learners although they encounter them infrequently in their daily lives or in class.

Moreover, the table above also shows that the development of their vocabulary level is accompanied by the development of the three measured aspects of word knowledge (meaning, spelling, and word parts). These aspects develop concurrently and in varying proportions.

Questionnaire and qualitative data analysis also revealed that not only the teacher's focus on high frequency levels helped participants develop their vocabulary size, but participants' preferred vocabulary learning strategies and techniques used inside and outside class also seemed to play a role, as discussed below.

6.3 Results for Research Question 3

To address the third research question and explore participants' preferred vocabulary learning strategies to determine the learning processes involved in the development of the three measured aspects of word knowledge, Schmitt's (2000) Vocabulary Learning Strategies were used, as discussed previously. Results showed that participants preferred five vocabulary learning strategies: list creation, dictionary use, oral repetition, reading strategy, and notetaking. Only three participants (Sara, Mohamed, and Fatima) reported using orthographic repetition strategy in addition to these five strategies.

These somewhat limited mechanical learning strategies might explain some of the problems participants faced, especially with spelling and word part knowledge development. Although they might result in successful second language vocabulary development, psychologists believe that more complex strategies that require deeper learning processes such as inferencing and imagery, are more effective in second language development and retention (Cohen & Aphek, 1981; Hulstijn et al., 1996).

Qualitative data analysis revealed that in addition to the use of their L1 phonological and sound-letter correspondence as discussed above, participants heavily used lists with isolated words they created during the course of their study to develop their meaning and spelling knowledge. The lists included most of their newly learned words inside and outside the class. Participants shared that they occasionally review words on their words lists and that they rarely refer to the original texts where those words come from, especially the two participants (Ibrahim and Laith).

Although some researchers (e.g., Cohen & Aphek, 1981) claim for the vital role of using list strategy for vocabulary development, it seems that reviewing and learning single isolated

words without some contextual elaboration has limited participants' knowledge of the three measured aspects of word knowledge (meaning, spelling, and word part).

In addition, two participants (Ibrahim and Laith) shared that they study their newly learned words in class only. They also added that they are not given any kind of homework due to the no-homework policy LINC programs in Canada follow. This seemed to decrease their word encounter opportunities and thus might have negatively affected their word knowledge attainment.

This has also negatively affected their overall language attainment at home and in other naturalistic settings as the participants explained in several instances. Apart from reporting lack of knowledge of the different vocabulary learning strategies and activities that can be used outside the class such as watching TV, listening to radio, and talking with native speakers, participants reported facing more problems in learning new words outside class than inside class.

For example, participant Ibrahim reported problems in finding vocabulary sources and vocabulary learning opportunities outside the class "*this is the only place (school) to learn in, there is no other place*". Participant Sara reported more problems in using her newly learned words outside the class, particularly orthographic word use "*we don't write at all, no one, in no place ask you to write*".

That is, the lack of sources for vocabulary input and vocabulary use outside the class seemed to negatively affect their word knowledge development. This might also explain some of their poor knowledge of lower frequency word levels (K3-K5) which were not focused on in class. To have a clearer picture of their learning behaviour outside class and underlying vocabulary learning processes and strategies and their effect on the three measured aspects of word knowledge, another study seemed to be necessary. Therefore, Study 2 was conducted to detect

and compare their vocabulary development inside and outside class (in Naturalist settings), as discussed in the following Chapter.

However, they all demonstrated very limited receptive knowledge of words at their K3, K4, and K5 levels. Even after six months of receiving intensive English classes, the development of their lower frequency word levels remained markedly poor especially the K4 and K5 word levels. This might not be surprising if we look at the level of the words participants were learning in class: 25 words (41.6%) out of the 60 target words were from the K1 word level, 18 words (30%) were from the K2 word level, 10 words (16.6%) were from the K3 word level, and 7 words (11.6%) from the K4 level.

That is, the good control participants had at high frequency levels seems to be supported by the greater focus and attention the class teacher gives toward at these levels over those at lower frequency levels. This also might not be surprising considering that the goal of LINC programmes is to help newcomers to Canada receive basic language training needed to settle and live in Canada. Douglas (2010) also claimed that these particular word levels are of great importance for this particular group of learners “because these are the words they use to communicate in their daily lives. They do not need to acquire the lower frequency items in order to communicate, and they may not be challenged to do so in their schools” (p. 189).

Moreover, the table above also shows that the development of their vocabulary level is accompanied by the development of the three measured aspects of word knowledge (meaning, spelling, and word parts). They develop concurrently and in varying proportions.

Questionnaire and qualitative data analysis also revealed that not only teacher’s focus on high frequency levels helped participants develop their vocabulary size, but also participants’

preferred vocabulary learning strategies and techniques used inside and outside class seemed to play a role, as discussed below.

Chapter 7: Results and Discussions for Study 2

7.1 Introduction

As discussed previously, participants appeared to lack knowledge of the different vocabulary learning strategies and activities that can be used outside class (in Naturalistic settings). They also were found to face problems in learning and using their newly learned words in Naturalistic settings. Therefore, another study (Study 2) was conducted over an eight-month period to address these issues through the following research questions:

1. How does knowledge of individual vocabulary items develop over time in Educational and Naturalistic settings?
 - Are they learned in a developmental sequence?
 - Do they develop at a similar rate? Why?
 - What facilitated or inhibited their development?
2. Is there a relationship between learners' word knowledge development and vocabulary level development?
3. What types of vocabulary learning strategies and activities do learners engage in to learn the three measured aspects of word knowledge?

Each of these questions is addressed below in separate sections

7.2 Results for Research Question 1

In answer to the first research question that addressed how knowledge of vocabulary develops over time, the participants' performance on the vocabulary tests that measured three aspects of word knowledge for the 90 target words (Appendix G) developed over the 8-month period are summarized in Tables 7.1 to 7.3 below

Table 7.1 below summarizes participants' performance on the first 20 words (September Words) which included 10 Thematic Words and 10 Naturalistic Words and were remeasured in the following five months. As discussed previously, each correct word knowledge aspect was awarded a score of (1) and the maximum possible score for each word group (Thematic or Naturalistic) is (10).

Table 7.1
Participants' Performance on the First 20 Words (September Words)

		Meaning						Spelling						Word Part						
			S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6	S1	S2	3	S4	S5	S6
Anas	Educational Words	Basic meaning	4.5	6.5	9	10	9	10	3	3.5	5	8	7.5	9.5	2.25	3.75	5	6.25	6.75	7.5
		Polysemy	0	2.5	7.5	10	10	7.5												
	Natural Words	Basic meaning	8	8	7	8	8	8	4	4	3.5	4.5	4.5	4.5	2.75	3	2.75	3	3	3
		Polysemy	0	0	0	2.5	2.5	2.5												
Noor	Educational Words	Basic meaning	5.5	8.5	10	10	10	10	4	5.5	7	10	9.5	9.5	2.5	4.25	6.25	8	7.25	8
		Polysemy	0	0	7.5	7.5	10	10												
	Natural Words	Basic meaning	8	9	9	10	10	10	5	5.5	5.5	6	6	6	3.25	3.75	3.75	4.25	4.5	4.75
		Polysemy	0	0	0	0	0	0												
	Sum							7	9	12	18	17	19	4.75	8	11.25	14.25	14	15.5	
								9	9.5	9.5	10.5	10.5	10.5	6	6.75	6.5	7.25	7.5	7.75	

Table 7.2
Participants' Performance on the Second 20 Words (October Words)

		Meaning						Spelling						Word Part						
		S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6	
Anas	Educa- tion	Basic meaning	4.5	7	7.5	7.5	8	8.5	3	5	6.5	7.5	9	9	3	4	5	5.5	7.5	8
	Words	Polysemy	0	0.5	0.5	0.5	10	10												
	Natural Words	Basic meaning	7	6	6	7	6	7	3.5	3	3	4	3	3.5	2.5	2.25	2.5	3	3.25	3.25
		Polysemy	0	0	0	0	0	0												
Noor	Educa- tion	Basic meaning	7	9	9	9	10	10	3	6.5	8.5	9	10	9	3.5	5	6.25	7.5	9	8.5
	Words	Polysemy	0	0.5	10	10	10	10												
	Natural Words	Basic meaning	6	8	8	9	9	9	4	5	5	6	6	6	2.5	3.5	4	5	5.25	5.75
		Polysemy	0	0	0	0	0	0												
Sum		Basic meaning							6	11.5	15	16.5	19	18	6.5	9	11.25	13	16.5	16.5
		Polysemy							7.5	8	8	10	9	9.5	5	5.75	6.5	8	8.5	9

Table 7.3
Participants' Performance on the Third 20 Words (November Words)

		Meaning						Spelling						Word Part						
			S1	T2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6
Anas	Education words	Basic meaning	7	6	8	8.5	8.5	8.5	4	4	5.5	6	7	8	3.5	4	5.25	6.75	7	7.25
		Polysemy	0.3	0.3	0.6	10	10	10												
	Natural words	Basic meaning	6.5	6.5	6.5	7	7	8	3.5	3.5	3.5	3.5	3.5	4	2.5	2.5	2.5	3	3.5	3.5
		Polysemy	0	0	0	0	0	0												
Noor	Education words	Basic meaning	7	9	9	9	9	9	5	6.5	8	10	9	10	3.75	6	7.75	9.25	9.5	9.5
		Polysemy	0.3	0.6	10	10	10	10												
	Natural words	Basic meaning	7	7	8	9	10	10	4	4.5	5.5	6	6	6	3.5	3.5	4.25	4.5	5.25	5.75
		Polysemy	0	0	0	0	0	0												
Sum								9	10.5	13.5	16	16	17	7.25	10	13	16	16.5	16.75	
								7.5	8	9	9.5	10	10.5	6	6	6.75	7.5	8.75	9.25	

Overall, the three tables clearly show that both participants had good control on Educational Words and relatively poor control on Naturalistic Words. Although they seemed to face difficulties with spelling and word part knowledge, especially those of their Naturalistic Words, they succeeded in developing all meaning knowledge of Educational Words and Naturalistic Words, as discussed below.

7.2.1 Knowledge of Meaning

In terms of word meaning knowledge development in the three tables above (7.1-7.3) it is notable that although meaning knowledge of the Naturalistic Words started relatively higher than Educational Words in the first sessions (S1), the latter developed faster and reached a peak in the following two sessions (S2-S3). This is especially true for the participant Noor who succeeded in developing the basic meaning knowledge of all her Educational Words by the second session (S2) and most of her Naturalistic Words by the third session (S3).

Qualitative data analysis of the ways participants were learning their newly learned words showed that both participants created word lists in which they included all the words they were learning in class, except Noor who also included her newly learned Naturalistic Words. Noor revealed that she uses this list as a private dictionary and as a reference for future revisions. However, Anas shared that he rarely included his Naturalistic Words to his word list.

Although both participants had the habit of word revision, it seems that Noor's inclusion of her newly learned Naturalistic Words helped her maximize her basic meaning knowledge attainment and outperform Anas who didn't include his newly learned Naturalistic Words. That is, because Anas did not include his Naturalistic Words to his word list he didn't have that

opportunity to review them in future revisions, and thus his attainment of basic meaning knowledge of Naturalistic Words was relatively poor.

Even in the sixth session (S6), he was unable to provide all meanings of his Naturalistic Words and their development remained relatively low as he succeeded to provide only 76.6 % of basic meaning senses of his Naturalistic Words. He also added that he focuses more on his Educational Words because *“the teacher brings them in the tests”, “I need them to pass the level”*. It seems that he focuses his attention more on passing the level by studying the words the teacher uses in the tests. This gave a privilege to the Educational Words over the Naturalistic Words.

The importance of word encounter and word revision in word development is supported by results obtained from series of longitudinal studies conducted by Sanaoui (1995), who concluded that for successful naturalistic word development learners need to review and encounter their newly learned Naturalistic Words several times, and in various contexts.

Sanaoui (1995) also stressed the vital role of word selection and motivation to learn in word development. He suggested that words that learners are motivated to learn and focus on more develop before any other words. Similarly, Douglas (2010) added that when “people are sometimes not motivated to use a word, it remains in the passive vocabulary” (p. 54). This was the case with Noor who revealed that she is motivated to learn all English words and that she makes sure to learn any word she encounters whether inside or outside of class: *‘I love memorizing English words, all the words, I feel fun, I feel confidence, pride’*.

It seems that her motivation to learn all English words not only helped her fully develop all basic meaning senses of her educational words but also helped her develop the different polysemy senses of these Educational Words. Out of the 30 Educational Words, there were nine

polysemy senses other than the basic meaning senses. It took almost three to four months (S3-S4) for these nine polysemy senses to be developed by both participants.

However, their performance on polysemy senses of their Naturalistic Words was markedly poor. Neither of the two participants successfully provided the target polysemy senses in his/her Naturalistic Words except in one instance when the participant Anas managed to provide one polysemy sense out of the six polysemy senses in his Naturalistic Words.

These results are in accordance with results obtained by previous research (González-Fernández & Schmitt, 2019; Schmitt, 1998; Webb, 2005, 2007). The researchers reported that their participants had more problems with polysemy knowledge than with basic meaning knowledge and word spelling knowledge. Polysemy Knowledge was found to be “a more difficult component to acquire and harder than previously thought” (González-Fernández & Schmitt, 2019, p. 20).

The researchers also added that knowledge of basic meaning senses and polysemy senses develop after knowledge of word spelling. This conclusion partially is in line with the results of the current study as both participants seemed to face more problems with polysemy knowledge than with spelling knowledge as discussed below.

7.2.2 Knowledge of Spelling

Although both participants seemed, according to the three tables above (7.1 to 7.3), to face real difficulties in developing knowledge of polysemy senses, they seemed to face fewer difficulties with basic meaning senses and average number of difficulties with spelling knowledge. Their performance on the measured 90 words showed relatively average

performance on word spelling knowledge of Educational Words and relatively lower performance on the spelling of Naturalistic Words.

Although they had studied the Educational Words explicitly in the class for more than eight months, they still had some problems with the spelling of some of these words. In no instance was the score of 10.0 attained by both participants by the last sessions (S6). Most of the instances fell between 8.0 and 9.5.

More serious spelling problems can be detected with their performance on Naturalistic Words. Both participants demonstrated relatively poor spelling knowledge on Naturalistic Words. Neither of the two participants managed to provide the correct spelling of all his/her Naturalistic Words. Most of the progression instances ranged from 3 to 6. This is especially true for participant Anas, who demonstrated the lowest spelling attainment rates. Even in the last sessions (S6), he managed to develop only 40% of spelling of his Naturalistic Words.

These results contradict results obtained from previous studies (e.g González-Fernández & Schmitt, 2019; Schmitt, 1997; Webb, 2005, 2007) in which participants were able to provide correct spelling of the measured words without developing the basic meaning senses of the target words. Although the researchers did not provide an explanation for the successful performance of their participants, this could be due to the fact that their participants were advanced English learners.

As this study aimed to investigate how and why spelling knowledge develops the way it does, deeper qualitative analysis of participants' performance on the measured 90 words was conducted. Results revealed that both participants relied heavily on knowledge of their L1 (Arabic) phonological sound-letter correspondence. They revealed that when they come to write any English word, they break them into their component sounds and write the letters that represent

those sounds. It seems that such extensive reliance on their L1 phonological processing of single letters had negatively affected the development of their spelling knowledge.

Moreover, results also revealed that their spelling knowledge might be affected by their inadequate awareness of the English vowel system. In particular, they had more problems with short vowels than with long vowels. Their short vowel errors can be classified under three types: insertion, deletion, and substitution.

- Insertion: participants inserted short vowels in word-different positions in order to break down long consonant clusters as in “constantly” for constantly, “curantly” for currently, and “sepread” for spread;
- Deletion: participants deleted short vowels as in “satsfy” for satisfy, “quot” for quote, “assumd” for assumed, and “approprat” for appropriate; and
- Substitution: participants heavily substituted short vowels as in “hisetation” for hesitation, “acheive” for achieve, “sefelian” for civilian, and “frustrated” for frustrated.

It was also found that both participants seemed to have fewer problems with consonants and relied much more on consonants to create words. This could be related, as Kharma and Hajjaj (1989) stressed, to the importance of consonants over vowels in Arabic orthographic system. However, participants seemed to have difficulty in processing some consonants that do not exist in Arabic.

For instance, because the voiceless stop consonant /p/ doesn't exist in Arabic, participants substituted with its minimal pair voiced consonant /b/ as in “consumbtion” for consumption, “sebarat” for separate, and “abologize” for apologize. They also substituted the consonant /v/ with its minimal pair consonant /f/ as Arabic doesn't have the former as in “praifacy” for privacy, “infestigations” for investigations, and “cefelian” for civilian.

Looking back to the ways participants were developing their spelling knowledge, it was found that sometimes Noor copies some of her Naturalistic Words from her word list, especially the long ones, to learn their spelling. Such learning behavior seems to have helped her outperform Anas who did not include his Naturalistic Words in his list. He disclosed that “*sometimes when I have time I re-write them*” (Educational Words), “*I always try to repeat them in my head*” (Naturalistic Words).

Anas seems to heavily rely on his memory to learn meaning and spelling knowledge of his Naturalistic Words. Learners who rely on their memory only, have demonstrated low rates of attainment (Nation, 2008, 2013). Learners are strongly advised (as recommended by others) to use a combination of several mechanical and cognitive learning strategies to enhance and maximize their attainment. For instance, it is recommended they view videos to enhance and maximize the link between their word meaning knowledge and word spelling knowledge (Webb & Rodgers, 2009a, 2009b).

It is worth mentioning that, although the two participants in this study demonstrated a high level of meaning knowledge and an average level of spelling knowledge, they demonstrated poor attainment rates of word part knowledge in general and word part knowledge of Naturalistic Words in particular, as discussed below.

7.2.3 Knowledge of Word Parts

The three tables above (7.1-7.3) show that word part knowledge was the least developed word knowledge aspect. Similar to word meaning knowledge and word spelling knowledge discussed above, the biggest change in the development of word part knowledge took place in the

first two or three sessions and decreased gradually in subsequent sessions, with very little or no change evident in the last two sessions (S5-S6).

A closer look at participants' performance on the last two sessions (S5-S6) shows that they had good control of their part knowledge of Educational Words, where Anas succeeded accurately attain 76% and Noor 87% of each set of 30 Educational Words. However, they had relatively poor control of word part knowledge of their Naturalistic Words. While Noor was able to develop almost 50% of word part knowledge of her Naturalistic Words, Anas was able to develop only 37% of word part knowledge of his Naturalistic Words.

These results are not limited to the participants of this study or to Arab learners of English in general. They were also reported by several researchers who investigated learners from different L1 backgrounds. For instance, in a large group study, Schmitt and Meara (1997) reported that their intermediate Japanese students had problems producing the different forms of word parts. They produced only 15% of the targeted word parts.

Similarly, Schmitt (1998) reported that his three advanced postgraduate participants faced problems developing their word part knowledge in general and especially their adjective and adverb forms. In a recent study, González-Fernández and Schmitt (2019) also reported that their advanced Spanish learners demonstrated very poor mastery of word parts knowledge and that this type of word knowledge "is among the last aspects to be learned" (p.19).

Qualitative analysis of the measured 90 words revealed that although participants were unable to provide most of the target word parts, they succeeded in several instances to tell whether a particular word part exists or not. The analysis also revealed no easy or difficult particular word part and that the word part encountered most was the first and the most developed

word part. The most known word parts were those used in class materials or encountered in different naturalistic settings several times.

This result suggests the need for more explicit and planned word part instruction to secure successful word part knowledge development and reduce word part problems. Fewer word part problems were detected in this study as participants' vocabulary size increased.

7.3 Results for Research Question 2

To address the second research question and explore the relationship between the three measured aspects of word knowledge and participants' vocabulary level development, two versions of Webb et al's (2017) Updated Vocabulary Levels Test (uVLT) were used before and after treatment. Results obtained are summarized in Table 7.4 below.

Table 7.4

Participants' Performance on the VLT Before and After Treatment

	K1		K2		K3		K4		K5	
	Before	After	Before	After	Before	After	Before	After	Before	After
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Anas	27 (90)	30 (100)	20 (66.6)	27 (90)	8 (26.6)	15 (50)	2 (6.6)	4 (13.3)	1 (3.3)	1 (3.3)
Noor	29 (96.6)	30 (100)	22 (73.3)	30 (100)	10 (33.3)	19 (63.3)	0 (0)	0 (0)	0 (0)	0 (0)

The table 7.4 above clearly show that after eight months of learning English, both participants succeeded in increasing their vocabulary level and appeared to have fully mastered the K1 and K2 level. Webb et al. (2017) suggest that a 24/30 (80%) threshold is required for level mastery. However, no participant in this study had reached the mastery level of the K3, K4, and K5

levels. Although both participants succeeded in doubling their K3 level in an 8-month period, their knowledge at the K4 and K5 level did not change and overall remained poor.

This suggests that the teacher was focusing heavily word knowledge at the K1 and K2 level, relatively less at the K3 levels but not much at the K4 and K5 levels. This is also evidenced in the 30 Educational Words participants learned during the course of this study. All the Educational Words were from the 2K and the 3K levels and no word was from the 4K or 5K levels. Most interestingly, even the 60 Naturalistic Words were all from the 2K and 3K levels only.

Participants' focus on the 2K and 3K words outside the class could be explained by findings from Webb et al. (2017) who suggested that the K1-K3 are high-frequency levels and the 4K and 5K are mid-frequency levels. That is, due to the high frequency of the 2K and 3K level, and as the participants have not mastered them during the course of the study, they were more focused on outside the class than within the 4K and 5K levels.

The change in the K2 and K3 levels before and at the end of the study is supported and accompanied by the incremental development of the three measured aspects of word knowledge discussed above (meaning, spelling, and word part). This conclusion is supported by Schmitt's (2014) assertion that vocabulary size and vocabulary depth are not separable dimensions but highly connected and related to one another. However, this conclusion also suggests that although they might develop in a parallel manner, they differ in how well they are known.

These results suggest that, for better vocabulary development, teachers need to focus on high frequency words as well as frequently encountered low frequency words that their learners have not (fully) grasped. Most importantly, learners need to be made aware of and trained to have control of the different learning strategies and techniques that could help them become

successful independent learners and handle low-frequency words required in the contexts of their specific communicative needs.

Participants of this study were no exception. Qualitative data analysis revealed that participants lacked knowledge and control of the different vocabulary learning activities especially those requiring deep processing. For instance, participants revealed that they do not watch English channels or listen to English radio because “*people on the TV and radio speak very fast and chew sentences*” as Anas put it.

It seems that participants are not trained to learn from watching TV or listening to radio, an adequacy which seemed to inhibit their word knowledge development. Therefore, teachers need to encourage their students and train them to watch TV and listen to radio, especially at the 3000-level as Webb and Rodgers (2009) have recommended. In addition, questionnaire and qualitative data analysis revealed that both participants lacked awareness and control of the different vocabulary learning strategies as discussed below.

7.4 Results for Research Question 3

To address the third research question which explores participants’ preferred vocabulary learning strategies to help understand learning processes involved in the development of the three measured aspects of word knowledge, Schmitt’s (2000) Vocabulary Learning Strategies were used, as discussed previously.

Questionnaire analysis revealed that both participants reported using six strategies: oral repetition, creating a list, dictionary use, taking notes, guessing meaning from context, and applying reading strategies. However, only Noor reported using the orthographic repetition strategy. Neither of the two participants reported using more complex vocabulary learning strategies

such as using newly learned words in sentences, making a mental image of word meaning or word form, connecting newly learned words to previous experience and remembering the word that precedes or follows the new word. Such more complex strategies are believed to result in more vocabulary learning and development (Oxford & Crookall, 1989; Schmitt, 1997).

Similar to results obtained from Study 1, qualitative data analysis revealed that both participants depended heavily on their L1 phonological and sound-letter correspondence to learn the written forms of new words and used their word lists to develop their newly learned words' meaning and word part knowledge.

Results also revealed that the least frequently employed strategies were noticing strategy, imagery strategy, and word part strategy. A reduced use of such mechanical strategies seemed to negatively affect participants' word knowledge attainment, as active manipulation of information and deeper mental processing required in these strategies could help them maximize their attainment.

To sum up, results obtained from Study 2 confirm results obtained from Study 1 discussed above. Both studies showed developmental hierarchy among the three measured aspects of word knowledge. They developed concurrently and in varying proportions. Results also clearly show that a 6 to 8-month period is not enough time to fully grasp these three aspects of word knowledge, at least for this particular group of participants.

As this study aimed to detect the incremental changes of word knowledge from the beginning stages of development to the full mastery which was not achieved, a Follow-up Study was needed to determine the required time for the full mastery of these three aspects of word knowledge. Therefore, a Follow-up Study with the same group of participants and target words was conducted as discussed below.

Chapter 8: Results and Discussions for the Follow-up Study

8.1 Introduction

As discussed previously, results obtained from Study 1 and Study 2 showed that an 8-month period is not enough to fully develop the three measured aspects of word knowledge (meaning knowledge, spelling knowledge, and word part knowledge), at least for this particular group of participants.. Therefore, a delayed Follow-up Study was needed to track their development after a more extended period of time. For this purpose, a follow-up study was conducted from January 8, 2020 to January 10, 2020, that is, 18 months after Study 1 and 8 months after Study 2. It was guided by the following research questions:

1. How does knowledge of individual vocabulary items develop over time?
 - Are they learned in a developmental sequence?
 - Do they develop at a similar rate? Why?
2. Is there a relationship between learners' word knowledge development and vocabulary level development?

Each of these questions is addressed below in separate sections

8.2 Results for Research Question 1

In answer to the first research question that addressed how knowledge of vocabulary develops overtime, the participants' performances on the 60 target words (Appendix I) are summarized in Table 8.1 to 8.2 below.

Table 8.1

Study 1 Participants' Performance on their Measured 20 Words

		Meaning		Spelling		Word Part	
		Thematic	Matching	Thematic	Matching	Thematic	Matching
Ibrahim	Basic	6	3	3	1	2.5	1.25
	Polysemy	0	0				
Sara	Basic	7.5	5	5	3	3.25	2.25
	Polysemy	0	0				
Mohamed	Basic	8	6	6	4	4.75	2.75
	Polysemy	0	0				
Sum	Basic	21.5	14	14	8	10.25	6.25
	Polysemy	0	0				

Table 8.2

Study 2 Participants' Performance on their Measured 20 Words

		Meaning		Spelling		Word Part	
		Education	Natural	Education	Natural	Education	Natural
Anas	Basic	10	8	8	5.5	6.25	3.25
	Polysemy	0	0				
Noor	Basic	10	6	8.5	4	7.5	2
	Polysemy	0	0				
Sum	Basic	20	14	16.5	9.5	13.75	5.25
	Polysemy	0	0				

Table 8.1 summarizes Study 1 participants' performance on their 20 words which included 10 Thematic Words and 10 Matching Words, and Table 8.2 summarizes Study 2

participants' performance on their 20 words which included 10 Educational Words and 10 Naturalistic Words. As discussed previously, each correct word knowledge aspect was awarded a score of (1) and the maximum possible score for each word group (Thematic or Matching) was (10).

Similar to results obtained from Study 1 and Study 2 discussed in previous chapters, results obtained from this Follow-up Study, summarized in the two tables (8.1 and 8.2) above, clearly show the good control participants had of their Thematic words and Educational words and relatively low control they had of their Matching Words and Naturalistic Words. In addition, results did not show developmental hierarchy among the three measured types of word knowledge (basic meaning knowledge, spelling knowledge, and word part knowledge). The three types developed concurrently and in varying proportions.

With regards to development of the three measured types of word, results also show that basic meaning knowledge always enjoyed the highest gains followed by spelling knowledge and word part knowledge respectively. However, when polysemy knowledge is considered, varying results are obtained.

While the three participants of Study 1 (Ibrahim, Sara, and Mohamed) demonstrated poor control of polysemy knowledge, with no successful identification of any polysemy word, both participants of Study 2 (Noor and Anas) succeeded in correctly supplying all the target polysemy words of their Educational Words and most polysemy words of their Naturalistic Words.

Differences in knowledge gains among the two groups of participants (Study 1 participants and Study 2 participants) are not limited to gains in polysemy knowledge development, but also to differences in their overall performance on the three measured types of word knowledge

(meaning, spelling, and word part) evident in this Follow-up Study and in the previous two main studies (Study 1 and Study 2).

Significant attrition rates are detected in the overall performance of the three participants Ibrahim, Sara, and Mohamed on the measured 20 target words in Study 1 (summarized in tables 6.1-6.3) and in their performance on the same words in this Follow-up Study (summarized in Table 8.1). In no instance were the three participants able to provide full knowledge of the three measured types of word knowledge. Only one participant, Mohamed, succeeded in providing 80% of the target basic meaning senses of his Thematic Words.

More attrition rates were detected in the development of spelling knowledge and word part knowledge. Participants were able to provide only 40% (8/20) of spelling of the supposedly already acquired target words and 30% (6/20) of the formerly understood target word parts.

Such poor performance might be related to lack of word exposure opportunities that Study 1 participants had to the target words after leaving school. In all the follow-up interviews, the three participants complained about the problem of lack of language use opportunities in their everyday life and particularly the written form of the language. That is, lacking adequate word exposure opportunities in Educational or Naturalistic Settings seemed to negatively affect their knowledge gains.

This suggestion is manifested in the better performance of Study 2 participants Noor and Anas who were still receiving formal language instruction and thus had more language exposure opportunities than Study 1 participants who dropped out of their school at the end of Study 1. Although the overall knowledge gains of Study 2 participants in this Follow-up Study (Table 8.2) are relatively lower than their overall knowledge gains in Study 2 (Tables 7.1-7.3), both

participants outperformed Study 1 participants on the three measured aspects of word knowledge in this Follow-up Study.

That is, language exposure opportunities at school seemed to help Study 2 participants outperform Study 1 participants in this Follow-up Study. In addition, vocabulary learning strategies Study 2 participants (Noor and Anas) reported using such as the Word List strategy might have played a role in their better performance.

While both participants of Study 2 (Noor and Anas) reported adding all their newly learned words (including their Naturalistic Words) to their Word Lists, only participant Sara from Study 1 reported adding all her newly learned words to her Word List, as discussed in Chapter 6 above. Such mechanical strategy not only seemed to help Noor and Anas improve their newly learned words, but it also provided them with more future opportunities to review their newly learned words, as discussed in Chapter 7.

However, their performance on the Naturalistic Words remained relatively low despite their inclusion in the participants' Word List. They managed to provide only 25% (5/20) of the target word parts. One could speculate that both participants met these words incidentally in Naturalistic Settings and thus they might have studied or noticed them to a minimal extent. This may relate to the critical role of explicit and formal language instruction, especially for this group of learners.

In addition to the potential role of explicit and formal learning of vocabulary items in participants' performance on the target 20 words, participants' vocabulary size might also explain some of the differences in their performance in this Follow-up Study, as González-Fernández and Schmitt (2019) suggested.

8.3 Results for Research Question 2

To address the second research question, participants' vocabulary levels were measured using Webb et al.'s (2017) updated Vocabulary Levels Test (uVLT). The two tables below (Tables 8.3 and 8.4) summarize participants' performance on the updated Vocabulary Levels Test (uVLT).

Table 8.3

Study 1 Participants' (Ibrahim, Sara, and Mohamed) Performance on the uVLT

	K1	K2	K3	K4	K5
Ibrahim	100%	73.3%	26%	3.3%	6.6%
Sara	100%	83.3%	33.3%	10%	0
Mohamed	100%	90%	40%	16.6%	0

Table 8.4

Study 2 Participants' (Anas and Noor) Performance on the uVLT

	K1	K2	K3	K4	K5
Anas	100%	100%	83.3%	26%	3.3%
Noor	100%	100%	76.6 %	33.3%	3.3%

Tables 8.3 and 8.4 above clearly show significant differences in participants' vocabulary size (level). While both groups of participants succeeded to fully develop the K1 and K2 levels, only Study 2 participants (Noor and Anas) succeed to fully develop the K3 level based on the 80% mastery threshold level set by Webb et al., (2017).

A comparison of participants' performance on the updated Vocabulary Levels Test (uVLT) in this Follow-up Study and their performance on the same Vocabulary Levels Test in Study 1 (Table 6.4) and Study 2 (Table 7.4) clearly shows that while Study 2 participants were able to double their vocabulary levels, Study 1 participants managed to slightly increase their vocabulary levels.

To sum up, results obtained from this Follow-up Study confirm results obtained from Study 1 and Study 2. The three measured aspects seemed to follow a developmental hierarchy with basic meaning knowledge always enjoying the highest gains followed by spelling knowledge and word part knowledge.

All participants demonstrated good control of Thematic and Educational Words and relatively less control of Matching and Naturalistic Words. Study 2 participants (Noor and Anas), who were still receiving formal language instruction and reported using more vocabulary learning strategies, outperformed Study 1 participants (Ibrahim, Sara, and Mohamed) who had dropped out of school at the end of Study 1.

These results and results obtained from the two main studies discussed above (Study 1 and Study 2) are discussed in more depth in the following chapter.

Chapter 9: Overall Discussion

9.1 Introduction

This longitudinal case study consisted of two main studies (Study 1 and Study 2) and a Follow-up Study, which aimed to provide a clearer picture of the developmental nature of the attainment of second language vocabulary. In particular, it attempted to detect and compare the incremental changes of three aspects of word knowledge (meaning knowledge, spelling knowledge, and word part knowledge) in Educational and Naturalistic Settings and how they develop overtime. It also examined the relationship between these three aspects of word knowledge and how they relate to overall vocabulary knowledge development.

This Chapter is devoted to addressing the commonalities of the results obtained from the two main studies (Study 1 and Study 2) and the Follow-up Study discussed previously. To better understand results obtained from the studies and to have a clearer picture of the findings, results obtained from all data sources used in the three studies including vocabulary tests, individual interviews, classroom observations, class/student materials, on-going field notes, Updated Vocabulary Levels Test (uVLT), and questionnaires need to be integrated.

9.2 Developmental Nature of Aspects of Word Knowledge

This section is devoted to addressing the research questions that were designed to investigate how the three aspects of word knowledge (meaning, spelling, and word parts) developed over time, their development patterns, and factors that facilitated or inhibited their development.

The key result obtained from the three studies (Study 1, Study 2, and Follow-up Study) was that the three measured aspects of word knowledge seemed to follow a developmental

hierarchy. This result counters previous research results (e.g., González-Fernández & Schmitt, 2019; Schmitt, 1997; Webb, 2005, 2007), which did not show an ordering in the development of the measured aspects of word knowledge.

A closer look at Tables 6.1-6.3, Tables 7.1-7.3, and Tables 8.1-8.2 also clearly shows that although the three measured aspects developed simultaneously and in a parallel manner, they developed in varying proportions with meaning knowledge always displaying the highest gains followed by spelling knowledge and word part knowledge respectively. That is, in all three studies, word meaning knowledge always enjoyed the highest gains. Most interestingly, none of the seven participants in the three studies was able to provide a word's spelling or a word part without also providing its meaning.

Qualitative data analysis showed that participants give priority to a word's meaning over its spelling and word part. This stems from their belief that they mostly use language orally and that they rarely have to use the written form of the language in their everyday life. As participant Ibrahim in Study 1 explained, *“more to meaning because... openly... since we entered Canada only in two or three instances I had to hold the pen to write..... and to write very simple words such as my name and date of birth”*.

Participant Noor in Study 2 confirmed that *“contrary to back home here we only sign and everything is online on the computer you do not need to write and if you make spelling errors the computer corrects them”*. That is, lack of written word use outside the class as well as technology side effects seems to be the drive behind participants' preferences to focus more on word meaning than on word spelling.

These results highlight the classroom as the primary or the only source of information for the participants. Thus, this limitation seemed to negatively affect their word knowledge

development. This supposition is supported with principles of Situated Learning Theories (discussed above) that emphasise engaging learners actively in naturalistic activities and communities of practices in which they are an essential part. Providing learners with highest levels of participation to maximize their attainment (Lave & Wenger, 1991; Rogoff, 1990).

Therefore, teachers, syllabus designers, stake holders, and educational authorities need to secure more language use opportunities for this type of learners for more successful learning attainment and better programme outcomes. They can for instance invite guest speakers to classes, hold conversations with other classes, and organize storyteller competitions.

As all participants demonstrated a good understanding of basic meaning senses, it was informative to check for their understanding of the different meaning senses of the target words. Results showed that participants demonstrated good control of polysemy knowledge of Thematic and Educational words, relatively medium control of polysemy knowledge of Matching Words, and markedly poor control of polysemy knowledge of Naturalistic Words, as revealed in the Follow-up Study.

This result is in line with Krashen's (1985) Natural Order Hypothesis (discussed above) proposal that although some language features are easy to learn, they cannot be fully learned until their time has come. That is, although polysemy knowledge seems to be an easy type of word knowledge to learn it is not fully internalized/acquired until later stages of word development.

To further understand the variation in the development of polysemy knowledge in the four word groups, qualitative data analysis revealed, that although the teachers attempted to provide their students with all possible frequent polysemous meanings of the new words, some of these meanings were only presented in isolation and with a minimal of repetition. Also, results showed that participants had more opportunities to encounter polysemous meanings of Thematic

and Educational words than polysemous meanings of Matching and Naturalistic Words, which were met only incidentally and less frequently.

It seems that the development of polysemy knowledge in each word group is in line with participants' opportunities to be exposed to these words. This is also manifested in participants' good control on polysemy knowledge of Thematic and Educational words and their inability to develop any of the target polysemous meanings of the Naturalistic words. Therefore, more explicit and planned exposure opportunities are required for initial learning and subsequent appropriate retrieval of this type of word knowledge, as Sullivan (2006) suggested.

The difficulties participants in this study seemed to face in developing their polysemy knowledge are not surprising "as acquiring a large number of meaning senses quickly and easily might be too auspicious to hope for, at least in L2 learning" (Schmitt, 1997, p. 300). Douglas (2010) further explained that factors such as words' low frequency, unfamiliarity with their use, and lack of clarity regarding their meaning senses make them difficult and drive people to avoid using them actively (Douglas, 2010).

It seems that such factors also prompted participants of this study to avoid using a low frequency word's meaning senses actively, which resulted in poor productive polysemy knowledge. Douglas (2010) also explained that "these words form a lexical bar, and for some people this lexical bar causes vocabulary to remain passive rather than active" (p. 51).

It is also important to note that participants' low attainment ratio of polysemy knowledge did not hinder the development of the other aspects of word knowledge (spelling and word part). Instead, the results showed that knowledge of basic meaning senses and knowledge of other aspects of the word might develop without or before knowledge of polysemy.

Furthermore, it is interesting to note that none of the seven participants in the three studies above was able to provide the spelling of any target word without providing its basic meaning sense. This result contradicts previous research results (Schmitt, 1998), in which participants were able to provide word spelling knowledge and word part knowledge even without understanding a word's basic meaning sense.

One possible explanation of the discrepancy in the results is that participants in Schmitt's study were at higher proficiency levels than participants in the current study. They were all university students and it seems that the regular use of written forms helped their spelling ability. In addition to the relationship to proficiency level, the medium of word delivery might have played a role as well.

While in Schmitt's study the target words were presented to the participants orally in the target language, only Arabic equivalents were presented to participants in the current study. These two factors, in turn, seemed to help Schmitt's participants to produce correct spelling forms or at least to "produce phonologically correct spelling" (Schmitt, 1997, p. 302).

As explained in Chapters 6-8 above, word spelling knowledge enjoyed the second highest gains, following knowledge of word meaning. Tables 6.1-6.3, Tables 7.1-7.3, and Tables 8.1-8-2 clearly show that participants in the three studies seem to face real problems in developing their spelling knowledge. This might be related to participants' greater focus on meaning knowledge than on spelling knowledge or word part knowledge, as discussed in Chapters 6 and 7.

Participants reported that they pay less attention to spelling knowledge because they believe that spelling is not important in their everyday life as Anas explained "*in my work place I only speak, I never write. I just write here* (meaning in the class)". Participant Ibrahim added that

“people only speak no one ask you to write.....“here (meaning in Canada) everything is online and the computer will help you if you make mistakes”.

It seems that participants' lower attention to word spelling knowledge stems from their low level of use of the written form of the language outside class as well as the extensive use of computers for writing. As a result, their spelling knowledge was adversely affected by these two factors. To reduce their effect, learners, and especially this group of learners, need to be provided with more language use opportunities particularly outside the classroom.

For instance, they can be guided towards taking advantage of writing centers and writing workshops in the school. They can also be encouraged to write personal journals or daily diaries, read and write novels, try blogging, write emails to friends, or any type of writing that will keep them using English in all forms on a regular basis. Such activities are believed to help learners develop language proficiency in general and spelling ability in particular (Blackstone et al., 2007; Tuan, 2010).

This critical role of word exposure opportunities is also manifested in participants' performance on the measured target words. Although the 150 target words (30 Thematic and 30 Matching words in Study 1 and 30 Educational and 60 Naturalistic words in Study 2) were selected from similar frequency bands (K1-K3), Thematic Words and Educational Words which were explicitly focused on in class always enjoyed the highest gains followed by Matching Words and Naturalistic Words, which were only met incidentally.

That is, the development of Matching Words and Naturalistic Words was relatively low and only accelerated when the Thematic and Educational Words were fully attained or about to fully develop. This suggests that participants' attention and focus were concentrated mostly on

Thematic and Matching Words and only when these words reached advanced levels of development was more focus shifted towards Matching and Naturalistic Words.

This signifies that the level of frequency of the target word doesn't play a significant role in the learning process, as long as the target word is taught and learned explicitly. This is in line with Horst's (2013) assertion that vocabulary learning needs to occur explicitly and based on the frequency principle. For successful vocabulary learning, planned exposure opportunities need to be secured and maximized.

This suggestion highlights the superior role explicit and formal language instruction plays in second language vocabulary development. This result also encourages learners, teachers, and stake holders to take advantage of the school/class time to maximize language attainment. For instance, teachers can provide numerous opportunities for students to be exposed to with new words, integrate previously learned words with newly learned words, and connect new words to learners' world in some way (Schmitt, 2014).

It is important to note that although the incremental changes of the different aspects of word knowledge varied across the four word-groups (Thematic vs Matching, and Educational vs Naturalistic), the developmental hierarchy of these aspects was constant in the three studies. That is, although the four word-groups differ in terms of exposure opportunities and instruction type (explicit or incidental), basic meaning knowledge always enjoyed the highest gains followed by spelling knowledge and word part knowledge across the three studies. This indicates that some word knowledge aspects are harder to attain than others, and that they require more focus and attention from the teacher and the learner.

When the ultimate gains of the four word-groups is considered, results from the three studies discussed above (Study 1, Study2, and Follow-up Study) clearly show that participants

demonstrated good control of Thematic and Educational Words, relatively medium control of Matching Words, and markedly low control of Naturalistic Words especially on Naturalistic Words in the Follow-up Study.

The low control participants had with their Naturalistic Words could be related, as the participants shared in several instances, to lacking the opportunity to learn and use words outside class in Naturalistic Settings. This lack of word-use opportunities outside class seemed to result in a lack of interaction opportunities with more fluent speakers which seemed to result in lower attainment ratios.

This finding is in line with principles of Situated Learning Theorists (e.g., Lave & Wenger, 1991; Rogoff, 1990) who view learning as a social process rooted in the experiences of the daily life of the learner. In their view, learners are viewed as apprentices in Naturalistic Settings who learn through observation and guided participation. This is also evident in the good performance of the participant Anas who reported active engagement with native speakers in his workplace.

To find out what facilitated or inhibited the development of the three measured aspects of word knowledge and what vocabulary learning strategies and processes were involved, qualitative data analysis was conducted and all data sources (class material, student material, field notes, and interviews) were consulted. Results revealed that one of the possible factors that might have played a role was the word inclusion to participants' special word list. That is, one of the noticeable used vocabulary learning strategies and techniques adopted by the participants was the Word List strategy.

Most of the students in CLB5 and CLB 6 levels created special word lists in which they included all the new words they had learned in class. However, only two participants in Study 1,

Fatima and Sara, and participant Noor in Study 2 were found to add words they learned outside class to their special word lists and studied them to even a minimal extent.

It seems that lack of including outside class words to participants' word lists negatively affected participants' word knowledge attainment. This is evident in the poor performance the two participants Ibrahim and Laith showed on the target words of their Matching Words.

Because the two participants did not include all their unfocused learned words to their word lists, they did not have the opportunity to study them or review them repeatedly as they did with their focused words (Thematic Words and Educational Words). This indicates that adding all newly learned words to a learner's word list provides more opportunities for further revisions and word use. Therefore, learners, and especially this type of learners, need to be aware of the importance of creating and adding items to word lists and should be encouraged to do so.

Most interestingly, planned word exposure opportunities not only seem to result in better word knowledge attainment rates, but also to result in better word retention rates. When results of the three studies (Study 1, Study 2, and the Follow-up Study) are compared, higher retention rates are evident with the five participants (Fatima, Mohamed, Sara, Anas, and Noor) who reported repeatedly studying their newly learned words outside class than with the two participants (Ibrahim and Laith) who reported studying their newly learned words in class only.

This result suggests that learners, at least this group of learners, only learned/attained vocabulary they were taught explicitly in class. Therefore, teachers, stake holders, and programme administrators need to provide their learners with the most frequent and unknown words and the opportunities to use these words.

Moreover, only in very few instances did the four participants who demonstrated the highest gains fail to produce words they had produced in preceding sessions, especially when

asked to provide Thematic and Educational words. More instances of forgetting were detected with the two participants (Ibrahim and Laith) especially when providing Matching Words. The relatively low forgetting instances signify that once a particular word knowledge aspect is learned explicitly and reviewed repeatedly it is harder to forget.

In addition to the word list strategy and the word orthographic repetition strategy, specific vocabulary learning strategies and techniques were found to either facilitate or hinder development of the three measured aspects of word knowledge as discussed below.

9.3 Involved Vocabulary Learning Strategies and Techniques

This section focuses on the second research questions that were designed to investigate the vocabulary learning strategies and activities learners engage in in and out of class to learn the three aspects of word knowledge. Qualitative data analysis revealed that one of the most used vocabulary learning strategies by the four participants Fatima, Mohamed, Sara, and Noor was the word orthographic repetition strategy.

The four participants shared that they not only use this strategy to enhance their better spelling ability, but also to enhance their learning of word meaning. This was evidenced in their better performance on spelling tests and the lower performance of the other two participants Laith and Ibrahim who reported using this rarely or if so, to only a minimal extent.

Another interesting related point the participants highlighted during the interviews was their avoidance of using printed dictionaries and their heavy reliance on and extensive use of digital dictionaries to learn new vocabulary items. They explained that they prefer a digital dictionary over a print dictionary because the former *“is easier, it give you the word write a way, you just type one or two letters and it gives you the word and pronounce it for you”*, as participant

Noor said. Most interestingly, they also reported that they mostly rely on their digital dictionaries to learn pronunciation of their newly learned words.

This preference for digital verification is of great importance because all seven participants explained that when they come to learn any new word, they always first hear it in their dictionaries and then repeat it till they learn its meaning. Moreover, they reported that they extensively use their Arabic sound-letter correspondence strategy to spell English words, as discussed previously. They spell words according to their pronunciation (which they learned from the digital dictionary) not according to the actual spelling of the word.

That is, when learning novel words, participants learn the pronunciation of these words from the dictionary, and later, they spell the word according to the pronunciation they learned from the dictionary, ignoring the actual spelling presented there. This L1 spelling strategy seemed to adversely impact their L2 spelling performance, as discussed above.

To help reduce such adverse impact, teachers need to explore their learners' L1 spelling system and teach them potential similarities and differences between their L1 spelling system and the English spelling system and how these similarities and differences can affect their English spelling ability positively or negatively. For instance, Arabic-speaking ESL learners need to explicitly be taught how their Arabic spelling system does not allow initial or final consonant clusters whereas this is allowed in the English spelling system (Ibrahim, 1978).

Further qualitative analysis of participants' performance on spelling tests revealed that participants always confused certain English consonants (v and p) which do not exist in Arabic. They always interchanged the voiced consonant /b/ with its counterpart voiceless stop consonant /p/ and the voiceless fricative consonant /f/ with its counterpart the voiced fricative /v/.

Participants also deleted, substituted, and inserted some vowels. All these errors signify that participants in this study are not adequately aware of the differences between their Arabic language (L1) and the target language system (English). The errors produced also confirm the Contrastive Analysis Hypothesis (CAH) hypothesis which states that those L2 elements that are different from learner's L1 will be more difficult for learners to learn and use (Ortega, 2009). Although other researchers have also found that some clearly distinctive forms are noticed for their novelty even if not always produced accurately or appropriately in natural speech or inter-language.

Therefore, learners need to be made aware of all the differences and similarities between the two sound systems to reduce errors and enhance attainment. For instance, they can be provided with the most important English spelling patterns and rules. They can also be trained to divide words into smaller parts or syllables. It is believed that the learning burden of word spelling is lighter if the word is made of known parts. Learning word patterns and word parts not only helps spelling knowledge development but also helps word part knowledge development (Nation, 2013).

Although they succeeded in supplying a good portion of the possible word part forms (nouns, adjectives, verbs, and adverbs) of their Thematic Words and Educational words, participants were able to produce only a small percentage of the possible word part forms of their Matching Words and Naturalistic Words. This result signifies that word part knowledge is more difficult than meaning knowledge and spelling knowledge, and therefore, more encounters and efforts are required to gain / achieve the ultimate attainment of this type of word knowledge.

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When checking which of the four word part forms (noun, verb, adjective, and adverb) that participants found easier or more difficult to learn, showed the word part encountered most to be the most developed word part form. However, deeper analysis of participants' spelling errors on the target words revealed more spelling errors with nouns and adverbs than with verbs or adjectives.

This result is in line with findings obtained in previous studies (e.g., Schmitt, 1998; Schmitt & Zimmerman, 2002), where verbs were the most developed word part forms. Schmitt and Zimmerman explained that L2 learners find verbs easier to learn and produce because the learning burden of verbs is lighter, as verbs are mostly word stems and thus learners do not need to produce derivational affixes.

Contrary to the results of the present research, Schmitt (1998) and Schmitt and Zimmerman (2002) classified nouns as an easy to learn word part knowledge. Nouns in the current study, however, were found to be the most difficult word part knowledge. The discrepancy in the results can be explained by the difference in means of word presentation as the target words in previous studies were presented to participants in verb and noun forms only but in the current two studies (Study 1 and Study 2) and the Follow-up Study words were presented according to the form presented to participants in class materials or as encountered in Naturalistic settings.

The discrepancy in the results might also be explained by the difference in proficiency levels of participants. While participants in previous studies were advanced university students,

participants in the current three studies were relatively intermediate LINC learners, as discussed in previous sections.

Different results were also obtained in this study when word part knowledge development of Matching Words and Naturalistic Words was considered. Participants failed to provide more than one word part form other than the target word part form. These forms were the most known word part forms. That is, the word part form learned or encountered incidentally or in naturalistic setting was the most developed word part form.

This result also highlights the importance of explicit word instruction in word knowledge development. It suggests that to maximize word part knowledge attainment teachers, and vocabulary material designers need to provide learners with all possible forms of new words. Future more, they also need to provide them in different contexts like those in learners' real life. Meeting words in various contexts helps consolidate meaning knowledge and word part knowledge in memory (Schmitt, 2008). Teachers can also explicitly train learners to use different word part learning strategies and become autonomous learners, who are capable of controlling their learning in Naturalistic Settings.

In the three studies discussed above, participants were able to deconstruct affixed target words (nouns, adjectives, and adverbs). In several instances, they succeeded in deconstructing affixed derivational affixes to these three word part forms. But when the encountered word part form was a verb, it was difficult to construct the other three forms of word parts. Tyler and Nagy (1989) referred to this ability of deconstructing words into parts as 'relational knowledge' where learners recognize the different parts of the word and know what these parts mean.

Although participants explained that they heavily use the word part strategy to learn and produce the different forms of word parts, they still face serious affixation problems. This is

evident in their word part errors on the target words which were mostly due to inaccurate suffix affixation.

They mostly affixed correct suffixes to create incorrect target word part forms, especially when creating noun forms. For instance, they excessively confused and incorrectly affixed the three suffixes (-tion, -sion, and -ship) to stems as in communicasion for communication, decision for decision, and culturship for culture.

These errors suggest that participants lacked the distributional knowledge required for word part use (Nation, 2013). Nation asserted that successful word part use requires learners “to know which form class of stem can take certain affixes” (p. 436). Therefore, he suggested that learners need to be explicitly taught the governing rules and given ample opportunities for application.

It is interesting to note that participants in the current three studies (Study 1, Study 2, and Follow-up Study) were able, in several instances, to tell when a particular word part didn't exist. They revealed that when they come to produce a form or when they are not sure of a particular word part they always refer to their Arabic word part system as a default model.

For instance, participant Anas disclosed the following: *“I refer to Arabic language and if it exists in Arabic most probably it will exist in English too, but I can't tell what it is”*. Participant Noor also added, *“always when I don't know a word I try to guess it or check if we have it in Arabic”*. That is, although this strategy seemed to help them to decide whether a particular word part exists or no, it did not help them to tell what that particular word part was.

This L1 strategy seems to play a positive role in facilitating learners' word part knowledge development, and at least for Arabic-speaking learners of English. This suggests that

teachers of this particular group of learners need to promote this strategy and encourage their students to use it to enhance their vocabulary development.

Participants also shared that they found word part knowledge learning more confusing and demanding than meaning knowledge learning and spelling knowledge learning. For instance, participant Fatima revealed, “*they (word parts) are very demanding not like meaning and spelling although spelling is not easy too, but word part is complex sometimes you add and other times you detach*”. Participant Noor stated that she finds word parts of naturalistic words more difficult “*people (native speakers) do not use the them, I noticed them only using verbs and nouns, I have heard no one since I arrived to Canada using adverbs or adjectives*”.

These two key comments, in addition to the quotations discussed above, signify that participants lacked knowledge of a word part strategy use as well as adequate exposure opportunity to their newly learned words in authentic settings. Therefore, more explicit word part strategy use instruction and more language use opportunities outside class need to be implemented.

Overall, similar to the development of the other two measured aspects of word knowledge (meaning knowledge and spelling knowledge), the development of word part knowledge seems to be challenging and incremental and knowing one or more word parts doesn't imply the other parts are known or will be learned easily.

This is not limited to participants of this study or to Arab learners of English in general, but rather it is universal as evident in several related studies. Participants from different L1 backgrounds reported word part knowledge as an advanced aspect of word knowledge, and harder than previously thought (González-Fernández & Schmitt, 2019).

González-Fernández and Schmitt (2019) also reported a strong correlation between word part knowledge development and learners' vocabulary size. Similarly, results of the current three

studies detected a relationship between participants' vocabulary level development and the three measured aspects of word knowledge (meaning knowledge, spelling knowledge and word part knowledge) as discussed in the next section.

9.4 Word Knowledge Development and Vocabulary Level Development

This section focuses on the third research question that investigated whether there is a relationship between learners' word knowledge aspect development and overall vocabulary knowledge development.

As indicated above, the three measured aspects of word knowledge (meaning knowledge, spelling knowledge, and word part knowledge) were found to develop concurrently, and in varying proportions. Higher frequency words always enjoyed the highest gains. This privilege seems to be supported by the more attention the class teachers give to these word levels over the lower frequency word levels. All words they learned in class belong to the 1-3K word level, as shown in Appendix G.

Moreover, participants' performance on both versions of the updated Vocabulary Levels Test (uVLT) in the current three studies showed very poor knowledge of lower frequency bands K3, 4K, and 5K. This indicates that participants paid more attention to higher frequency words. This is manifested in the number of higher frequency words they learn in class, as 43 (71.6%) words of the Thematic and Educational words were from these frequency bands.

The direct relationship between the three measured aspects development and participants' vocabulary size development is supported by Pienemann's (1998) Processability Theory (discussed previously) and the six proposed stages of development. It seems that as participants'

vocabulary level (size) develops, their knowledge of the three measured aspects develops but in varying proportions.

Douglas (2010) also explained that ESL learners tend to develop higher rates of higher frequency words “because these are the words they use to communicate in their daily lives. They do not need to acquire the lower frequency items in order to communicate, and they may not be challenged to do so in their schools” (p. 189).

In several instances, participants complained about the problem of lacking word exposure opportunities in Naturalistic Settings. They expressed that they do not find ample time and opportunities to interact with native or more proficient speakers of English because as Mohamed said “*there is no place where you can practice what you learned and certainly you can’t stop people and ask them to talk with you to improve your speaking*”. Participant Isra also added that “*you only have the clinic or the supermarket and there is no much opportunity to have a conversation with someone there*”.

This result might not be surprising as “people generally hear and read words more often than they use them” (Douglas, 2010, p. 54). However, this result suggests that opportunities for outside language use need to be secured as discussed above to help learners maximize their attainment. This suggestion is supported by principles of the Situated Learning Theories (discussed above) that view learning and knowing as social, rooted in the experiences of the daily life of the learner. Learners are viewed as apprentices in Naturalistic Settings who learn through observation and guided practice (Lave & Wenger, 1991; Rogoff, 1990).

This was evident in the good performance the two participants Mohamed and Anas demonstrated on the vocabulary tests. Moreover, the participant Anas shared that the words he learned in the workplace were much easier to learn and harder to forget than words he learned in

class “*I always forget the words they teach us here (in class), they are easier to forget although we study them, but it is impossible forget a word I learn in the store*”.

Therefore, learners need to be placed in different naturalistic social contexts so that through gradual interaction with people they will learn different vocabulary items and enhance their language proficiency. To achieve this aim, teachers, stake holders, and programme administrators can, for example, arrange for field trips, invite guest speakers to class, organise conversation circles with native speakers or more proficient English speakers, or arrange for computer-interactive connections.

Another interesting related note was highlighted by two participants, Laith and Ibrahim. Participant Laith disclosed that he focuses on words they learn in class “*because they come in the final exams*”. The participant Ibrahim repeatedly disclosed that he was attending classes to pass the test and get the certificate needed for settlement and residency purposes.

This instrumental type of motivation (Gardner, 1985) seemed to play a vital role in participants’ word selection and word knowledge attainment. This was clearly evident in their performance on the measured target words. The five participants (Mohamed, Fatima, Sara, Anas, and Noor) who voiced a more integrative or longer-term goal-oriented ambition to secure a place in the work force and postsecondary education, always outperformed the two participants who connected their learning with the more short-term goal of passing a test and receiving a certificate.

For instance, the participant Fatima reported her passion to expand her vocabulary and improve her language proficiency to increase her job opportunities. Although she has a good experience in nursing, she has found difficulty securing a place in the health sector that requires high levels of language proficiency. As she reported “*I applied for several positions but they*

always reject me because they ask for level 8 and above (CLB8)". The participant Mohamed also reported difficulties in securing a job due to language barriers: *"when I apply for the highest paying companies, they always say we need someone with excellent writing and speaking skills"*.

The five participants also seemed to take their learning more seriously. Qualitative data showed that they use more vocabulary learning strategies than the other two participants. Only the four participants (Mohamed, Anas, Laila, and Noor) reported having the habit of studying English at home. They revealed that they usually review their newly learned words orally and orthographically at home.

However, two participants (Laith and Ibrahim) shared that they rarely study their newly learned words at home. They admitted that they do not do any amount or any kind of homework at home because LINC programs follow a no-homework policy. This seemed to negatively affect their attainment as a bulk of research has demonstrated a positive relation between language attainment and homework. Homework was viewed as "a mechanism for transfer because students practice and refine, at home, skills learned in school" (Schunk, 2012, p. 323).

Educators, programme administrators, and policy makers, therefore, need to reconsider assigning homework to learners to maximize their knowledge attainment. Homework should include work that reinforces new as well as previously learned vocabulary items. They need also to consider all the factors discussed above that might facilitate or inhibit word knowledge development. Ideally, homework should engage students in critically thinking about how to integrate meaning into realistic contexts and therefore how to incorporate vocabulary to which they have been exposed, whether within or outside the classroom.

Chapter 10: Conclusion

10.1 Introduction

This concluding Chapter begins by summarizing the research rationale, study design, and leading research questions. This is followed by a summary of main results obtained from this three-phase longitudinal case study. Then the Chapter concludes with some educational implications of the findings and identifies further research directions.

10.2 Research Rationale

As discussed previously, most of the research conducted in the field of second language vocabulary development is largely empirically driven. Thus, with a background of second language theories (chapter 2), the current longitudinal study was largely informed by prominent empirical research that has been carried out in the field of second language vocabulary development.

Most of the research conducted in the field of second language vocabulary development has been heavily focused on breadth of vocabulary (Nation, 2013, Schmitt, 2014). However, breadth of vocabulary knowledge tells us little about how well learners know words, the depth of their vocabulary knowledge, or how they develop their knowledge of these words over time. Nation, (2001, 2013) proposed that future research needs to consider the question ‘what is involved in knowing a word’ to have a clearer picture of what is involved in knowing a word.

Nation (2001, 2013) proposed his Word Knowledge Framework that breaks knowledge of knowing words into nine components or aspects (spoken form, written form, word parts, form and meaning knowledge, concepts and references, associations, grammatical function, and

collocations). Few studies have attempted to use this word knowledge framework as a research rationale to explore the developmental hierarchy of these nine aspects.

Therefore, this thesis attempted to fill this gap and adopt this framework as a research rationale to detect and compare the incremental changes in three aspects of word knowledge (meaning knowledge, spelling knowledge, and word part knowledge) in Educational and Naturalistic Settings, in a three-phase longitudinal research study, as summarized below.

10.3 Research Design

As discussed previously, this thesis is composed of a three-phase longitudinal case study. In phase 1, a six-month longitudinal case study (Study 1) was conducted from January 2018 to June 2018. Five Arabic-speaking ESL learners from CLB5 class were tested on their understanding of 20 words. In phase 2, an eight-month longitudinal case study (Study 2) was conducted from September 2018 to May 2019. Two Arabic-speaking ESL learners from CLB6 class were tested on their understanding of 20 words.

In phase 3, a one-time Follow-up Study was conducted in January 2020. Three participants from Study 1 and both participants of Study 2 were tested on their understanding of the same words used in Study 1 and Study 2. A battery of pen-and-paper tests (e.g, spelling test, multiple-choice, fill-in-the-blank, and vocabulary levels test), field notes, student/class material, interviews, and questionnaires, were used to elicit data from student participants. Data were analysed and results were obtained as summarized in the following section.

10.4 Summary of Results

Results from the three studies demonstrated that word knowledge development is not a linear process but there are times where it remains constant or even declines before it resumes its development. A developmental hierarchy was detected among the three measured aspects of word knowledge (meaning knowledge, spelling knowledge, and word part knowledge) with meaning knowledge always enjoying the highest gains followed by spelling knowledge and word part knowledge.

The biggest change took place in the first two or three months (sessions) culminating in no or very little change in the last two months, and with very little decline experienced at times. The reduction in decline indicates that the percentage of forgetting is minor for the three measured types of word knowledge and that once a particular word knowledge aspect is learned it is typically not forgotten.

Results obtained from the two main studies (Study 1 and Study 2) in particular showed that an 8-month period could lead to full meaning knowledge development but not to full spelling knowledge development or word part knowledge development. They require more encounters and efforts, at least for this group of participants. Results obtained from the Follow-up Study even showed that 24 months are enough to gain full understanding of meaning knowledge and spelling knowledge, but not word part knowledge.

Although the three measured aspects of word knowledge developed concurrently, some aspects seemed to be easier or more difficult than others. In all three studies (Study 1, Study 2, and Follow-up Study), meaning knowledge enjoyed the highest gains followed by spelling knowledge and word part knowledge. In no instance was word spelling or word part form provided without its basic meaning sense also being understood.

However, it was also found that the fast development of basic word meaning knowledge did not help the development of word polysemy knowledge. Participants needed about two months to fully develop word basic meaning knowledge; however, polysemy knowledge required more time and even after a 24-month period none of the participants succeeded in providing polysemy knowledge of their Matching Words or Naturalistic Words. This indicates that some aspects of word knowledge might develop without or before the other aspects.

A qualitative data analysis of factors which might have facilitated or inhibited the incremental changes of the three measured aspects of word knowledge (meaning knowledge, spelling knowledge, word part knowledge), showed that several factors might have played a role. First, word encounter opportunities were found to be the major factor that affected word knowledge attainment. This was evident in participants' good performance on Thematic Words and Educational Words which were encountered several times in class in contrast to their poor performance on Matching Words and Naturalistic Words which were encountered only incidentally while reading or listening.

These findings suggest that to maximize word encounter opportunities outside classroom, teachers, educators, and stake holders can, for instance, organize field trips to museums, job fairs, local community centers, educational institutions, public organizations, hospitals, factories etc.... In this way, the learning process doesn't end.

Such field trips and activities will allow learners to interact with more fluent and more knowledgeable persons which will result in better language attainment as Vygotsky (2012) suggested. In addition, as Hutchins (1995) recommended, they also need to be actively engaged in activities in which they are an essential part and which can provide them with highest levels of participation.

Active participation and interaction in such field trips and activities not only helps LINC learners enhance their language development in general, but also provides them the opportunity to be exposed to and learn the vocabulary needed for their future careers. As discussed above, two of the participants reported the problem of finding and using the vocabulary relevant to their professions which negatively impacted their job opportunities.

Therefore, LINC learners should be helped to learn and practice the vocabulary relevant to their potential field of work in real workplace environments. Such educational apprenticeship opportunities will not only help them develop their vocabulary and language in general, but also will help them understand Canadian workplace norms and connect and establish relationships with employers and thus maximize their job opportunities.

In addition, as participants were found to face difficulties in finding adequate opportunities to use their newly learned words outside classroom, teachers and syllabus designers need to make use of the class time to maximize word encounter opportunities in the classroom to more efficaciously foster language attainment by the learner. In other words, following Krashen's (1985) $i+1$ hypothesis, instructors and peers can scaffold enhanced input to provide engaged learning opportunities for the development of word knowledge in all its forms and functions.

It is important to note that this recommendation is in line with Swain's (1985) Pushed Output Hypothesis discussed above. Swain also recommended that second language learners need to be helped to produce their newly learned words several times and in different contexts to maximize their attainment. In using their new language, learners notice gaps between what they want to produce and what they actually can produce and how more fluent speakers actually use the target language. In this way learners enhance their existing linguistic knowledge, consciously and metacognitively, until spontaneous and authentic language can emerge.

Moreover, the importance of practicing newly learned words in communicative settings is also supported by the communicative approach to language teaching (Swain & Lapkin, 1995). Both researchers and practitioners have long established that receiving and producing language in communicative settings helps learners access and expand existing knowledge and more rapidly put it into effective production.

Proponents of the Situated Learning Theories (discussed above) such as Lave and Wenger (1991) and Rogoff (1990) also stressed that learners learn through observation and guided participation in communicative activities and therefore they need to be actively engaged in communicative activities and events to develop their knowledge attainment.

In addition, several vocabulary learning strategies and techniques were found to facilitate or hinder the incremental changes of the three measured aspects of word knowledge. For instance, word spelling knowledge development was negatively affected by participants' first language (L1) spelling strategy. This conclusion is in line with principles of Lado's (1957) Contrastive Analysis Hypothesis discussed above.

It seems that the significant differences between participants' L1 (Arabic) spelling system and the English spelling system negatively affected participants' spelling ability. This is partially explained by both the dramatic differences in the orthographic representation. The phonological inconsistencies in English pronunciation can be traced to the Arabic system, upon which the participants tended to rely to decode and implement English spelling.

Learners need to be educated on any differences between their first language (L1) system and the target language system (L2) to predict potential errors and enhance attainment. This has been a standard practice in contrastive analysis from the 1950s and 1960s but is not commonly undertaken in current teaching materials.

It is not surprising, therefore, that participants in this longitudinal study were weak in this area and showed a dependency on techniques which resulted in negative transfer of spelling conventions. This was evident in their confusion of short and long English vowels and their heavy reliance on English consonants, in particular their confusion in the distinction between English minimal pairs not found in Arabic.

In addition, learners' heavy reliance on digital dictionaries and their extensive use of their L1 sound-letter correspondence strategy were found to have negatively affected their word spelling knowledge development. When learning new words, participants were found to learn pronunciations of those words from their personal digital dictionaries and later spell words out according to the pronunciation they learned from the digital dictionary rather than in line with the actual spelling of words.

To help reduce such adverse impact, teachers need to explore their learners' L1 learning strategies and make them aware of any strategies which produce negative transfer with the aim of reducing errors and maximizing overall attainment of words. Educators also need to educate and train students to use different English spelling strategies such as orthographic word repetition strategy and letter pattern strategy. Learners can also be helped to have access to public libraries, writing centers, and writing workshops to practice their spelling ability.

In addition, learners can be encouraged to actively seek any kind of written material (flyers, ads, signs, public notices, blogs, emails, YouTube instructions, labels, postcards, letters, etc.) most relevant to their academic, personal and career aspirations to appreciate that words are in all contexts and that each encounter can support their growing vocabulary. It is also believed that engagement with variety of such written materials and activities can help them notice gaps in their production and encourage them to reflect upon language use (Schmidt, 2010, Swain, 1985).

Although participants' first language spelling strategy seemed to negatively hinder their spelling ability, their first language word parts use enhanced their second language word part ability. This also is in line with Lado' (1957) assertion that when the first language and the target language are similar positive transfer occurs and correct forms are produced.

This was evident in numerous instances in participants' produced word part forms. Results of the current study showed that when participants consulted their Arabic word part system, they were able to tell when some target words do not have a particular word part form(s). Therefore, learners need to be educated on and encouraged to apply their L1 strategies that can result in positive transfer. But teachers also need to be aware of their learners' L1 language system to effectively help them take advantage of it.

Although word part knowledge was the least developed word aspect knowledge in the current longitudinal study as discussed above, no easy or difficult word part form was found. The most encountered word part form was the most developed word part. Similar to the development of basic meaning knowledge and spelling knowledge, word parts of Thematic and Educational Words which were encountered most enjoyed higher rates of development than word parts of Matching and Naturalistic Words which were least encountered.

In addition to highlighting the vital role of word encounter opportunities on word knowledge development, this result also confirms the critical role of comprehensible input in second language development (Krashen, 1985). Krashen proposed that second language development emerges from interaction between the rich input learners receive and their Language Acquisition Device (LAD).

It is worth mentioning that although the three measured aspects of word knowledge (meaning knowledge, spelling knowledge, and word part knowledge) developed in varying

proportions across the three studies (Study 1, Study 2, and Follow-up Study), this proportional development correlated positively to the development of participants' overall vocabulary size (level).

The relationship between the measured aspects of word knowledge and participants' overall vocabulary size can be detected in participants' good performance on higher frequency word levels (K1-K3) and their poor performance on the lower frequency word levels (K4-K5) on the Vocabulary Levels Test. This is in line with their performance on the 150 target words in the two main studies (Study 1 and Study 2) which were all from the higher frequency word levels (K1-K3).

This signifies that the two class teachers in both studies were focusing mostly on the higher frequency word levels. Unfortunately, several classroom practices and programme policies were found to hinder participants' word knowledge development. For instance, observational analysis showed that speaking skills and reading skills receive more attention in class than writing skills and listening skills.

Particularly, it was found that reading comprehension tests followed by vocabulary questions and grammar exercises are the most commonly used activities in class. It seems that the limited attention writing skills and activities receive in class has negatively affected participants' word spelling knowledge development. This focus on speaking and listening skills might not be surprising considering the nature and the aims set by Language Instruction for Newcomers (LINC) programs to help adult newcomers to Canada learn the language needed to settle, live and work in the country.

However, although the Canadian Language Benchmarks are a disruptive scale of language ability and doesn't prescribe a curriculum or specific discrete elements of vocabulary

items, CLB teachers and syllabus designers are recommended to seek vocabulary items that are most relevant to their students' academic, personal, and career aspirations.

Moreover, the LINC programme's no-homework policy also seemed to negatively affect participants' word knowledge development. Studying newly learned words in class only decreased word exposure opportunities and thus might have negatively affected their word knowledge attainment. This was evident in the performance of participants who reported reviewing and studying their newly learned words in class only compared to the more successful learners who practiced and refined their word knowledge learned in school at home (Schunk, 2012).

Therefore, teachers, stake holders, and policy makers need to reconsider assigning some homework in their programmes to maximize learners' attainment and still meet programme objectives. For this purpose, teachers can also make learners aware of out-of-class language learning strategies and language sources such as talking to more fluent people, watching TV, listening to the radio, and reading magazines to maximize their word exposure opportunities and enhance attainment.

Using outside class language sources and strategies not only promotes language learning (Webb and Rodgers, 2009a, 2009b, 2011, 2016) but also motivates the learner (Schmitt, 2014). The five participants seemed to be more motivated to learn the language than the other two participants. They seemed to take their classes and learning more seriously. They always outperformed the other three participants on vocabulary tests.

They also reported using outside class language resources and applying more vocabulary learning strategies, as discussed above. Their motivation to apply learning strategies of any kind is likely reinforced by their ambition to secure a place in the work force and/or postsecondary education. On the other hand, the two less successful participants simply connected their learning

with passing English language tests and receiving the certificate for settlement and work purposes.

To conclude, answering the research questions in the current three-phase longitudinal study not only helped in understanding the incremental changes of the three measured aspects of word knowledge (meaning, knowledge, spelling knowledge, and word part knowledge) in different contexts, but also added to the component approach and the global phenomenon of vocabulary development which has wider applicability than the current study.

Answering the research questions also added to the previous theories of Second Language Acquisition (discussed above) as it confirmed the critical role of comprehensible input, pushed output, noticing, L1 transfer, and interaction with more knowledgeable people in communicative settings on word knowledge development.

The main conclusions drawn from this three-phase longitudinal study can be summarized in the following points:

1. The three measured aspects of word knowledge developed concurrently and in varying proportions;
2. Some aspects of word knowledge developed before or without other aspects of word knowledge;
3. Meaning knowledge always enjoyed the highest gains in improvement followed by spelling knowledge and word part knowledge, respectively;
4. Word knowledge development is an incremental and dynamic process;
5. Word knowledge development is not linear, but there are periods of stability and/or attrition;
6. Word knowledge development is a long-term process;

7. Some aspects of the word require more attention and efforts than others;
8. Word exposure opportunities play a major role in word knowledge development;
9. Polysemy knowledge is problematic and only develops at later stages;
10. Polysemy knowledge and spelling knowledge requires more explicit learning;
11. Several vocabulary learning strategies can facilitate word knowledge development (e.g., word list, word orthographic repetition, and word parts strategy);
12. Learner's first language (L1) can facilitate or inhibit word knowledge development;
13. There seems to be a relationship between the various aspects of word knowledge and vocabulary size (level) development;
14. Teachers should maximize class time in organizing tasks and focuses to facilitate word knowledge; and
15. Motivation plays a vital role in word knowledge development.

As discussed previously, this longitudinal qualitative study not only added to our understanding of the incremental nature of the three measured aspects of word knowledge in different settings, but it has also generated several pedagogical implications to support teaching and assessment of these three aspects of word knowledge, as discussed in the following section.

10.5 Pedagogical Implications

This study showed that participants did not face difficulties in developing basic word meaning knowledge and that more problems were associated with spelling knowledge and word part knowledge, particularly the latter type of knowledge. Therefore, teachers and syllabus/material designers need to allocate more time and more activities to these two types of word knowledge to enhance their attainment.

Results of the current study also showed that the number of word encounters is a driving factor towards the development of the three measured aspects of word knowledge. Unfortunately, participants were found to face difficulties in finding adequate opportunities to use their newly learned words outside classroom. Therefore, LINC teachers and syllabus designers need to make use of class time to maximize word encounter opportunities in the classroom as outlined in more detail previously. They also need to be provided with the most frequent words and only when they develop a good knowledge of these words, then they could be provided them with the less frequent words.

Outside the classroom, results of this longitudinal case study suggest that LINC learners need to be provided with some educational apprenticeship in their potential workplaces (. g., factories, plants, hospitals, body shops, and libraries) to maximize their knowledge attainment. During this educational apprenticeship they need to be exposed to and be given the opportunity to practice the vocabulary relevant to their professions. This will also help them increase their job opportunities by understanding Canadian workplace norms and establishing relationships with employers.

This was evidenced in the present research by participants' poor performance on less frequent words which were met only incidentally during reading or listening. Learners need to be explicitly taught the target words and/or to be encouraged to use them actively within meaningful contexts based on their personal needs and goals to fully grasp their meaning.

Results also showed that this need to be accompanied by explicit learning of the different vocabulary learning strategies and techniques including (but not limited to) word part strategy, finding silent letters, using rhymes, and flashcards.

Learners need also to be made aware of the different vocabulary learning strategies and sources found outside the classroom such as listening to the radio, watching TV, and reading magazines to tackle less frequently encountered words and become independent learners. The current study also showed that assigning some type of homework increases word encounter opportunities and enhances attainment.

Therefore, teachers, educators, and policy makers need to consider assigning some type of homework to learners registered in the LINC programmes. What to give and how much to give and how often to give, need to be looked into in future research studies. As a starting point, this study recommends that homework should include work that reinforces newly as well as previously learned vocabulary items.

In addition, as several factors were found to facilitate or inhibit word knowledge development such as the extensive use of digital dictionaries and first language (L1) negative transfer, learners need to be encouraged and helped to get in the habit of paper-based writing activities and self-editing as they write. They also need to be made aware of the adverse effects of auto-correct technology on their spelling ability, in particular, and their language development in general.

To help reduce potential negative L1 transfer, learners need to be explicitly taught their first language system and the target language system and the differences between the two systems. But they also need to be encouraged to use any positive transfer strategies such as word parts strategy, at least for Arabic learners of English.

As mentioned above, this study also adds to the field of second language vocabulary testing. Results obtained from this study could help teachers and test designers determine what

information to give about the target words in the test. They can also make assumptions of what type of word knowledge would be known if a particular word knowledge type was provided.

Moreover, this study confirms the power of vocabulary tested and the updated Vocabulary Levels Test (uVLT) used in the three studies (Study 1, Study 2, and Follow-up Study) in assessing the three measured aspects of word knowledge as well as participants' vocabulary size (level).

It is worth mentioning that results obtained from the current longitudinal study not only add to current research on word knowledge development and the global phenomenon of vocabulary development, but they can also be taken as the starting point of future research as discussed in the following section.

10.6 Further Research Directions

Because this three-phase longitudinal case study was the initial step in detecting the incremental changes of some aspects of word knowledge over an extended period of time in different contexts, a replication of this study is recommended in order to create a clearer picture of the results obtained from this study.

Some of the results obtained from this study were found to contradict results obtained from related research studies. For instance, this study found that spelling knowledge is problematic and that all participants seemed to face problems in developing their spelling ability. However, previous studies (e.g., Schmitt, 1998; Webb, 2005, 2007) found that spelling knowledge was the easiest word knowledge aspect and that participants were able to provide correct spelling even when no meaning was provided. Therefore, future research focusing on spelling knowledge

development is needed to provide a clearer picture of the development of this particular aspect of word knowledge.

Also, as this study has explored the incremental changes of only three aspects of word knowledge (meaning knowledge, spelling knowledge, and word part knowledge), future research is needed to explore the incremental changes of the other aspects of word knowledge (e.g., spoken form, collocations, association, and constraints of use) and in different contexts to have a complete picture of their developmental hierarchy.

Another potential extension of the current longitudinal study could include receptive and productive knowledge of the different aspects of word knowledge because the current study has focused on measuring the productive aspects only.

In addition, although the current longitudinal study was carefully designed and all measures were validated and piloted, similar future research studies using different vocabulary measures are recommended. This could help determine if similar results will be obtained and if results can be generalized.

Finally, the number of participants recruited for the three studies (Study 1, Study 2, and Follow-up Study) was a significant limitation. As there were a total of only seven participants in the three studies, the inclusion of more participants is recommended in future studies so that correlation between the measured aspects of word knowledge can be refined. Because all participants were from the same language population (Arabic), which limited the generalizability of its findings, a replication of this study with other language population(s) is needed.

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Appendices

Appendix A: Samples of Student/Class Material

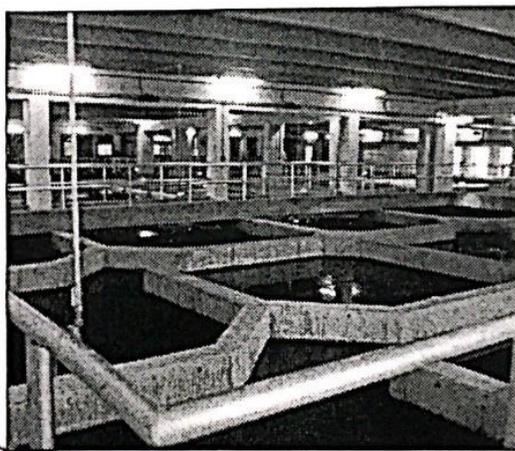
II. Reading Text

OUR WATER ENVIRONMENT: EVERY DROP COUNTS

For people, animals, and plants, water is the basic necessity of life. Without ^{it}, we would not be able to survive. Water is used in all sectors of our society—industry, agriculture, and in our homes. In Canada, there seems to be an abundance of fresh water supply—beautiful lakes and rivers from coast to coast. However, water is something that we have come to take for granted. As we turn on our faucets and flush the toilet, there seems to be a limitless supply, but this is misleading. Since water is so easily available at such a cheap cost, we misuse and waste water. Canadians use twice as much water per person as Europeans! The water that we use to wash the dishes, shower, flush the toilet or brush our teeth is returned to the same source from where we took it. Using such large quantities hurts the water environment. Water conservation, doing more with less water, is more important than ever before. The less water we use, or abuse, the less we degrade this essential resource and the more we can count on having clean drinking water in the years to come.

Water Treatment

Have you ever wondered where the tap water comes from, and where it travels to after it goes down the drain? Residents of Ottawa are fortunate in that the region has state-of-the-art environmental facilities that treat the water before and after residents use it. The region of Ottawa draws its water supply from the Ottawa river. Two purification plants, one at Britannia and one at Lemieux Island, treat the water for the region. The river water enters the treatment plants through intake pipes that extend into the middle of the river. At the purification plants, viruses, bacteria, algae, vegetation, suspended particles and colour are removed from the water through an extensive process of chemical treatment and filtering. The water is then distributed through the pipes and storage reservoirs for the city. The water is extensively tested at various points in the process and exceeds federal and provincial drinking water standards.



The Britannia Filtration Plant, one of the plants where water is treated before use.

French and English classes are good

Wastewater (the water that was discarded by homes, businesses, and industries) is treated at the Robert O. Pickard Environmental Centre. Wastewater is comprised of 99.9% water, and .1% solids. After water is used, it enters an elaborate piping system that brings it to the Pickard Centre. At the centre, more than 450 million litres of wastewater is cleaned everyday! The wastewater is screened and pumped, undergoes biological and chemical treatment, before



Easter

Between March 22 and April 20

Many Christians believe that Easter is the greatest festival of the year. It is the holy day when Jesus came back to life, after being hung on a cross, or crucified, till he died. Easter celebrates the miracle of Jesus rising from his grave, called the Resurrection, after his death and burial. In the year 325 A.D., it was decided that Easter would be celebrated on the first full moon after the spring equinox. Why then? The idea was that pilgrims could travel late by the light of the moon to reach the Easter festivals.

In the northern hemisphere, Easter comes in the spring. Flowers and plants that have been buried under the snow begin to come back to life. Not only the plants are being reborn; young animals are being born and eggs are hatching. And so Easter — a religious festival celebrating Jesus' rebirth — also comes at a time of new life and rebirth in nature.

Easter eggs

One of the best known of all Easter symbols is the egg. New life hatches from eggs, and so they have symbolized life and regeneration for many people. Centuries before the first Easter, the people of China, Greece, Persia and Egypt gave eggs to celebrate the annual revival of nature.

In some places an egg is the symbol of the sun, or of the universe itself. In one creation myth, the world began as chaos in the form of an enormous egg. Its contents were all disorganized, so that chaos finally split the shell. Then the upper shell formed the dome of our sky and the rest became the earth.

The early Christians saw eggs as emblems of Jesus' birth and adopted them as gifts for Easter. Down through the centuries eggs have been brought to church to be blessed before they are given or eaten, and many Christians in Canada, such as members of the Eastern Orthodox churches, still practise this custom.

Easter rabbits

In Canada today Easter eggs are said to be delivered by the Easter Bunny. But in other parts of the world, they are

Appendix B: Ethics Clearance



Office of Research Ethics and Compliance
5110 Human Computer Interaction Bldg | 1125 Colonel By Drive
| Ottawa, Ontario K1S 5B6
613-520-2600 Ext: 2517
ethics@carleton.ca

CERTIFICATION OF INSTITUTIONAL ETHICS CLEARANCE

The Carleton University Research Ethics Board-A (CUREB-A) has granted ethics clearance for the research project described below and research may now proceed. CUREB-A is constituted and operates in compliance with the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* (TCPS2).

Ethics Protocol Clearance ID: Project # 108073

Project Team Members: Mr. Muftah Mohamed (Primary Investigator)
Janna Fox (Research Supervisor)

Project Title: Detecting the Incremental Changes of Three Aspects of Word Knowledge
[Muftah Mohamed]

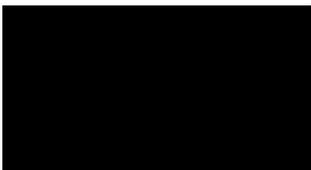
Funding Source (If applicable):

Effective: **January 11, 2018**

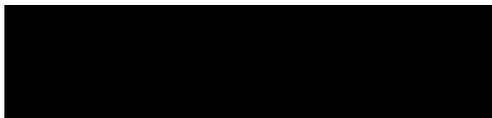
Expires: **January 31, 2019.**

CLEARED BY:

Date: January 11, 2018



Andy Adler, PhD, Chair, CUREB-A



Bernadette Campbell, PhD, Vice-Chair, CUREB-A



Office of Research Ethics
 5110 Human Computer Interaction Bldg | 1125 Colonel By Drive
 Ottawa, Ontario K1S 5B6
 613-520-2600 Ext: 2517
ethics@carleton.ca

CERTIFICATION OF INSTITUTIONAL ETHICS CLEARANCE

The Carleton University Research Ethics Board-A (CUREB-A) at Carleton University has renewed ethics approval for the research project detailed below. CUREB-A is constituted and operates in compliance with the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* (TCPS2).

Title: Detecting the Incremental Changes of Three Aspects of Word Knowledge [Muftah Mohamed]

Protocol #: 108073

Project Team Members: **Mr. Muftah Mohamed (Primary Investigator)**
 Prof. Janna Fox (Research Supervisor)

Department and Institution: Faculty of Arts and Social Sciences\Linguistics and Language Studies (School of), Carleton University

Funding Source (If applicable):

Effective: **November 21, 2018**

Expires: **January 31, 2020.**

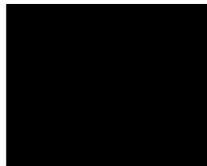
Please ensure the study clearance number is prominently placed in all recruitment and consent materials:
 CUREB-A Clearance # 108073.

CLEARED BY:

Date: November 21, 2018



Bernadette Campbell, PhD, Chair, CUREB-A



Natasha Artemeva, PhD, Vice-Chair, CUREB-A

Appendix C: Informed Consent Form

Student Consent Form

Title of Research Project: Detecting the Incremental Changes of three Aspects of Word Knowledge

Project clearance number: (108073)

I _____, choose to participate in a study on understanding how Arabic-speaking English language learners learn new words inside and outside the classroom. The researcher for this study is **Muftah Mohamed**, a Ph.D. candidate in the School of Linguistics and Language Studies at Carleton University. He is working under the supervision of Janna Fox and Trudy O'Brien, Professors in the School of Linguistics and Language Studies at Carleton University (contact information is provided below).

Conditions of Participation

I understand that my participation in this study will involve attending eight meetings of 2-hours each, and I agree to participate in individual interviews and paper and pencil tests during these meetings. I will arrange for the first meeting based on my availability. After that meeting, I agree to meet monthly (from January 2018 through April 2018) based on a schedule arranged with the researcher Muftah Mohamed.

At some meetings, I will be asked to answer questions regarding my experiences learning vocabulary words inside and outside the classroom. At other meetings, I will be asked to write a paper and pencil vocabulary test. I will not be asked any personal questions, and all of my answers will be kept private and confidential. I give Muftah Mohamed permission to audio-record all of our meetings.

I will be given \$20 for completion of each meeting. I understand that the study will take place at the Ottawa Carleton Immigration Services Organisation (OCISO) School. I also give my permission to Muftah Mohamed to collect my study materials, such as texts books, notes, and essays, once a month and understand that he will return them to me within 24 hours.

I understand that all information collected during the study process will be kept confidential. My real name will be deleted from all hard copy data (including interview and tests data) and replaced by a pseudonym instead. I understand that all the coded hard copy data will be scanned onto a password-protected laptop and backed up on Muftah Mohamed's password-protected and encrypted USB drive.

While I am being recorded, I may ask to stop the recording at any time. All audio recordings will be transcribed and saved in a Word Document file that will be stored with the other soft data on Muftah Mohamed's password-protected laptop and backed up on his password-protected and encrypted USB drive. Once the audio-recordings are transcribed, they will be destroyed. Only Muftah Mohamed and his supervisors, Dr. Fox and Dr. O'Brien will have access to the coded transcripts and any coded collected materials (my real name will not be used during the study). The USB drive will be housed in a locked cabinet in Muftah Mohamed's home office. All soft data will be deleted from his laptop and his USB drive at the end of his Ph.D. study (August 31, 2020).

I understand that I can withdraw from the study at any time. If I decide to withdraw after or during an interview or a test, Muftah Mohamed will keep previously collected data for analysis up to the time of withdrawal. I understand that previously collected data will be kept anonymous and will be used in the final results and discussions in the final report.

I acknowledge that there are no known risks to my participation. If I have any questions or concerns, I will contact MuftahMohamed@cmail.carleton.ca. I may also contact his supervisors, Drs. Janna Fox and Trudy O'Brien, through the School of Linguistics and Language Studies supervisors by email at: janna_fox@carleton.ca and trudy_obrien@carleton.ca

I acknowledge that this study has been cleared by the Departmental Ethics Committee in Carleton University. If I have any ethical concerns with the study, I may also contact Dr. Andy Adler, Chair, Carleton University Research Ethics Board-A by phone at 613-520-2600 ext. 2517 or via email at ethics@carleton.ca).

If you decided to participate in the study, please sign and return the form to the information disk at the Ottawa Carleton Immigration Services Organisation (OCISO) School.

Yes, I agree to participate in the study and to be audio recorded.

No, I do NOT agree to participate in the study.

Name:

Signature of participant

Date

Signature of researcher

Date

Information Request

Please send an e-copy of the study results to the email address listed below.

Email:

Note: please find enclosed an Arabic version of this form.

Appendix D: updated Vocabulary Levels Test

Version A

<https://benjamins.com/#catalog/journals/itl.168.1.02web/details>

Version B

<https://www.edu.uwo.ca/faculty-profiles/docs/other/webb/NVLT-VERSION-B.pdf>

Appendix E: Interview Script

1. Which aspect of word knowledge (written form, grammatical form, meaning) do you usually pay attention to? Why?
2. Which aspect do you find more easy/difficult to learn? Why
3. How do you often learn these aspects?
4. What strategies do you use?
5. Did you use these words after last interview?
6. Can you tell me more about this?

Appendix F: Questionnaire

Before answering the questionnaire, please read instructions carefully:

- 1) There is no true or false answer.
- 2) Choose what you really do in learning a new vocabulary not what you think as useful to be used in learning English.
- 3) Answer one by one from the beginning without looking at the following items.
- 4) Answer demographic questions at the end of questionnaire.
- 5) Be sure that all your data will be kept confidential and no one will have access to them except the researcher.
- 6) Please write any other methods, techniques, or strategies you use in learning new vocabularies if not listed in the questionnaire. You can add them at the end of questionnaire in the space provided and mention its scale (never, seldom, sometimes, often, and always).
- 7) Please write any sentence, phrase, or word which is not clear or meaningful for you. Write them at the end of the questionnaire in the space provided.
- 8) Finally, thank you very much for your careful and honest answers to this questionnaire.

When I find a new English word that I don't know, I...		Never	Seldom	Sometimes	Often	Always
1	Check new word's form (e.g., find its verb, noun, adj., adv., etc)					

<p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>7</p> <p>8</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p>	<p>Look for any word parts that I know (impossible, possible, possibility, possibly, etc)</p> <p>Check if the word is also a Persian word (e.g. Caravan)</p> <p>Use any pictures or gestures(body language) to help me guess the meaning</p> <p>Guess its meaning from context</p> <p>Use a Persian-English dictionary</p> <p>Use an English-English dictionary</p> <p>Ask the teacher to give me the definition or a sentence</p> <p>Ask my classmates for the meaning</p> <p>Study the word with my classmates</p> <p>Ask the teacher to check my definition</p> <p>Talk with native speakers</p> <p>Draw a picture of the word to help remember it</p> <p>Make a mental image(imaginary image) of the word's meaning</p> <p>Connect the word to a personal experience</p> <p>Remember the words that follow or precede the new word</p> <p>Connect the word to other words with similar or opposite meanings</p> <p>Remember the words in scales (always, often, sometimes, never). If it is used more, I spend more time to remember it</p> <p>Group words together to study them</p> <p>Use new words in sentences</p> <p>Write paragraphs using several new words</p> <p>Study the spelling of a word</p>					
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23	Study the sound of a word					
24	Say the new words aloud when I first meet them					
25	Make a mental image of the word's form.(e.g. if the word is noun I make a mental image different from its verb form)					
26	Remember the word using its part (im-, un-, -able, -ful, -ment, ex-)					
27	Remember the word using its word form (verb, noun, adjective)					
28	Make my own definition for the word					
29	Use physical action when learning a word					
30	Repeat the words aloud many times					
31	Write the words many times					
32	Make lists of new words					
33	Use flashcards to record new words					
34	Take notes or highlight new words in class					
35	Put English labels on physical objects					
36	Keep a vocabulary notebook					
37	Use English-language media (songs, movies, the internet)					
38	Test myself with word tests					
39	Study new words many times					
40	Skip or pass new words					
41	Pay attention to English words when someone is speaking English.					

If you use any other method in learning new vocabularies not listed in the questionnaire, Please write them in the space provided.

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If a sentence, phrase, or word mentioned in the questionnaire is not clear or meaningful for you, please write it in the space provided.

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Appendix G: Study 1 Target Words (January Words)

	Thematic words	Band	Matching words	Band
21	Accident Meanings (1) Form: Parts: (N, Adj, Adv)	2	21 Safe Meanings (2) Form: Parts:	1
22	Valuable Meanings (1) Form: Parts: (N, V, Adj)	2	22 Discover Meanings (1) Form: Parts: (V, N)	2
23	Favourite Meanings (1) Form: Parts: (V, N, Adj, Adv)	2	23 Peaceful Meanings (1) Form: Parts: (N, Adj, Adv)	2
24	Condition Meanings (2) Form: Parts:	2	24 Determine Meanings (2) Form: Parts:	2
25	Except Meanings (1) Form: Parts: (V, N, Adj, Adj)	1	25 Consider Meanings (1) Form: Parts: (V, N, Adj, Adv)	1
26	Appear Meanings (1) Form: Parts: (V,N, Adj, Adv)	1	26 Prepare Meanings (1) Form: Parts: (V, N, Adj, Adv)	1
27	Pollution Meanings (1) Form: Parts: (V, N, Adj)	2	27 Environment Meanings (1) Form: Parts: (N, Adj, Adv)	2
28	breathe Meanings (1) Form: Parts: (V, N, Adj)	2	28 Influence Meanings (1) Form: Parts: (V, N, Adj)	2
29	Arrange Meanings (1) Form: Parts: (N, V)	1	29 Informal Meanings (2) Form: Parts: (N, V, Adj, Adv)	1
30	Communicate Meanings (1) Form: Parts: (N, V, Adj)	3	30 Interact Meanings (1) Form: Parts: (N, V, Adj, Adv)	3

February Words

	Thematic words	Band		Matching words	Band
11	Regularly Meanings (1) Form: Parts: (V, N, Adj, Adv)	2	11	Frequently Meanings (1) Form: Parts: (V, N, Adj, Adv)	3
12	Cultural Meanings (1) Form: Parts: (N, Adj, Ad)	2	12	Relationship Meanings (1) Form: Parts: (V, N, Adj)	1
13	Suit Meanings (2) Form: Parts: (N, V, Adj, Adv)	1	13	Decide Meanings (1) Form: Parts: (V, N)	1
14	Vertical Meanings (1) Form: Parts: (N, V)	4	14	Stitch Meanings (1) Form: Parts: (V, N, Adj)	4
15	Believe Meanings (2) Form: Parts: (V, N, Adj)	1	15	Express Meanings (2) Form: Parts: (V, N, Adj, Adv)	1
16	Ability Meanings (1) Form: Parts: (V, N)	1	16	Subject Meanings (3) Form: Parts: (V, N, Adj, Adv)	1
17	Modest Meanings (1) Form: Parts: (V, N)	3	17	Create Meanings (1) Form: Parts: (V, N, Adj, Adv)	2
18	Attract Meanings (1) Form: Parts: (V, N, Adj, Adv)	2	18	Succeed Meanings (1) Form: Parts: (V, N, Adj, Adv)	3
19	Expensive Meanings (1) Form: Parts: (N, Adj, Adv)	1	19	Object Meanings (2) Form: Parts: (N, V Adj, Adv)	2
20	Refine Meanings (1) Form: Parts: (N, V Adj, Adv)	4	20	Shallow Meanings (1) Form: Parts: (V, N)	4

March Words

	Thematic words	Band		Matching words	Band
1	Allow Meaning (1) Form: Parts: (V, Adj)	1	1	Please Meanings (2) Form: Parts: (N, V, Adj)	1
2	Avoid Meanings (1) Form: Parts: (V, N, Adj)	2	2	Harmful Meanings (1) Form: Parts: (N, V, Adj)	2
3	Profit Meanings (1) Form: Parts: (V, N, Adj, Adv)	3	3	Ease Meanings (1) Form: Parts: (Adj, Adv, V)	2
4	Reside Meanings (1) Form: Parts: (N, Adj)	3	4	Vision Meanings (2) Form: Parts: (V, N, Adj, Adv)	2
5	Abnormal Meanings (1) Form: Parts (V, N, Adj, Adv)	4	5	Petition Meanings (1) Form: Parts: (V, N)	4
6	Benefit Meanings (1) Form: Parts: (V, N, Adj)	2	6	Patient Meanings (2) Form: Parts: (N, Adj, Adv)	2
7	Sickness Meanings (1) Form: Parts: (V,N, Adj)	1	7	Careful Meanings (1) Form: Parts: (N, Adj , Adv)	1
8	Admit Meanings (2) Form: Parts (N, V, Adj)	1	8	Examine Meanings (1) Form: Parts (N, V)	2
9	Therapy Meaning (1) Form: Parts (N, Adj)	3	9	Rotate Meanings (1) Form: Parts: (Adj, Adv)	3
10	Necessary Meanings (1) Form: Parts (V, N, adj, adv)	2	10	Equipment Meanings (1) Form: Parts (V, N, adj)	2

Appendix H: Study 2 Target Words (September Words)

	Educational words	Band		Anas's Natural words	Band		Noor's Natural words	Band
1	Expenses Meaning (2): Form: WP:	2	1	Casual Meaning 1: Form: WP:	2	1	Abandoned Meaning 1: Form: WP:	3
2	Consumption Meaning 1: Form: WP:	3		Heaven Meaning 1: Form: WP:	2	2	Maintenance Meaning 1: Form: WP:	2
3	Products Meaning 1: Form: WP:	2	2	Determine Meaning 2: Form: WP:	2	3	Complain Meaning 1: Form: WP:	2
4	Convince Meaning 1: Form: WP:	2	3	Settlement Meaning 2: Form: WP:	2	4	Factors Meaning 2: Form: WP:	3
5	Limiting Meaning 1: Form: WP:	2	4	Weird Meaning 2: Form: WP:	2	5	Swear Meaning: Form: WP:	2
6	Accurate Meaning 1: Form: WP:	2	5	Regret Meaning 1: Form: WP:	3	6	Oath Meaning: Form: WP:	2
7	Period Meaning 3: Form: WP:	2	6	Developments Meaning 1: Form: WP:	2	7	Frustrated Meaning 1: Form: WP:	2
8	Associated Meaning 1: Form: WP:	2	7	Represents Meaning 1: Form: WP:	2	8	Granted Meaning: Form: WP:	2
9	Values Meaning 2: Form: WP:	2	8	Measures Meaning 2: Form: WP:	2	9	Availability Meaning: Form: WP:	2
10	Specific Meaning 1: Form: WP:	2	9	Refurbished Meaning 1: Form: WP:	3	10	Witness Meaning: Form: WP:	2

October Words

	Educational Words	Band		Aans's Naturalistic Words	Band		Noor's naturalistic words
1	Privacy Meaning 1: Form: WP:	2	1	Suspend Meaning 2: Form: WP:	2	1	Diversity Meaning: Form: WP:
2	Guide Meaning 1: Form: WP:	2	2	Counter Meaning 2: Form: WP:	2	2	Priority Meaning: Form: WP:
3	Unfamiliar Meaning 1: Form: WP:	2	3	Leather Meaning 1: Form: WP:	3	3	Enhance Meaning: Form: WP:
4	Clarified Meaning 1: Form: WP:	3	4	Confidence Meaning 1: Form: WP:	3	4	Various Meaning : Form: WP:
5	Behaviour Meaning 1: Form: WP:	3	5	Spread Meaning 1: Form: WP:	2	5	Swallow Meaning: Form: WP:
6	Aggressive Meaning 1: Form: WP:	3	6	Sponsor Meaning 1: Form: WP:	3	6	Version Meaning 2: Form: WP:
7	Assumed Meaning 1: Form: WP:	2	7	Injured Meaning 1: Form: WP:	2	7	Appropriate Meaning : Form: WP:
8	Quote Meaning 2: Form: WP:	2	8	Investigations Meaning 1: Form: WP:	2	8	Entire Meaning : Form: WP:
9	Constantly Meaning: Form: WP:	2	9	Separate Meaning: Form: WP:	2	9	Gravity Meaning: Form: WP:
10	Fortune Meaning 2: Form: WP:	2	10	Port Meaning 1: Form: WP:	2	10	Divisions Meaning: Form: WP:

November Words

	Educational words	Band		Anas's naturalistic words	Band		Noor's naturalistic words	Band
1	Candidates Meaning 1: Form: WP:	3	1	Insisted Meaning 1: Form: WP:	3	1	Platform Meaning: Form: WP:	3
2	Requirements Meaning 1: Form: WP:	3		Rapid Meaning 1: Form: WP:	2		Subsidy Meaning 1: Form: WP:	3
3	Volunteer Meaning 1: Form: WP:	3	2	Poem Meaning 1: Form: WP:	2	2	Observations Meaning: Form: WP:	2
4	Participate Meaning 1: Form: WP:	3	3	Essentially Meaning 1: Form: WP:	3	3	Universe Meaning: Form: WP:	3
5	Collaboration Meaning 1: Form: WP:	3	4	Achieve Meaning 1: Form: WP:	3	4	Satisfy Meaning: Form: WP:	2
6	Ethnic Meaning 1: Form: WP:	3	5	Plain Meaning 1: Form: WP:	2	5	Material Meaning: Form: WP:	2
7	Civilian Meaning 1: Form: WP:	3	6	Significance Meaning 1: Form: WP:	3	6	Qualifications Meaning: Form: WP:	2
8	Independence Meaning 1: Form: WP:	3	7	Authorities Meaning 1: Form: WP:	3	7	Hesitation Meaning: Form: WP:	2
8	Outstanding Meaning 2: Form: WP: 9		8	Randomly Meaning: Form: WP:		8	Challenging Meaning: Form: WP:	2
9	Raw Meaning 3: Form: WP:	3	9	Trend Meaning: Form: WP:	3	9	Approximately Meaning: Form: WP:	3
10	Neglect Meaning : Form: WP:		1 0	Unique Meaning: Form: WP:	3	10	Currently Meaning: Form: WP:	2

Appendix I: Follow-up Study Target Words

1. Words for the Three Participants Ibrahim, Sara, and Mohamed

	Thematic Words		Matching words
1	Avoid Meaning: Form: WP:	1	Recent Meaning: Form: WP:
2	Painful Meaning: Form: WP:	2	Patient Meaning: Form: WP:
3	Admit Meaning: Form: WP:	3	Vision Meaning: Form: WP:
4	Ability Meaning: Form: WP:	4	Damage Meaning: Form: WP:
5	Attract Meaning: Form: WP:	5	Create Meaning: Form: WP:
6	Suit Meaning: Form: WP:	6	Accept Meaning: Form: WP:
7	Valuable Meaning: Form: WP:	7	Decide Meaning: Form: WP:
8	Accident Meaning: Form: WP:	8	Interact Meaning: Form: WP:
9	Appear Meaning: Form: WP:	9	Determine Meaning: Form: WP:
10	Pollution Meaning: Form: WP:	10	Discover Meaning: Form: WP:

2. Words for the two Participants Noor and Anas

	Educational words		Anas's naturalistic words	Noor's Naturalistic words
1	Neglect Meaning: Form: WP:	1	Rapid Meaning: Form: WP:	Complain Meaning: Form: WP:
2	Aggressive Meaning: Form: WP:	2	Regret Meaning: Form: WP:	Universe Meaning: Form: WP:
3	Guide Meaning: Form: WP:	3	Suspend Meaning: Form: WP:	Gravity Meaning: Form: WP:
4	Products Meaning: Form: WP:	4	Counter Meaning: Form: WP:	Various Meaning: Form: WP:
5	Participate Meaning: Form: WP:	5	Casual Meaning: Form: WP:	Qualifications Meaning: Form: WP:
6	Unfamiliar Meaning: Form: WP:	6	Sponsor Meaning: Form: WP:	Factors Meaning: Form: WP:
7	Universe Meaning: Form: WP:	7	Plain Meaning: Form: WP:	Challenging Meaning: Form: WP:
8	Raw Meaning3: Form: WP:	8	Weird Meaning: Form: WP:	Entire Meaning: Form: WP:
9	Outstanding Meaning: Form: WP:	9	Spread Meaning: Form: WP:	Oath Meaning: Form: WP:
10	Constantly Meaning: Form: WP:	10	Port Meaning: Form: WP:	Universe Meaning: Form: WP:

Appendix J: Samples of Data Coding

Code	Rep	Category	Theme
USE MY MIND	9	Store in mind	Underlying Word Processes
STORE IT IN MIND	12		
STORE IT IN MY MEMORY	7		
Think deeply	5		
LOOK AT IT	19	Word Visualization	
Draw A PICTURE OF IT	3		
Imagine how it is written	6		
Keep looking at it	8		
PRONOUNCE AND WRITE	10	PRONOUNCE AND WRITE	
Listen to digital dictionary and repeat	7		
Just write	6		
MEMORIZE IT	22	Word Memorization	
Memorize whole short words	5		
Memorize part to whole	9		
ANALYZE IT	18	Word Analysis	
Divide into parts	12		
Find pattern	4		
See if it looks familiar	3	Noticing	
See how it is written	4		
Handouts	9	Handouts	Vocabulary sources
Workplace	7	Workplace	
Words on goods	5		
Words on signboards	4		
Digital dictionary	8	Dictionary	
Facebook	5	Internet	
You tube	13		
Frequent words	15	Preferred words	

Example from the participant Ibrahim

M: where do you usually find new words, I mean is there a source you like to learn from?

Ibrahim: I don't have a specific source, but mostly yes from class.... or from work.

M: lets speak about how you learn and use English at work.

First, where do you find new words at work?

Ibrahim: clarification requested.

M: for example, do you hear them from customers or from colleagues?

Ibrahim: yes usually I learned a lot from customers and colleagues

M: do you speak and write a lot there?

Ibrahim: no, we don't write but speaking yes, we speak a lot with each other.

M: what do usually do after you hear a new word from a colleague or a customer? how do you memorize it?

Ibrahim: I keep repeating it till I memorize it.

M: good and how do you know its meaning?

Ibrahim: I check my dictionary and sometimes I understand it from the speech

M: do you ask your colleagues for the meaning?

Ibrahim: yes sometimes yes I ask.

M: which do you do first ask colleague or check the dictionary?

Ibrahim: dictionary first but if the dictionary gave me several meanings sometimes I ask colleagues for its precise meaning, but not too much.

Class and workplace (sources or vocabulary)

Workplace (source of vocabulary)

Work place

1) No writing at work 2) Interaction

REPEATING

1) CHECK MY DICTIONARY
2) guessing from context

DICTIONARY FIRST
Rarely ask colleagues

Example from the participant Sara

M: which do you think are more difficult to read verbs, nouns, adjectives or adverbs?

S: nouns I think more. Especially nouns of people.

M: why nouns not adjectives or verbs?

S: because nouns are I think longer and you know when you come to learn them they have confusing endings as I told you earlier.

M: you mean the tion and sion and the other endings?

S: yes.

M: and verbs easy or difficult?

S: no I think easier although they sometimes also difficult to memorize.

M: when do you think they are easier and when they are more difficult?

S: yes I mean sometimes they are even hard to pronounce and memorize not always easy

M: how do you find pronunciation affects your memorization?

S: sorry I didn't understand

M: in other words do you think pronunciation affects words' meaning or spelling or both?

S: both

M: how? can you clarify more? imagine now you are memorizing a new word how would you find pronunciation affects its meaning and spelling learning?

S: I don't know how to describe it for you but I wanted to say for example if the word is long and sure its pronunciation will be difficult here it will not enter the mind easily

M: what do you do in this case?

Nouns are difficult

Long nouns are more difficult

Suffixes create confusion

Pronunciation affects learning

Pronunciation affects meaning and spelling

Length affects pronunciation
ENTER THE MIND