The relationship between working memory and reading comprehension in L1 Arabic and L2 English for Arabic speaking children.

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Abstract

This mixed methodology research project comprised four studies that explored relationships between working memory and literacy, as well as the potential influence of home literacy, in L1 Arabic and L2 English children in grade six (aged 11) of mainstream Kuwaiti schools (N = 44 to 99). Quantitative studies 1 to 3 investigated these potential relationships using measures of working memory, literacy, phonological skills and vocabulary. Study 3 also contrasted vowelized and non-vowelized Arabic. Study 4 combined findings from approximately 70 completed parental questionnaires about home literacy background with qualitative data from four parental interviews, and compared these data with their children's scores on working memory, literacy and vocabulary.

Findings from studies 1 to 3 suggested that L1 and L2 literacy development can be predicted by working memory after controlling for word reading and vocabulary; and, in the case of Arabic, both vowelized and non-vowelized text showed relationships with working memory. Additionally, Arabic listening span and Arabic backward digit span were predictors of comprehension in L2 English, whereas only listening span predicted comprehension in L1 Arabic. Data indicated that the association between L1 working memory and L2 comprehension was dependent upon L2 language competence. Findings from study 4 also argue for influences on literacy and language skills of the child's background, including cultural activities associated with upbringing and parental attitudes towards learning and literacy.

Overall, similar predictors emerged for English and Arabic literacy skills arguing for these orthographies to rely on common processes. However, there is a need for further development of working memory measures for Arabic contexts to ensure that these measures assess skills appropriately, and for a consideration of parental influences on learning. Educators should consider both cognitive and sociocultural factors as foundations for teaching literacy, and support the establishment of communication routes between parents and schools.

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Declaration of Originality

I hereby declare that this thesis is my own work. It has not been submitted before for any degree or examination at this or any other academic institution, nor has it been published in any form.

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Chapter 1

INTRODUCTION

This work focuses on investigating Arabic and English literacy skills and their relationship with working memory, including the impact of the home literacy environment on both literacy acquisition and working memory performance. This work will contribute to the understanding of how different working memory components and home literacy factors contribute to literacy with the aim to promote children's attainment in literacy skills.

There is a lack of research into working memory, specifically at the text level and also when looking at the potential variables that might affect working memory/literacy skills in the Arabic context. Although this work is a study that has focused on Arabic-English bilingual children, it is not only important for the target population in Kuwait, but also for the current international debate about the best way to help children who are learning to be literate in two languages.

To achieve these goals, three empirical studies were conducted in Kuwait with children from grade six (age 11). These children were learning Arabic as a first language and English as a second language in governmental schools. A fourth mixed study involved both a quantitative element (measures of working memory, literacy and a questionnaire) and a qualitative element (personal interviews with children's parents) to explore the influence of home literacy activities and the parents' beliefs and attitudes towards literacy on literacy acquisition and working memory performance.

In the first three studies a quantitative design was adopted. Children were assessed for working memory measures (forward digit span, non-word repetition, backward digit span, listening span and block recall), literacy measures (word reading accuracy and fluency, spelling and comprehension), phonological skills measures (phoneme deletion, rapid naming and decoding) and a language measure (vocabulary). All measures were carried out in both Arabic and English. This data was then analysed by the SPSS

software program to determine if there were correlations between different aspects of working memory and literacy skills. Regression analyses were also conducted to determine the contribution of working memory components in reading comprehension measures in Arabic and English. The fourth study introduced a mixed methodology approach. Children's performances in both working memory and literacy measures were compared to their parents' answers to the questionnaire to explore if there would be any differences between children who were raised in a richer home literacy environment and those who were raised in a poorer home literacy environment. Based on the results of the questionnaire, semi-structured interviews were conducted with the children's parents to investigate how parents' beliefs and attitudes may affect the efficacy of home literacy activities, which in turn may affect children's performance on literacy tasks.

The phenomenon of children who have trouble in reading preoccupies all educators' minds (e.g., Gathercole & Alloway, 2008) because reading comprehension is linked to all school subjects. One of the important factors that has been found to impact on reading is the nature of language orthography. Therefore, the second chapter in the thesis gives an overview about the Arabic orthography and how Arabic language is interwoven with the Qur'an. Moreover, discussing the development of Arabic script itself is important because Arabic is less familiar to readers in contrast to other languages such as English. Thus, chapter 2 discusses the specific features of Arabic script and how these features may influence the development of literacy and cognitive skills. For example, Arabic script has two forms; a vowelized and devowelized script (Abu Rabia & Taha, 2006 a, b). The former could be described as a transparent script, while the latter, can be viewed as an opaque script. Accordingly, it has been argued that the processing involved in reading these two forms may be different (Abu Rabia & Siegel, 2002; Al Menaye, 2009). Furthermore, Arabic script has specific features (e.g., diglossia; different shape of letters according to their positions within a word) that are considered to be a source of reading problems (Eviatar, Ibrahim, & Ganayim, 2004; Mohamed, Elbert, & Landerl, 2010).

However, language orthography is not the only factor that may affect literacy acquisition or cognitive factors. The social context in which the literacy skills are developed can determine success or failure in reading (Bonci, Mottran, & McCoy, 2010; Sadiq & Jessica, 2011). For that reason, chapter 3 discusses the influence of social context;

mainly home literacy activities and the family's beliefs and attitudes towards literacy. Chapter 3 also discusses the Kuwaiti schools in which children learn to read and write, since much of what we learn is done within the context of formal education. Chapter 3 also discusses the potential drawbacks of the Kuwaiti education system and how this could be a source of literacy problems.

However, analysing and providing a systematic description of the Arabic orthography and the social context which the child is raised would not provide a full explanation of learning difficulties related to this writing system. A psychological framework can provide theories about the strategies that can be used and the skills an individual needs to acquire when reading and writing (Gillon, 2004). Hence, chapter 4 discusses the concept of literacy and sheds light on specified models of reading, looking at both words and texts. It also discusses certain variables (predictors) that are significantly related to reading. Phonological processing is one of the variables that significantly supports the word reading process (Chiappe & Siegel, 2006), and can differentiate skilled readers from less skilled ones (Everatt et al., 2010). Vocabulary would be the second variable discussed as it plays a fundamental role in both word reading and reading comprehension (Pany, Jenkins, & Schreck, 1982; Quellette & Beers, 2010).

However, several researchers (Al Menaye, 2009; Daneman & Carpenter, 1980; Gathercole, Lamont, & Alloway, 2006; Swanson & Jerman, 2007) found that children's performance in literacy and cognitive measures were affected by their ability to maintain and process information for a short period in their minds (working memory). Thus, chapter 5 discusses in depth a working memory model (Baddeley's model), and the relationship between working memory and reading comprehension. Chapter 5 also goes on to discuss some controversial issues related to the reading comprehension/working memory relationship. The issues are; firstly, that the nature of this relationship is undecided, with an ongoing debate in terms of whether the relationship between working memory and reading comprehension operates through verbal working memory measures alone (Cain, Oakhill, & Bryant, 2000) or through both verbal and nonverbal working memory measures (Swanson & Siegel, 2001). Secondly, this chapter discusses the potential interaction between verbal working memory and the individual's level of language proficiency. Finally, this chapter would construe the likely role of the task used

to assess reading comprehension in determining the relationship between working memory and reading comprehension.

Chapter 6 discusses the rationale behind the thesis, the aims and the research questions. It also outlines the research design, including the participants, the materials used and the procedures followed in exploring the relationship between working memory and literacy skills in Arabic and English. It also discusses the potential role of social context, mainly home literacy practices in enhancing both literacy skills and working memory performance.

Chapters 7, 8, 9 and 10 discuss the studies that were conducted across the thesis. Chapter 7 discusses study 1 which investigated the relationship between working memory and reading comprehension in Arabic and English. Fifty-five children in grade six (age 11) from government schools who spoke Arabic as their 1st language and English as their 2nd language were tested on their working memory skills (phonological loop, visuo-spatial and central executive), their literacy skills (word reading accuracy, word spelling and sentence reading comprehension) and a decoding measure (non-word reading) was used for both languages.

Chapter 8 discusses study 2, which further investigated the role of working memory in reading comprehension and whether working memory plays the same role in L1 and L2 or not. The study also assesses the variables that affect that role. An independent cohort of ninety-nine children from government schools at grade six (age 11) were recruited for this study. In addition to the previous measures used in study 1, children were tested further on working memory (listening span) and literacy measures (text comprehension, word reading fluency, phonological awareness and vocabulary).

Chapter 9 discusses study 3 which investigated the influence of vowelized and devowelized forms of Arabic script on both reading and cognitive skills (working memory). Forty-five children from government schools, grade six (age 11) participated in this study. This study used measures of reading comprehension (vowelized & devowelized), word reading fluency, phoneme deletion, rapid naming and listening span.

Chapter 10 discusses study 4 which explored the influence of social context, mainly home literacy activities and parents' beliefs and attitudes about literacy, on language

skills development and working memory performance. The sample used 99 parents of children who participated in study 2. Data from this study was collected from the parents' answers on a questionnaire which was then compared with their children's performances on measures of literacy skills and working memory. Four adults (parents) representing four families were interviewed personally to provide in depth information about their beliefs and attitudes towards literacy to understand how these may have affected the development of their child's literacy skills.

Chapter 11 discusses the general findings and the theoretical interpretation of the four studies. Practical implications of these findings are discussed in the hope of informing teachers and parents about the best ways to support their children's literacy attainment. The findings of this work could help in the developing of diagnostic tools for literacy problems in government schools. Finally, the limitations of current work in this field are mentioned and avenues for future research are suggested.

The following chapters provide literature background details to the areas covered in the research.

Chapter 2

LITERATURE REVIEW

2.1 NATURE OF THE ARABIC LANGUAGE

Arabic is one of six official languages used in the United Nation Organization. It is the language of over 300 million inhabitants of the Arab states in the Middle East and North Africa (Elbeheri & Everatt, 2007). In addition to this large number of native speakers, Arabic is used by all Muslims around the world in their daily prayers or when reciting the Qur'an, the holy book of Islam. The interweaving of Arabic with the Qur'an has had a significant influence on the development of the Arabic language and on bringing it to the position of a world language. That influence of the Qur'an on Arabic language is evident in different aspects of the language. This chapter discusses how the Qur'an has affected the Arabic language, the unique orthographic features of Arabic script and the potential impact of these features on literacy acquisition.

The impact of the Qur'an on the Arabic language

There is no doubt that the Arabic language has an outstanding position in Islam because it is the language of the Qur'an. It is the Qur'an that affects the content, structure and literary style of the Arabic language (Omran, 1988). For example, the dot system was invented to clarify the Arabic alphabet letters and to ensure reading accuracy since most of the letters are vague without dots (see Table 1.2). Furthermore, Arabic grammar emerged as a tool to overcome the misreading of the Qur'an by Muslims, especially by non-Arabs. The Arabic grammarians in the past and up till now use verses of the Qur'an to explain the different rules of the Arabic language. Therefore, it is normal to find verses from the Qur'an in Arabic grammar. Hence, the Qur'an is considered as both a reference book of Arabic grammar and a useful method for teaching grammar in the past and in the present (Omran, 1988).

The Qur'an's contribution to the Arabic language is not limited to Arabic orthography and grammar, it also extends to vocabulary. The Qur'an enriched Arabic vocabulary by providing old Arabic words with new meanings. For instance, the use of the word ***ahad***

(one) in ***sura*** (chapter) 112 of the Qur'an, entitled Al ***Ekhlaas***, is a good example. Previous to the Qur'an, it had been used to mean many things such as *one of us*, or *Sunday*. But the Qur'an gives the word an entirely new usage to mean that there is no God, except Allah.

From structural and stylistic points of view, Omran (1988) clarified how the Qur'an helped to develop and enrich the Arabic language. He stated that the Qur'an introduced new styles such as narrative style and storytelling as in the ***Yousif*** (Joseph) ***surah*** (chapter). In this ***surah***, for example, the Qur'an presented the complete story elements such as theme, plot, characters, and conclusion. In addition, the Qur'an uses images to describe objects, actions, feelings, ideas, and to deepen and enhance understanding of the language. Qutb (1988), an Arabian religious writer, stated that using imagery and figures of speech is the Qur'an preferred style. Many images in the Qur'an are conveyed by using metaphors and similes. **Al A'raaf** surra 7, verse 40 is an example of imagery usage. In this verse, the Qur'an asserts the impossibility of the disbelievers' entry into paradise with these words: "Nor will they enter the Garden until a thick rope can pass through the eye of a needle.'' However, it is worth noting that the impact of the Qur'an is not limited to the linguistic aspect of the Qur'an, it could also have implications for literacy and cognitive skills. These issues will be discussed later in chapter 4.

Despite the prominent position that Arabic language has gained around the Arab and Islamic world because of the Qur'an, there are still large numbers of illiterate people in the Arab countries (Al Menaye, 2009). Arabic researchers put the blame on the special nature of Arabic orthography (Abu Rabia & Taha, 2006a, b). Hence, a discussion of the specific features of the Arabic language is essential to the understanding of literacy acquisition and the demands that these features may impose on cognitive skills such as working memory, and how these features could be a source of reading problems.

The nature of Arabic script

Arabic is from the same Semitic language family as Hebrew. However, Arabic has specific features that distinguish it from other languages including English. Despite, Arabic and English having an alphabetic writing system, Arabic is unlike English in the direction of writing. Arabic is written from the right to left, whereas English is written from left to right. Furthermore, written text in Arabic does not have separate forms of

letters with spaces between them as in English text. That is because Arabic script is always written in cursive and its letters are joined by joining strokes called ligatures (Abu Rabia, 2002; Taouk & Coltheart, 2004). Arabic letters have various letter shapes depending on the positions of the letters, whether they come at the beginning, middle or at the end of the word (See Table 1.1)

Table 1.1 The different shapes forms of Arabic letters

	Separate	Initial	Medial	Final		Separate	Initial	Medial	Final
1	ا أ إ	ا	ـا	ـأ	15	ض	ضـ	ـضـ	ـض
2	ب	بـ	ـبـ	ـب	16	ط	طـ	ـطـ	ـط
3	ت	تـ	ـتـ	ةت	17	ظ	ظـ	ـظـ	ـظ
4	ث	ثـ	ـثـ	ـث	18	ع	عـ	ـعـ	ـع
5	ج	جـ	ـجـ	ـج	19	غ	غـ	ـغـ	ـغ
6	ح	حـ	ـحـ	ـح	20	ف	فـ	ـفـ	ـف
7	خ	خـ	ـخـ	ـخ	21	ق	قـ	ـقـ	ـق
8	د	د	ـد	ـد	22	ك	كـ	ـكـ	ـك
9	ذ	ذ	ـذ	ـذ	23	ل	لـ	ـلـ	ـل
10	ر	ر	ـر	ـر	24	م	مـ	ـمـ	ـم
11	ز	ز	ـز	ـز	25	ن	نـ	ـنـ	ـن
12	س	سـ	ـسـ	ـس	26	ه	هـ	ـهـ	ـه
13	ش	شـ	ـشـ	ـش	27	و	و	ـو	ـو
14	ص	صـ	ـصـ	ـص	28	ي	يـ	ـيـ	ـي

Unlike English, Arabic intensively uses a dot system within its letters. Thus, Arabic letters can be divided into two groups according to the presence or the absence of dots and also the number of dots on, in, or under the letters (Abu Rabia & Taha, 2006a). Out of twenty eight letters, thirteen letters are written without dots. The remaining fifteen letters have dots: ten letters have one dot, three letters have two dots and finally two letters have three dots. (See Table 1.2)

Table 1.2 Dotted and undotted Arabic letters

I. Dotted letters	
One dot	ن ف غ ظ ض ز خ ذ ج ب
Two dots	ي ق ت
Three dots	ش ث
II. Undotted letters	
أ ح د ر س ص ط ع ك ل م هـ و	

Arabic phonology

The twenty-eight letters of the Arabic alphabet are all regarded as consonants, except three letters which represent the long vowels (Abu Rabia & Taha, 2006a). Table 1.3, which is derived from Smart and Altorfer (2005), displays the mapping of the phonemes of the Arabic letters and the short vowel diacritics. In the case of Arabic, the English alphabet is used to provide Arabic letter sounds. However, having a precise equivalent sound for every sound in Arabic is not possible. (See Table 1.3)

Table 1.3 Transcriptions of the Arabic Letters

	Arabic Letter	Pronunciation	English	English Example		Arabic Letter	Pronunciation	English	English Example
1	ب	Baa’	B	But	14	ض	Daad	**D**	-
2	ت	Taa’	T	Tart	15	ط	Taa’	**T**	-
3	ث	Thaa’	Th	Think	16	ظ	Dha’	**DH**	-
4	ج	Jiim	J	Jar	17	ع	: ain	**:**	-
5	ح	Haa’	**H**	-	18	غ	Ghain	Gh	-
6	خ	Khaa’	Kh	-	19	ف	Faa’	F	force
7	د	Daal	D	Duck	20	ق	Qaaf	**Q**	calm
8	ذ	Dhal	Dh	Mother	21	ك	Kaaf	K	kick
9	ر	Raa’	R	Rock	22	ل	Laam	L	line
10	ز	Zaay	Z	Zebra	23	م	Miim	M	mum
11	س	Siin	S	Sit	24	ن	Nuun	N	nib
12	ش	Shin	Sh	Flash	25	ه	Haa’	H	hold
13	ص	Saad	**S**	-	26	ء	Hamzah	’	-

Smart and Altorfer (2005) divided the Arabic sounds into three groups:

Group one refers to sounds that are more or less like sounds in English. These sounds are/ b/, /d/, /dh (ð)/, /f/, /h/, /j/, / k/, / l/, /m/, /n/, /s/, /sh (ʃ)/, /t/, /th (θ) /, /w/, /y/ and /z/.

Group two includes sounds which do not occur in English, but are found in other European languages. These sounds are /*r*/ sound which is like trilled *r* of Scottish 'very', the /*gh*/ sounds which is near to the /r/of Parisian French and the /*kh/* sounds which is similar to the German sound /*ch*/ as in the word doch (but).

Group three involves sounds which are particular to Arabic language. These sounds */S/, /T/, /DH/, /aiyn/, /H/,* /**'**/ **hamzah** (as in the Glaswegian pronunciation of t or /*tt*/ in the word bottle) and /*q*/.

Arabic vowels

Arabic as in English has two types of vowels, short and long vowels. Long vowels are represented by three letters ***alif, waaw*** and ***yaa.*** However, these long vowels in Arabic are also considered sometimes as consonants like the English when the phoneme represented by the letter changes as, for example, with letter 'Y' is a vowel in the Arabic word ***بيت bait*** which means *house* but a consonant in the word ***يد yad*** which means *hand*. In contrast, short vowels are not represented by letters as in English; they are represented by diacritical markers above, below or within the body of the word. Adding these short vowel diacritics to the script makes it completely transparent in terms of the consistency between the written symbol and its representative sound. (See Table 1.4)

Table 1.4 The Arabic vowels

Arabic Vowels			
Short vowels		**Long vowels**	
Arabic Vowel	English transcription	Arabic Vowel	English Transcription
َ Fatha as in letter b بَ	'**a**' after the letter as in the word *hat*	Extended alif- المدبالألف آ بآ	'**aa**' after the letter as in the word *and*
ِ Kassrah بِ	' **i**' after the letter as in the word *if*	Extended Yaa' – المدبالياء **ي** بى	' **ii**' after the letter as in the word *liver*
ُ Dammah بُ	'**u**' after the letter as in the word *put*	Extended Waaw – المد بالواو **و** **بو**	'**uu**' after the letter as in the word s*ound*

In addition to vowel diacritics, there are other reading symbols that ease reading in Arabic and ensure accuracy (see Table 1.5). ***Sukoon*** (zero vowel diacritic) is used when a consonant has no vowel. This is marked by writing a tiny circle like zero above the consonant. ***Shadda*** (doubled consonants) is a symbol like a tiny comb with three strokes facing upward above the letter. It is used to indicate duplication in pronunciation. In English, when a consonant is doubled in the same word, meaning the first syllable ends in the same letter that the second syllable starts with (e.g., funny 'fun-ny'); both consonants are written separately. When this happens in Arabic, the letter is only written once. The doubling consonant sign is very important in Arabic since it can change the meaning of the word dramatically. For example, the Arabic word ***مثل mathal*** which means a *proverb* in English is changed in meaning to another **مثّل *maththal*** *he acted* or *he deformed the mutilation* when the ***shadda*** sign is used above the sound /*th*/.

Tanween is another symbol used in the Arabic language. Tanween is the addition of a final /*n*/ sound after short vowels. It is used with indefinite nouns or adjectives. Besides its role in enhancing reading accuracy, it can also affect the meaning of the word. For example, the Arabic verb ***قتل qatel*** which means *kill*, if it is written with ***Tanween*** in a

sentence as in this Arabic sentence أنا قاتلٌ غلامك ***Ana qateloon Gholamak,*** it means *I will kill your servant*. However, the meaning of the verb changes, if it is written without ***Tanween***, it means *I killed your servant*. ***MADD*** is an extension symbol. It is used for extending the sound of an Arabic letter. It is mostly related to ***alif***. It is written over ***alif.*** Finally ***hamza*** is a glottal sound. It can stand by itself as a separate or combined with other letters. (See Table 1.5)

Table 1.5 The Arabic diacritics

Arabic diacritics	Description	Examples
◌ْ Sukoon	Zero vowels diacritic	مكْتب maktab (desk)
◌ّ Shadda	Doubled consonants	مثّل maththal (he acted)
◌ٓ Maad	As hamaza followed by long **aa** vowel	القرآن Al-Qur'aan The Holy book of Islam
◌ً Tanween with fatha	Adding the sound /n/ after fatha.	كتاباً ketaban (a book)
◌ٍ Tanween with kasrah	Adding the sound /n/ after short vowels kasrah	جديدٍ jededin (new)
◌ٌ Tanween with damah	Adding the sound /n/ after short vowels damah	قاتلٌ qateloon (will kill)
◌ٔ / ◌ٕ hamza	Glottal sound (can be separate or combined with other letters.	سماء sama'(the sky) بئر bi'er (well) لؤلؤ lu'lu' (pearl)

Arabic morphology

Arabic diacritics play an important role not only on emphasizing the accuracy of reading but also in conveying the meaning of the word at morphological level. Arabic word construct is mostly built on a three-consonant root. Consequently, a lot of words in Arabic have identical shapes; and to distinguish or vary the meanings of these identical words (consonantal root morphemes), vowel diacritics and sometimes prefixes and suffixes are added. Furthermore, the short vowel diacritics help to

convey the word class (e.g., noun, verb forms). The three consonantal root ك ت ب ***k t b*** is an example of how the meanings of the Arabic words (verb forms, nouns, adjectives, participles etc.) are established by placing these three root consonants into vowel patterns and adding prefixes or suffixes. (See Table 1.6)

Table 1.6 Example of Arabic Morphology usages

Meaning	**Pronunciation**	**Arabic**
He wrote	ka ta ba	كَتَبَ
It was written	ko te ba	كُتِبَ
He is writing	yak to bo	يَكْتُبُ
Writer	ka te bon	كاتِبٌ
Desk	mak ta bon	مَكْتَبٌ
I write	ak tob	أُكْتُبْ

Thus, the addition of diacritics, mainly vowels, on Arabic script helps to provide the Arabic reader with phonological, morphological and syntactic information.

Another distinctive feature of Arabic language is that one word can stand for and equals an English sentence. The Arabic verb ***كَتَبْنَا ka tab a Na*** which means in English *we wrote* is a good example of how one word in Arabic language corresponds to a whole sentence. If we analyse the word, it contains the three root consonants ***k t b***. This verb root undergoes some base changes with respect to vowelizing to be ***كَتَبَ ka ta ba*** which means wrote, then modified by adding the Arabic plural pronoun suffix ***نَا na*** *which* means *we* in English. Unlike English, pronouns in Arabic are letters added to the word, not separated forms. Therefore, both the verb and pronouns in Arabic are written as one word to refer to a sentence.

Diglossia is a unique feature that distinguishes the Arabic language from English. It is a term describing the existence of two different forms of the Arabic language. The first form is the spoken language, and the second one is literary language or the modern standard Arabic language (MSA). The two forms of Arabic language are significantly different in terms of vocabulary, phonology, syntax and grammar (Ibrahim, Eviatar, & Aharon Peretz, 2007; Saiegh -Haddad, 2003). This linguistic difference between the two forms of Arabic language might be due to an on-going updating of the spoken language according to the changes in the community; whereas the rate of literary updating is ruled by a strict system that is likely to slow down the speed of the literary language updating in contrast to the spoken language (Levin, Saiegh-Haddad, & Hende, 2008). Furthermore, the spoken language is informally learned at home and is used in every day speech. Therefore, it is considered the mother tongue or the everyday language of the area it is spoken in (Maamouri, 1998). It is usual to find that spoken language varies widely from country to country to the extent that some of these spoken languages may be hardly understood by other Arabic speakers. In contrast, literary language is typically learned at school, and is rarely used by the learner in their daily life situations. However, it (literary language) could be considered as the lingua franca of the Arab world because it is the language of formal communication and literacy in schools.

The impact of Arabic orthography on literacy

Due to the growing demand for literacy, researchers from different countries with different languages have begun investigating the link between their language orthography and literacy acquisition. For researchers exploring Arabic it seems that the features of Arabic script could be a source of difficulty for children when learning to read. One of these features is the multiple shapes of Arabic letters and sequencing in reading (Maamouri, 1988; Torgesen, Wagner, & Rashotte, 1997). These grapheme complexities are likely to impose heavy demands on cognitive skills. For example, to decode these graphemes in a word, the reader in Arabic might have to activate the spelling rules of writing in his memory while reading.

Moreover, despite the useful role that Arabic diacritics play in enhancing reading accuracy, the different functions that these diacritics carry out at phonological, morphological and syntax levels may confuse the Arabic reader, especially at initial grades (Mohamed et al., 2010). This confusion may be a cause of misreading and

misspelling (Azzam, 1993) or at least may slow down reading (Eviatar et al., 2004) because the reader needs to memorize the meaning of these abstract symbols during the reading process. Thus, it might impose heavy demands on working memory. However, this does not mean that diacritics are not important in promoting Arabic literacy. In a series of studies, Abu Rabia (1997, 1999 & 2001) has come to conclude that those vowel diacritics are significant facilitators of word recognition and reading comprehension regardless of the level of reading skill or the age of the reader. Abu Rabia continued to argue that reading separate words without short vowel diacritics is a hard task even for the reader in Arabic regardless of his level (skilled or beginner).

The absence of vowels in Arabic script makes it opaque at both the lexical and phonological levels. This is because Arabic script is a mostly consonantal system and consequently contains limited information (phonological & lexical), which in turn produces a large number of homographs (Ibrahim, Eviatar, & Aharon, 2002). In order to solve this ambiguity, the reader has to process the whole sentence or text in order to derive the meaning and pronounce the words correctly. The three-consonant verb root ***أكل a k l*** in the Arabic sentence ***أكل الرجل كلبه*** which means in English *the man fed his dog* is a good example of how the reader in Arabic depends on context and his prior knowledge. When the reader is first exposed to this sentence, he initially reads the verb as ***akala*** which means in English *ate* in spite of ***akkla*** which means *fed* because it is more proper and common to the reader than the verb fed. This lexical ambiguity or incorrect interpretation is the outcome of the absence of diacritics which makes both verbs identical in shape. Reading in Arabic, in this sense, is an interactive process (Abu Rabia, 2002) because the reader is heavily depends on the context to facilitate word recognition. In contrast, the English reader is unlikely to rely heavily on the previous and succeeding words in order to decode the target word or words correctly. Arguably, these processes that occur during reading the Arabic script might influence the contribution of complex cognitive skills to Arabic literacy. That is, learning Arabic might help develop complex cognitive skills. To perform all these strategies, there is a need to temporarily store the decoded items while retrieving the prior knowledge of vocabulary, syntax and morphology from long term memory. The potential system that can perform all these processes is working memory. It has the ability to direct and to control the searches for information from the long term memory. In support of this view, Al Menaye (2009) in a study investigating the influence of vowelization on the reading

performance of grades 3 and 4 Arabic Kuwaiti mainstream school children, found that processing a vowelized text required less complex cognitive skills (i.e. working memory) in contrast to devowelized text. He justified his findings by arguing that processing a vowelized text seemed to be mainly dependent on phonological skills and requires less working memory resources. In contrast, processing a devowelized text seemed to require combinations of phonological processing skills and working memory resources.

Finally, the phenomenon of the two separate forms of the Arabic language, the spoken and the literary (diglossia) is thought to be an important reason for literacy problems or delays in literacy acquisition, especially during early school years (Saiegh-Haddad, 2003, 2005; Zuzovsky, 2008). The linguistic differences between the two forms are believed to have a passive impact on literacy acquisition (Abu Rabia & Taha, 2006a, b; Saiegh-Haddad, 2003, 2005). This profound influence could be lessened by increasing early exposure to the literary language during preschool years (Abu Rabia, 2001). This increased exposure was found to overcome the unfamiliarity of literary language (Ibrahim, 2008).

In conclusion, Arabic has unique features that are likely to affect literacy acquisition in Arabic (Ibrahim, et al., 2007; Eviatar et al., 2004). In that regard, these linguistic features should not be ignored when dealing with theories of literacy development. However, language orthography is not the only variable that may influence literacy acquisition or the cognitive factors linked to literacy. The social context in which the literacy skills are developed can determine success or failure on reading. The next chapter will discuss the impact of Kuwaiti social context on literacy skills development.

2.2 THE SOCIAL CONTEXT OF ARABIC LITERACY

Language is primarily learned and developed in a social context; and that social context is considered to have a strong influence in developing literacy acquisition (Bonci et al., 2010; Spolsky, 1990). This influence is apparent in the opportunities it gives for literacy acquisition. These opportunities can be divided into formal opportunities like school and informal opportunities such as the home literacy environment (de Jong & Leseman, 2000; Leseman & de Jon, 1998).

Family literacy

There is a general agreement among researchers that the literacy skills required for effective reading in schools are influenced by both the home literacy environment and parent-child interaction(de Jong & Leseman, 2001). For example, vocabulary knowledge and phonological awareness skills which are considered as essential for understanding a text (Snow et al., 1998; Storch &Whitehurst, 2002) are presumed to be developed between ages 2 to 6 years (Sénéchal & LeFevre, 2002). Moreover, de Jong and Leseman (2001) argued that the home literacy environment may affect the development of reading. Thus, children whose home environments are rich in literacy resources and whose parents involve them in literacy and oral language practices are likely to perform better in reading and writing in primary school (Dickson & Tabors, 2001). Moreover, the influence of home literacy is not only limited to the early school grades but also extends to later school grades (de Jong & Leseman, 2001; Sénéchal & LeFevre, 2002). Therefore, an understanding of the ways in which home literacy environment contributes to the development of literacy skills and the factors that might affect that contribution could enable us to promote successful literacy acquisition and prevent reading failure. It is worth noting that distinguishing between rich and poor home environment across the current work, is in terms of poor or rich levels of language not in terms of low and high economic status. That is because Kuwaiti society is an economically rich country.

Learning is an on-going process starting from birth and continues throughout the life span (Bonci et al., 2010). In this sense, basic skills for literacy and oral language are emerging and developed before children learn to read and write formally at school (Teal

& Sulzby, 1986). There is increasing evidence that the amount of oral language that the child is exposed to by adults in his or her home environment (speaking and listening), the availability of home literacy activities and parental involvement with their children in literacy activities contribute positively to literacy outcomes in the early years. However, there is evidence that the home literacy influence continues into the teenage and even adult years (Desforges & Abouchaar, 2003). Feinstein and Symons (1999) supported the on-going effect of home literacy when they found that parental interest in their child's education seemed to be a significant predictor of attainment at age 16. They rationalized this influence by stating that children spend about 85% of their lives with their families in this period (from age 5 to 16), whereas they only spend 15% of their lives in school. Similarly, Sanders and Epstein (2000) argued that parental guidance and support of adolescent students is important to secondary students' schooling and future success.

One aspect of home literacy skills that naturally develops and is considered as the foundation of all other literacy skills is oral language. Children learn oral language skills at an early age without formal instruction. Oral language skills require time and practice to be developed in their natural social context. Children learn oral language through imitating adults in everyday situations. Thus, the more adults speak to the child, the more he or she understands and is able to use oral language (Wolf, 2008). Oral language skills include four components: phonological, semantic, syntax and pragmatic. Wolf (2008) clarifies how all these four components of oral language contribute to the development of later literacy skills development. She stated that a child's awareness of phonological skills is developed as he or she hears more words. Hearing more words develops the child's ability to realize that spoken words consist of distinct sounds that make up the words. Hearing more words also builds children's vocabulary; that in turn increases their understanding of the meanings of these words. Wolf (2008) describes semantic growth as, "a fuel that operates the engine of all language growth" (p.84). She continues to argue that, through interaction with adults, children acquire and use language in grammatical relationships that enable them to understand how word order can affect the meaning of the sentence. For example, this sentence, *the boy brushed his teeth*, which is different from, *the teeth brushed the boy*. Children's morphological knowledge develops in a way that enables children to know that *Ed* at the end of the verb *brush* means the word is in the past tense. Finally, Wolf (2008) argued that the

interaction between parents and the child in natural meaningful contexts provides the foundations of how to use language appropriately in different social situations according to the social cultural rules (what words he or she says and when he or she says these words). These cultural rules that determine the use of language are known as the pragmatic components of oral language.

However, a poorer home literacy environment is likely to provide few or no literacy opportunities to the children who are raised in it. Consequently, those children who come from a poorer home literacy environment are likely to lag behind their peers in oral language skills (Wolf, 2008). Wolf elaborated her view by stating that children who are raised in a poorer home literacy environment are likely to hear fewer words, which in turn may lead to poor knowledge of word concept (vocabulary) and word structure (morphology). Moreover, parents of those children are likely to spend less time talking to or with them, so their children are less exposed to syntactic forms. Accordingly, those children's knowledge about the rules of putting words together to make meaningful sentences (grammar rules) is poor. Finally, Wolf argues that less developed communication between the child and his or her parents may make the child less aware of the cultural traditions and the feelings of other people (pragmatic components of oral language).

In summary, children's home literacy environment is important in developing their oral language, which in turn paves the way for developing subsequent reading skills. Conversely, without enough adult/child communication, oral language is likely to be poor, and poor oral language skills are likely to profoundly affect reading skills.

Another important home literacy activity that is strongly related to the development of children's oral language and literacy skills is parent-child book reading. Wolf (2008) explains how the development of pre-reading skills happens in the context of an adult-child relationship of unconditional regard, for example, a small child on their parent's knee sharing books and stories in a situation of warmth and affection. She stated that these pre literacy skills are acquired gradually when the child learns that, "lines on the page make letters, letters make words, words make stories, and stories can be read many times" (p. 82).

Furthermore, shared book reading is an interactive activity which supports both literacy skills and social development (Sénéchal & LeFevre, 2002). During reading sessions, both parent and child are engaged in reading aloud and have conversations about the new words, pictures and the story. Moreover, the parent or child may also pose questions, comment, make predictions about what happens next in the story or invoke certain views and feelings regarding the events and the characters of the story. Through reading stories, "the child learns about the feelings of others; and also experiences new feelings and emotions that range from happiness to fear and sadness, according to the nature of the story that is read to him or her" (Wolf, 2008, p. 86). In this sense, shared book reading is likely to promote a variety of oral language skills and also empathy and understanding of the perspectives of others. These skills are known to be important for the development of reading comprehension. Within this context, Sénéchal and LeFevre (2002) asserted the importance of parent child shared book reading on developing literacy skills and hypothesized that there is a direct path from shared book reading to vocabulary and language comprehension. They argued that this direct route may be a result of parents' attention to the message or the meaning of the print and not from the print itself.

However, the efficacy of parent-child shared book reading in terms of vocabulary and language comprehension depends on the reading style that parents use during book reading. De Temple (2001) postulated that there are two types of styles. De Temple named these, *immediate talk* and *non-immediate talk*. According to De Temple (2001), parents who adopt *immediate talk* tend to stick to the illustrations or words in the text that has been read. They typically provoke yes–no questions. This type of question is likely to be associated with children's good or bad performance on receptive vocabulary measures. Alternatively, *non-immediate talk* refers to information that is not visible in text. Parents who use this type of talk are usually extending the text by asking questions and initiating discussion, encouraging deduction, prediction and connecting the reading of the story to the real world. Consequently, De Temple (2001) argued that this may enhance language comprehension skills.

In an attempt to examine the influence of both types of talking styles, *immediate and non-immediate*, on measures of language and literacy, De Temple (2001) found that *immediate talk* was not correlated with measures of language and literacy skills. The

results suggested that parents who most often used *immediate talk* while reading to their children whilst they attended pre-school and kindergarten tended to have children who had low scores on measures of literacy skills. In contrast, they found that parents who are involved with their children in *non-immediate talk* that extended beyond the text were more likely to have children who performed well on measures of comprehension, vocabulary and literacy skills.

Direct teaching is another type of home literacy activities. This activity is less scrutinized by researchers in contrast to parent-child book reading. However, it has been acknowledged that parental involvement in teaching letter-based activities with their children is associated with children's phonological awareness skills that in turn play a foundation role in word reading (Gillon, 2004). For example, it was reported that children whose parents had taught them letter names and writing skills were likely to have better letter knowledge and earlier word reading skills than their peers (Haney & Hill, 2004), whereas those children who come from a poorer language environment are likely to play catch up with those peers who come from a richer reading environment when they embark on these activities at school (Wolf, 2008). Data from previous studies supports this view and shows that parent teaching accounts for about 10% of the variance in children's letter knowledge, after taking into account controls for age, cognitive ability, phonological awareness, parent education and storytelling (Evans, Shaw, & Bell, 2000).

A unique home literacy activity restricted to Muslim communities, which could have a linguistic and cognitive (in terms of working memory) impact on Muslim children, is the experience of learning the Holy Qur'an. In Muslim communities, children are exposed early (mostly before age 6) to memorizing and reciting the Qur'an verses. During this pre-schooling period, the parents' or the Sheikh's (a hired teacher of the Qur'an) have a strong interest in the child memorizing verses and learning to recite the Qur'an perfectly. Therefore, little weight is given to the verses' meanings. That is, the main goal of the early stages of Qur'an learning is chanting the Qur'an by heart even if the child does not comprehend some of the memorized material. However, as the children grow up, the emphasis on understanding these memorized verses increases.

The process of Qur'an learning consists of two components. Firstly, the verbatim memorization of the verses which exist in a printed form; and secondly, the

memorization of the sound of these verses as heard from the parent or sheikh (teacher of the Qur'an). In order to recite the verses correctly, the child has to first listen to the sounds made, and then retain them by repeating them back to the adult. They then reinforce this memorization by further practice. The child memorizes the new verses by reciting them aloud and also systematically reciting the verses that had been previously learned. Memorization of the Qur'an in this sense is incremental because recitations of the new verses are added to the ones that have already been learnt (Wagner & Spratt, 1987). Therefore, the experience of memorizing the Qur'an verses should have an impact on children's memory performance i.e. the ability to recall material progressively and their literacy skills development. In support of this view, Wagner and Spratt (1987), in a study which investigated the cognitive consequences of contrasting pedagogies in Morocco (in modern and religious schools), found a positive relationship between prior Qur'an experience and incremental serial memory performance among adults. Incremental memory measures resemble the forward digit span measure except that the string builds incrementally on the prior string (e.g., ***trial 1***: 3, 5, 8; ***trial 2***: 3, 5, 8, 1; etc.). The potential impact of the Qur'an on memory could be due to the memory strategies that are used during teaching of the Qur'an, such as rehearsal strategy and mnemonic techniques like Ghnona (chanting), chunks (pairing) and the use of imagery. These memory strategies have been found to foster encoding information in long term memory and make the information more easily retrieved. For example, short term memory retention was found to be better when individual items were grouped into chunks rather than recalling these items separately (Gathercole & Alloway, 2008). Hence, recalling a telephone number is easier than recalling the same numbers individually. Again transforming verbal information into visual information is likely to instil meaning long term; and thereby promote the recall of this information by working memory (Dehn, 2008). The example of describing the impossibility of the disbelievers' entrance into paradise as being like the impossibility of passing a thick rope through the tiny hole of the needle in Joseph chapter 12, verses, 1:3 is a good example of using imagery mnemonic strategy in the Qur'an.

Learning via memorization has been a method of learning in Arabic communities since the pre-Islamic era. It is considered an effective way that enables the learner to reach automaticity in reciting the Qur'an by heart and in other subjects. This method of learning could be suitable for mastering the basic skills of reading such as letter

knowledge, graphemes, phoneme associations, and vocabulary which are essential for higher skills of reading comprehension (Westwood, 2004). Thus, in addition to its potential efficacy on memory, the learning of the Qur'an should have a role in enhancing Arabic language skills. Through learning the Qur'an, children can hear and acquire Arabic phonemes and vocabulary (Zaid, 2011). In other words, early exposure to the Qur'an is believed to develop phonological skills, vocabulary, grammar and reading comprehension.

One might presume that parent/child interaction during reading and learning the Qur'an, especially at preschool age (age 3 or 4) might be similar to reading either a nursery book to teach letter knowledge or a story book for enjoyment. Accordingly, one could presume that the experience of learning the Quran might have a similar impact like story or nursery books in developing literacy skills. It is likely to be similar to the story book in terms of its narrative style and storytelling. It presents themes, plots, and characters as in the stories of Noah Abraham, Joseph and Jesus. This portion of the Qur'an is clear evidence of how the Qur'an uses stories as a method of teaching, "We do relate unto thee the most beautiful stories, in that we reveal unto thee before this thou too were among those who knew it not" (Joseph Sura (chapter 12, verses: 1:3).

Likewise it has similarities to the nursery rhymes in that its verses are full of words that end with similar sounds. See the underlined words in 'Ar-Rahmaan' or The Compassionate. (Sura 55) as examples of rhymes: **Ar-rahm<u>an</u>, alqur-<u>an</u>, al-ins<u>an</u>, albay<u>an</u>, bihusb<u>an</u> & yasjud<u>an</u>.**

الرَّحْمَنِ
عَلَّمَ الْقُرْآنَ
خَلَقَ الْإِنسَانَ
عَلَّمَهُ الْبَيَانَ
الشَّمْسُ وَالْقَمَرُ بِحُسْبَانٍ
وَالنَّجْمُ وَالشَّجَرُ يَسْجُدَانِ

When a child listens to these rhyming sounds, his or her ear may learn that, "words can sound similar because they share a first or last sound" (Wolf, 2008, p. 99). This rhyming knowledge in preschool is likely to help children differentiate paired sounds and consequently to segment words into its smaller components. Thus, developing children's

awareness at the onset-rhyme level during preschool period may promote children's awareness at the phoneme level, which in turn facilitates reading (Bryant, MacLean, Bradley, & Grossland, 1990). Furthermore, Goswami (1994) suggested that the knowledge of rhyming units may help children to read and spell new words analogically.

The Qur'an might also prompt comprehension skills through the use of imagery. Despite the fact that the use of imagery makes the Qur'an phrases and sentences lovely, it also makes them cognitively demanding. Consider this example of simile where the Qur'an affirms the impossibility of the disbelievers' entry into paradise with these words: "Nor will they enter the Garden until a thick rope can pass through the eye of a needle." In order to understand this simile, children are required to compare the thick rope to the hole of the needle and infer how it is impossible to pass this thick rope through the tiny hole of the needle. The similes here actually aid children in performing such complicated cognitive operations as a size based comprised and depth perception because children practice analogical skills (Wolf, 2008). This process may foster comprehension because it makes children use skills such as inference skills (deduction or guessing based on whatever information is given), which are significantly related to comprehension (Kintsch & Rawson, 2005).

Furthermore, during reciting or reading the Qur'an, children are exposed to classical Arabic language which is full of vocabulary that children rarely use in their daily conservation with their families or peers. Consequently, it might be expected that children who are frequently exposed to Qur'an prior to school, have more vocabulary knowledge than those who lack this experience. However, there might be challenges to teaching the Qur'an to children with difficulties with memory and phonology.

It has been well established that home literacy activities play an important role on literacy acquisition. However, there are many factors that can influence the efficacy of these activities. For example, researchers found a significant association between parents' educational levels and children's performance on literacy skills. Rauh et al. (2003) found that a low educational level of parents was linked with low reading performance in a large sample of American third grade children. Similarly Parson and Bynner (2007) found that there was a direct link between parents' educational level and their children's literacy development. They reported that children who achieved poorly

in schools were likely to have parents who did not have any school qualification. Bonci et al. (2010) explained the connection between children's development in literacy skills and their parents' educational level when they stated that parents with lower educational levels are less likely to assist their children with reading and writing because they feel they are not competent to do this. Consequently, they tend to avoid interacting with their children in literacy activity (Wasik & Bond, 2001). Furthermore, parents with lower educational levels are less likely to have children who read for pleasure (Williams, Clemens, Oleinikova, & Tarvin, 2003). Alternatively, parents with higher levels of education are more likely to ask their children more simulating questions during reading activity than parents do with parents with lower educational levels (Bonci et al., 2010).

Parents' beliefs and attitudes towards literacy which might be a product of their own educational experiences, could affect children's literacy development (Bus, 2001). There is a large body of evidence supporting the close link between parents' beliefs and attitudes regarding literacy skills and their children's literacy development. These parents' beliefs and attitudes are likely to influence the effectiveness of literacy activities in homes (e.g., Bus, 2001; Sénéchal & LeFevre, 2002). Consistent with this, Wasik and Herrmann (2004) reported that parent's belief about literacy affects the interaction that they have with their children relative to literacy materials that are available at home. Similarly, Weigel, Martin and Bennett (2006) stated that parental beliefs about the value and the goal of parent/child shared book reading and other home literacy activities were related to the practice and the frequency of home literacy activities, and to the children's performance on literacy measures. Likewise, many studies showed that those whose parents view literacy as a source of entertainment rather than a set of skills to be learned engaged in more home literacy activities with their children (Baker, 2003). Alternatively parents who have negative attitudes are likely to avoid interaction with their children regarding literacy activities (Wasik & Herrmann, 2004). To sum up, the families' educational level and their attitudes and beliefs relative to literacy play an important role in the developing literacy skills of their children.

From the discussion above, it is evident that a large body of accumulated research points to the conclusion that parental involvement in literacy activities with their children and their attitudes and beliefs about literacy play a critical role in developing children's literacy skills. However, children obtain much of their literacy skills within the context

of class through curriculum and instruction. Accordingly, differences in teacher practice may be one of the reasons for differences in children's achievement levels existing across classrooms. Thus, a practical theory of literacy must include instructional context as an integral part of the model (Mehta, Foorman, Branum-Martin, & Taylor, 2005). Consequently, the next section will discuss the formal educational context in Kuwait. It will shed light on the historical development of education, description of the general structure of education, the curricula, teacher training and finally, the potential drawbacks of the educational system that might be a source of learning problems for Kuwaiti children.

The impact of schooling on literacy

Education in Kuwait is a gender segregation system. It is also divided into public education and private education. Both types of education are supervised by the Ministry of Education. The structure of pre-university level follows the 5-4-3 model: five years at the primary level, four years at the intermediate and three years secondary levels. The pre-university level is obligatory. Children are admitted at age 6. This sequence is preceded by two years of kindergarten that is not obligatory, but is provided free to Kuwaiti citizens. In kindergarten school, children learn basic learning blocks such as colours, numbers, and letters and learn how to spell their names. Children also recite and memorize short verses from the Qur'an. It is worth noting that reciting and memorizing the Qur'an is a separate curriculum in all later grades (from grade 1 to 12). As for English language, children learn it from the first grade of primary stage. (See Table 2.1)

Table 2.1 Primary education: weekly lesson time table

Subject	Number of weekly periods in each grade				
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Islamic education	2	2	2	2	2
Koran	2	2	2	2	2
Arabic language	6	6	6	6	6
English language	6	6	6	6	6
Science	4	4	4	4	4
Mathematics	5	5	5	5	5
Social Studies	2	2	2	2	2
Physical education	3	3	3	3	3
Fine Arts	2	2	2	2	2
Music	1	1	1	1	1
Life skills	2	2	2	2	2
Each teaching period lasts 50 minutes					

Intermediate education lasts four years and is also obligatory. Students who successfully complete this cycle are awarded the Intermediate School Certificate, granting access to secondary education. The objectives of this level are to help students acquire an understanding and knowledge of their national identity in the following subjects: Arabic language, social studies, basic science, mathematics and English. (See Table 2.2)

Table 2.1 Intermediate education: weekly lesson timetable

Subject	Number of weekly periods in each grade			
	Grade 6	Grade 7	Grade 8	Grade 9
Islamic education	2	2	2	2
Koran	1	1	1	1
Arabic language	6	6	6	6
English language	6	6	6	6
Science	4	4	4	4
Mathematics	5	5	5	5
Social Studies	2	2	2	2
Physical education	2	2	3	2
Fine Arts	1	1	1	1
Music	1	1	1	1
Life skills	1	1	1	1
Computer studies	2	2	2	2
Practical studies	1	1	1	1
Each teaching period lasts 50 minutes				

A discussion of how literacy is taught in Kuwaiti classrooms will be presented in the literacy acquisition chapter (See chapter 4).

The evaluation system at different levels

The Kuwaiti Ministry of Education has set the regulations governing evaluation and examinations. The system follows the two-semester academic year. Each semester has two periods of examinations and comprises two methods: school evaluation for transitional classes from first year primary to ninth grade and central evaluation directly supervised by the Ministry, limited to secondary education and leading to a secondary school certificate.

At primary stage from grade one to grade three, the ministry of education has adopted what is called an 'Achievement Profile.' This term means on-going assessments within the framework of the syllabus system and it is intended to continuously measure the students' capacity to follow and absorb subject matter, and measure their own efforts throughout the school year. The students pass automatically according to oral evaluation by the teachers. The case is different in grades 4 to 12. During these grades promotion is based on the results of the average of the four periods' evaluation (oral and written). If the student fails to obtain 50% of the maximum grade in one subject in the first round, he or she has to sit for an exam in the same subject in the second round. If a student fails in more than three subjects, he or she remains in his or her grade with the new promoted children to that grade. This might have a negative impact on that child, especially because the child is not provided with any systematic intervention programme or any extra help outside the class to improve his or her low literacy skills. Furthermore, being among new younger peers might demotivate the child and might lead to him dropping out.

From grade four till grade nine, a Kuwaiti student has to pass four periods of exams during the scholastic year. The first and third period's exams are done by the student's school, whereas the second and the fourth periods' exams are prepared by the educational directorate in charge of these schools. There are 6 educational directorates according to the 6 governorates that are in Kuwait. That is, there are six separate second and the fourth periods' exams across the state of Kuwait.

Teacher training

Aware of the essential role of the teaching profession and the teacher in directing the educational process to achieve its goals, the Ministry of Education in Kuwait has aimed to raise the efficiency of the teacher through training programs and workshops. The Ministry of Education, represented by the Development Department, draws up an annual training plan for the teaching staff to keep pace with the latest developments in education. These training courses are mostly in teaching methods, classroom managements and using technology aids inside the classroom.

Problem with the Kuwaiti educational system

Despite Kuwait seeing education policy as a priority and taking significant steps towards modernizing its educational system, Kuwaiti students have displayed modest achievements in international examinations. These exams aim to measure children's performance in literacy and mathematics and Kuwait participated in these in the years 1995-2011. For example the results of the Trends in International Mathematics and Science Assessment (TIMSS, 2011) and the Progress in International Reading and Literacy Study (PIRLS, 2011) revealed that for grade four and eight, the Kuwaiti students came in second before the last in mathematics (48 out of 50 countries) and in third place before the last (46 out of 49 countries) in literacy (reading comprehension).

The low level in literacy measures might indicate some flaws in the education system. Burnery and Mohammed (2002) described these drawbacks as the internal inefficiency of the public education system in Kuwait. The following section would explain some of the drawbacks of the public education system in Kuwait.

Despite the changes in the school curriculum, Ayoub (2012) stated text book content for literacy is still overloaded and fails to cope with children's interests or the students' level. He elaborated this view when he stated that the Arabic curriculum, from primary stage and intermediate, appears to be difficult and full of repeated subjects. This might partially explain the low level of children's performance in Arabic.

The evaluation system that the ministry of education adopted in the initial three years of primary stage might be one of these flaws. During the first three years in primary education, the ministry sets the policy of promoting children to upper grade automatically, whether they are acquainted with the skills for this stage or not, because there is no written test during this period. The only method of assessment during these initial grades is a teacher's evaluation according to the children's participation in the class (an on-going oral assessment). This evaluation policy at the initial grades could allow a child to progress up to the higher level, regardless of their mastery of the literacy skills required for this level. Therefore, those children are likely to struggle in reading skills and be unable to cope with the higher level in terms of literacy skills. As a result, they might have "perceive them to be at the bottom of the heap and may well carry that

thought with them throughout their educational lives, until they can leave and find their own way forward. Even then the difficulty will remain" (Pavey, 2007, p.4).

The system of examination in primary and intermediate stages varies across educational zones across Kuwaiti governorates in the semester tests, and it even varies enormously from school to school across the first and third periods in the same governorate. Blair (2010) argued that the lack of a unified system of examination may have an influence on the standard of tests, which in turn will influence the literacy skills rate. Some schools or teachers might assess some criteria and ignore others. Furthermore, the system of examinations in general seems to still rely heavily on assessing the students' ability to master the contents of the text books (Ayoub, 2012). In addition, teachers may give inaccurate grades to avoid being accused of not doing their job properly or because of the influence of children's parents (Blair, 2010).

From the researcher's knowledge as an educator in Kuwait, there are no scientific tools for diagnosing the unexpected difficulties that children may experience in learning to read in Kuwaiti mainstream schools. That is, there are no individual tests to collect profiles of strengths and weaknesses and see why they are failing and what to do to support them (Elshiekh, 2012). The absence of such scientific tools might be one of the factors contributing to the growing of dropout and non-completion rates because there is no scientifically based remediation to help those students. This drop out phenomenon seems to be especially impeding the progress of students at secondary stage and at the university (UNESCO, 2011). High rates of drop out especially at higher grades seem to be a sign of educational system failure in Arab countries (Maamouri, 1998). Burnery and Mohammed (2002) lend further support of this view from a recent study. Comparing the public education system in Kuwait with other comparable countries, they found some inefficiency such as the short length of the year, and high repetition rate. Therefore, they come to the conclusion that the public education system in Kuwait is relatively inefficient by international standards.

The shortage of nationally qualified teachers might be another potential factor leading to inadequacy and deterioration of education in Kuwait (Salma & Alramazi, 2009). Part of this shortage could be due to early retirement, particularly among Kuwaiti teachers who retire between the ages of 30-40. Another problem is that Kuwaiti youth, particularly males, have been reluctant to join the teaching profession (Salma & Alramazi, 2009).

They believe that teaching is a hard and less well paid job in contrast to other jobs that require the same or even lower academic qualifications (Ayoub, 2012). Hence, the shortfall of nationally qualified teachers could lead to continuous dependence on teachers from many Arab countries. This possibly handicaps the students' understanding of the social and cultural characteristics of their own society; and could also have profound impact on the Arabic language because those teachers tend to use their spoken language as the medium of communication inside the classroom. That usage might increase the linguistic distance between the literary language and the spoken ones.

Furthermore, the administrative responsibilities are on the shoulders of teachers and the full burden of a rigid timetable could be possible factors that might hinder teachers from doing their work well. In addition, the ethos of teacher training seems to be simply transmitting information (filling up empty jugs with facts).This means that teacher training courses might not necessarily show the competencies of the teachers, only the fact they received training (See course syllabuses of teacher training in Kuwaiti ministry of education site, 2014 moe.ed.ku). Within the same context, even student teachers (students in the faculty of education) may not be well prepared because they receive inadequate field training (Blair, 2010). He justified his view by stating that the amount of field training that those students teacher receive is low compared with other job's such as doctors. They only receive field training in school classes for one semester; and this means that their training does not exceed three months or less; besides, the curriculum in the college of education is mostly theoretical and vary far from the reality of the classroom (Ayoub, 2012). Ayoub continued to argue that work experience, teaching methods and materials, or classroom conditions affect the quality of teaching. Moreover, teachers have to follow the content and the sequence of text books strictly. Thus teachers' principal objectives seem mainly to cover the content of the books in a given period and to prepare the students to pass examinations. One might be inclined to argue this could have an impact upon the way that students are taught to read and the students' perception and attitude towards reading. Children in this sense, are likely to perceive reading as a task, a product of classroom routine and relentless practice. Thus, the real meaning of reading is likely to be lost (Reid, 2005).

In conclusion, scrutinizing and providing a systematic description of the orthographic characteristics of the Arabic language alongside describing the social context within the

family and the school on their own cannot answer questions regarding what strategies children can use when reading; or provide a full explanation of learning difficulties related to this writing system. For that reason, a psychological framework is also required. Therefore, models of reading development are needed to provide theories about what strategies children use when acquiring literacy skills (Gillon, 2004). The following chapter will discuss the concept of literacy and shed light on specified models of reading.

2.4 LITERACY ACQUISITION

Literacy implies both reading and writing skills; however reading is the main concern of this work. Reading is described as a set of skills that includes phonemic awareness and decoding, fluency, vocabulary, and comprehension (National Reading Panel, 2000). Within this context, Eames (2002) emphasised the comprehensive view of reading when she argued that reading involves both learning to read and reading to learn. In this sense, the reader should depend on two important skills: the ability to understand the language in which the text is written, and the ability to recognize and process printed text (Reid, 2005). Each of these abilities appears to depend on lower level skills such as word attack skills (letter recognition, segmentation, blending, phonemic awareness, analogy strategies and grapheme phoneme correspondence) and word recognition skills (recognition of word pattern and the use of visual memory skills). Thus models of literacy stress the importance of efficient word recognition to the development of reading comprehension ability (Gough & Tunmer, 1986; Perfetti, 1985; Stanovich, 1988). Because of the importance of word recognition as a foundation of reading comprehension, many theories of word reading have emerged. However, there are two models that have dominated the literature of literacy (Gillon, 2004). These two competing models are the dual route and the connectionist model. Discussion of these two models of reading follows.

Dual route model

The Dual route model is a theory about the cognitive structure of the information processing system used for reading and spelling (Coltheart, 2005). According to this theory, written language processing is accomplished by two different but interactive routes (procedures) referred to as lexical and non-lexical (phonological) routes.

The lexical route

According to this route, word recognition is a direct process in which the reader connects the orthographic representation of a printed word immediately to meaning of the word that is stored in his or her memory upon seeing it (Coltheart, 2005). Word recognition therefore, does not include sounding out words; it stresses the use of memory. However, this lexical route fails with reading unfamiliar words or non-words because these words do not have lexical representations in the memory.

The non-lexical route

According to the non-lexical route, a word is recognized once the phonological representations of this target word, which are stored in the reader's mental lexicon, are accessed. However, accessing the phonological representations of a given word involves several steps. First the reader has to analyse the string of letters in the printed word into those letters or a set of letters, and translate these letters into sounds (phonemes). Then, the phonemes are assembled to build the phonological representation of the target word; and finally, matching the phonological representations of the word with its meaning in the reader's mental lexicon. This way of reading is also referred to as decoding. The non-lexical (phonological) route is essential for new words and is helpful for reading all words or non-words that have consistent grapheme phoneme relationships. However, it fails with irregular words that do not obey the grapheme phonemes conversion rules.

Connectionist model

In contrast to the dual model of reading, the connectionist model is considered as a single route. According to the connectionist model, the reader recognizes printed words through strong connections between orthographic, phonological and semantic knowledge. The connections among the three systems are gradually strengthened through the learning process (Bjaalid, Høien, & Lundberg, 1995). Accordingly, all words whether regular or irregular are recognized in the same way.

The previous models (dual or connectionist) describe how readers recognize printed words. However, it is important to understand the developmental process that leads to efficient word recognition. Developmental models of reading propose that word recognition is not an instant skill but rather an on-going process that happens in successive and progressive stages or phases (Gillon, 2004). According to developmental models of reading, children pass through defined stages or phases in order to acquire efficient fluent word reading (Ehri, 1992, 2005; Ehri & McCormick, 1998; Frith, 1985). One of the stage models of literacy that would be discussed and applied to Arabic is Frith's model.

Frith's model

Frith (1985) proposed a three stage model describing the acquisition of literacy. The three stages are logographic, alphabetic and orthographic. Each stage of her model is

divided into two levels according to the skills that the child acquires during each stage. Level one represents the initial skills whereas level two represents the advanced skills of the same stage. Each new stage (at the initial level) is assumed to benefit from the level 2 of the earlier stage. Thus the child progresses through these stages in a sequential order.

The logographic stage

Frith (1985) divided the logographic stage into two levels. Level 1 of this stage is a pre-literacy phase where children acquire symbolic skills. During this phase, children acquire some understanding of metalinguistic terms such as *word* and *phrase*. Once children acquire these skills, they reach level 2 of logographic stage. At this level, children depend on the visual cues. These visual cues could be in or around the word to recognise the word. For example, the logographic children could read the word *look* because they see the letters *oo* as *two eyes* in the middle of the word. Logographic children could also read the word *MacDonald's* because of the context around it - the picture of the clown. However, when these visual cues in and around the learned word are removed or changed, the children could not identify it (Gough, Hoover, & Peterson, 1996). That is, children read words by a memorisation route not by decoding words because of their limited knowledge of the alphabet system. During logographic stage, children spontaneously acquire a large number of visual vocabularies that in turn may play a role in developing their awareness of letter names and sounds (Metsala & Walley, 1998). This awareness is likely to help children associate some letters to their sounds. That means children move to the subsequent stage –the alphabetic stage.

The alphabetic stage

In its first level, the alphabetic stage is initially employed for writing while the logographic is still used for reading. When the children are more comfortable with alphabet system, they move to level 2 which can be defined as the phonological stage because the children start to develop a good knowledge of phonological awareness skills. At level 2 of the alphabetic stage, children can make use of their phonological knowledge in forming connections between written symbols and sounds (Teriman, 2000). Accordingly, children can read new word or non-words, but not necessarily correctly. For example, children can sound out the word *cat* by applying the grapheme-

phonemes rules but he or she may wrongly decode the word *Yacht*. This may be due to the inconsistent relationship between the letters *ch* and their correspondent sounds.

The orthographic stage

As reading experience increases, children are exposed to different words that have common repeated letter sequences such as *ing* or *ed.* Children begin to deal with letter sequences as an orthographic unit and use it in reading as a whole. In this sense, the alphabetic stage is displaced with the orthographic stage when children apply the orthographic unit to read words. At the orthographic stage, children read the word *king* as *k- ing*, whereas at the alphabetic stage, they read it as *k-i-n-g*. Thus, reading at orthographic stage is more accurate and faster than the alphabetic stage.

During the orthographic stage, morphological knowledge plays an important role in reading and is described as the hallmark of the orthographic stage (Firth, 1985). At level 1 of the orthographic stage, Frith reported that knowledge of morphological units enables children to recognize words instantly and to analyse these words into larger orthographic units (morphemes) without decoding. However at level 2, the orthographic representations are precise in a way that enables the reader to spell the word correctly.

However, the sequence of literacy development may be different according to the type of reader (typically developing or struggling reader) and the nature of language (shallow or opaque). The struggling reader may experience difficulty in moving through these stages. Some children may fail to master the cognitive processes that accompany the stages. Consequently, they may fail to advance normally from one stage to another. As for the logographic stage, it is extremely rare to find children who may face difficulty in the skills required in this stage (Frith, 1985). However, it is common to find children who fail to master the skills required in the alphabetic stage. This difficulty in mastering alphabetic skills is typical of children defined as at risk of dyslexia (Frith, 1985). Dyslexic children are likely to find difficulty in sounding out and blending letters. However during the alphabet stage, their use of logographic skills may be extended as a compensatory strategy to help children to recognize words (Frith, 1985), but this strategy does not work with unfamiliar words. As a result, children, who find challenges in acquiring the alphabetic principles of the alphabetic stage, find difficulty in

progressing towards the orthographic stage and acquiring the relevant skills (Frith, 1985).

Despite this, there is awareness among researchers that skills in word reading develop gradually and in successive stages (Ehri, 2005; Frith, 1985), the rate that children pass through these stages may be affected by the nature of the language orthography (transparent or opaque script). It is presumed that children who learn to read in transparent orthographic systems such as Spanish or German appear to spend a shorter period in the logographic stage or entirely omit this stage, and move to the alphabetic stage quicker than children who learn to read in an opaque writing systems such as English (Cardoso-Martins et al., 2002; Wimmer & Goswami, 1994). Furthermore, the transparency of orthography may be responsible for differences in adopting strategies to recognize words between a transparent orthography such as German and an opaque one such as English (Wimmer & Goswami, 1994). In a study investigating the influence of orthographic consistency on word reading development in English and German, Wimmer and Goswami (1994) found that English and German children differ in the period at which they begin to use direct access strategies (the orthographic strategy). They argued that the consistent relationship between letters and their representative sounds in German language may encourage children to rely on the alphabetic stage for recognizing any new words they are exposed to. In contrast, reading in English, as a less transparent orthography, appears to rely more on direct strategy (orthographic strategy) because assembling pronunciations via grapheme-phoneme translation does not guarantee accurate reading in English (e.g., island – knight).

In this context, Paulesu et al. (2001) in a cross language study investigating the impact of language orthography on the development of reading skills in Italian and English found that transparent script is easier to read than a complex orthography such as English. They also found the English group performed slower than the Italians in all measures of single word and non-word reading. Paulesu et al. (2001) explained the difference between the Italian and the English participants by stating that the Italian readers have the advantage of the simple letter sound relationships of the Italian script which is sufficient for reading Italian language. In contrast, the English readers need other orthographic strategy than the phonological route to disambiguate print sound mapping.

However, this early difference in reading strategy is likely to disappear at later stages of reading, since the ultimate goal of reading is fast reading for meaning. To achieve this goal, children need to depend on orthographic strategy and stop depending on the alphabetic stage on reading words because it does not ensure automaticity in contrast to orthographic stage (Wimmer & Goswami, 1994).

Adaptation of Firth's model to acquisition of literacy in Arabic

Studies investigating stages of development of literacy in Arabic have been relatively scarce (Taouk & Coltheart, 2004**)**. However many researchers suggested that learning to read Arabic is very much like learning to read English (Abu Rabia, 2001; Elbeheri & Everett, 2007) and the three phases of Frith's model could be applied to acquisition of literacy in Arabic (Azzam, 1990). In attempting to apply Frith's model of literacy acquisition, the differences between Arabic and English scripts and the distinctive features of Arabic orthography (see chapter 2) should be considered. These features of Arabic script have been found to determine the cognitive process involving in the process of learning to read Arabic (Al Menaye, 2009). However, the specific features of Arabic script may have an influence on the rate that children move through the reading stages. This is discussed below.

As with the beginning reader in English, the beginning Arabic reader starts first reading by depending on memorizing the appearance of words, or by learning to recognize words by looking at the first and last letter. Therefore most young logographic readers cannot read the learned word by itself. For example, children cannot read the Arabic word قف *qef* which means in English *stop* without its accompanied sign. Furthermore, logographic reader cannot differentiate between words that have the same configuration such as *سيارهsaiyara* which means in English *a car* and the Arabic name ساره *Sara* which means in English *happy*.

As children are exposed to more words, they may be familiar with salient features of Arabic script such as diacritical markers (short vowels), dots and also can name most of the letters. Interestingly, most of the Arabic letters names carry their sounds at the beginning of their names. For example, this Arabic letter /ل/ is named *lam* and its sound is */l/*. Since Arabic children are exposed to a transparent or shallow orthography (vowelized) at their initial grades (from grade 1 to 3), it could be presumed that the

Arabic children could stay a short period in logographic and move to the alphabetic stage faster. Relatively, the alphabetic strategy seems to be sufficient for reading vowelized Arabic script (Taouk & Coltheart, 2004). During this stage children are likely to be familiar with letter-sound translation rules and have a good knowledge of diacritical markers and their corresponding phonemes. They are likely to know all the different forms of the same letter and also to differentiate between the closely identical letter (see Table 2.1&2.2).

However, the advantage of transparency of Arabic orthography gradually disappears when the vowel diacritics are gradually removed until the children experience devowelized script at later grades (grade 6 ages 11). When the child is confronted with devowelized script, the skill of the phonological strategy (alphabet stage) alone appears to be inadequate for correct reading, because this devowelized script is opaque in its relationship between letters and sounds and full of homographs. Therefore, children are likely to recruit their knowledge of morphological units and the root pattern system of Arabic as well as syntax and vocabulary knowledge to derive correct pronunciations of the devowelized words and distinguish between homographs. That is, the children move away from the phonological strategy towards the orthographic strategy.

Stemming from the notion that teaching practice partly influences the development of literacy acquisition, Taouk and Coltheart (2004**)** argued that the three stages that describe reading development in English can be applied to the teaching of Arabic. The next section will discuss the application of Frith's model to the teaching practice in Kuwait.

Teaching Arabic in Kuwait

Children at the kindergarten and grade 1 (age 4-6) are likely to be logographic learners. For this, the Kuwaiti teaching policy followed by Kuwaiti Ministry of Education focuses on methods that enhance sight vocabulary during kindergarten and grade one (See, the distribution of syllabus of primary stage curriculum and teaching plan, 2013-2014 of the Kuwaiti Ministry of Education in appendix Q). Therefore, methods of teaching such as *Look & Say* are used to enable children to memorize the shape of words; or to recognize words by looking at the first and last letter from firmly selected vocabularies in

progressive texts. Often this method is taught by slides or cards with a picture next to a word to teach children to link the whole word with its meaning.

Later in grade one; children are exposed to words in which the letter sound appears. For example, the letter ب *b* is written with the whole word بطة *ba ta h* accompanied by a picture of a duck. The main goal behind this exposure is to start to develop children's phonological awareness skills. That means teachers teach children to identify letter sounds and names in context (i.e. in words). The letter forms are presented individually with diacritical vowels later at this period (ages 5-6).

In grade two, children progress towards the alphabetic stage and therefore, teachers give more attention to teaching the alphabet principals. Furthermore, children are taught to write the letters in their different forms with and without vowels at this grade. Then, the *cutting pasting* technique or sounding out is passed on to children to facilitate their word reading. This technique trains children to break the words into phonemic units (consonants with their corresponding vowels); and then phonemically pasting together these phonemic units until the whole word is pronounced. For example, the teacher says the word Arabic word لَونُ *lawonon* which means colour in English to the child, then the child breaks it into three phonemic units /نٌ/ / وْ/ / لَ/ and then blends and pronounces these phonemic units together until the whole word is decoded. This cutting-paste technique may develop children's phonological awareness (Taouk & Coltheart, 2004**)** that in turn helps children to read accurately (Gillon, 2004).

In grade three, there is a frequent revision of the previously taught material in grade 1 and 2. Furthermore, children in this grade are exposed to new diacritical reading markers such as the *shaddeh and stressed syllable 'Maqta'a Mushaddad'*. For instance, the word بناء *banna'a,* which means *builder* in English has a stress on the letter 'n' and its stressed syllable is *nna*. Moreover, children's phonological ability to differentiate between comparable letters is further developed. For example; the س /s/ sound as in word سناء *'san'a '* which means in English *dignity or moonlight* and the ث /*th/* sound as in word ثناء '*thana'* which means *praising* in English. However, children may find difficulty in mastering some sounds because of the influence of their spoken language (diglossia influence). For example, in the Kuwaiti spoken language the Arabic sound ق /*q*/ is mostly pronounced as غ /*gh*/. This difference might confuse children and might be

a source of misreading. Different types of *Hamza* are also taught in this grade. Reading (decoding) and reading comprehension skills are developed later in this grade.

In addition to the regular revision of previously taught material in earlier grades, children are exposed to a new diacritical reading marker- the *madd* in grade four. Furthermore, reading and reading comprehension skills are established as a result of their knowledge of grammar in grade four and five. Children practise reading aloud from passages and are required to answer questions related to the passages. They are also taught the grammatical rules applied to diacritical markers and other grammatical activities include classifying words into nouns, verbs, adjectives, relative pronouns and negation. Acquiring these grammatical rules is likely to enhance children's ability to read and write. Grade six as usual involves a quick revision of what was previously taught in other grades. Now the children can read and comprehend devowelized texts fairly well. They are also able to write in their own Arabic what the text is about.

Reading ccomprehension

Word reading is an important component of reading comprehension, but recognizing words is not the whole story in terms of comprehending a written text. Comprehending a text requires integration of different multi-level skills starting with a lower level of literacy skills (word recognitions skills) and proceeding to higher language comprehension skills such as listening comprehension, vocabulary and syntax.

According to the Simple View of Reading model (theory) (Gough & Tunmer, 1986; Hoover & Gough, 1990), reading comprehension is a product of two components. Firstly, decoding which requires the ability to translate the strings of letter into their sounds representations accurately; and secondly, language comprehension which includes different skills such as listening comprehension, vocabulary knowledge or syntax. However, Joshi and Aaron (2000) suggested that the theory of the the Simple View of Reading model (Gough & Tunmer, 1986) should be expanded by adding word reading fluency. They found word reading fluency a significant predictor of reading comprehension, independently of the language comprehension and decoding skills. Fluency enables the reader to concentrate on getting the meaning of what is read. Without fluency, comprehension may be impaired. A non-fluent reader is likely to read too slowly or haltingly because the reader's main concern is on pronouncing the words

correctly. The text in this sense is likely to be broken into strings of words or phrases; and remembering these words is likely to be hard for a non-fluent reader. Consequently, much of the text meaning may be lost (Hasbrouck & Tindal, 2006). Many studies assured the importance of reading fluency for both older children and adults, and found that reading fluency accounted for unique variation in reading comprehension over and above decoding and listening comprehension (e.g., Joshi & Aaron, 2000).

However, the contribution of the word reading skills and language comprehension in promoting reading comprehension varies according to the stages of reading. At initial stages of reading, comprehension is considered to be led by word level skills, whereas at a later stage it is presumed to be led by language comprehension skills (Wilson & Rupley, 1997). Evidence that supported this view showed that there were individuals who could decode words efficiently, but they could not understand what they read (Cain & Oakhill, 2007). This might be due to poor vocabulary which is an aspect of language comprehension. Understanding a text is not possible without understanding the vocabulary of that text (Laufer, 1996) and there should be a lexical threshold that is required to allow understanding of any text (Nagy & Scott, 2000).

Much evidence from monolingual and bilingual studies confirmed the significant role that vocabulary plays in predicting reading comprehension, even after controlling all other variables of phonological awareness, decoding, word recognition and listening comprehension (Hagtvet, 2003; Quellette & Beers, 2010; Snowling & Nation, 1997). The importance of vocabulary in enhancing reading comprehension stems from its role in facilitating word reading and constructing the meaning base of text level.

With the help of vocabulary knowledge, the reader can decode words accurately and fluently (Ehri, 2005). Vocabulary knowledge helps to develop phonological skills (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Metsala, 1999). Furthermore, it is the vocabulary growth during the preschool years that mediates the transition of children's lexical representations from holistic to finer, segmental representations of words, which in turn leads to better awareness of phoneme-sized units in speech (Metsala &Willey, 1998). Metsala (1999) conducted an empirical study as an attempt to investigate the effect of lexical status in the development of phonological awareness in children aged three, four and five years. Metsala found that children performed better with early-acquired and dense neighbourhood words (similar sounding

words in the target lexical neighbourhoods such as *cat fat, mat, sat , hat* than both later-acquired and spare words(few similar words). However, encoding lexical entries in long term memory is at the phoneme level, and it is the phoneme that cues the meaningful differences between words. Therefore, the relationship between phonological awareness and vocabulary can be described as a mutually supportive relationship (Troia, 2004).

Again with the help of vocabulary, the reader can extract the meanings of the decoded words from the lexicon, then combine these words into meaningful units (phrases, sentences, paragraphs) to form text meaning ; and finally, integrate the text meaning with the prior knowledge that contributes to better and deeper understanding (Kintsch, 1988). Anderson & Freebody (1981) argued that a large vocabulary reflects a general knowledge, and that general knowledge could play an important role on better understanding the written text. Thus, comprehension performance is likely to be affected negatively if there are too many unknown words in the text.

Another literacy skill related to reading comprehension is spelling. Joshi, Treiman, Carreker and Moats (2009) argued that spelling may play a fundamental role in reading comprehension by supporting both word reading and vocabulary development. Spelling may facilitate how words are pronounced, what sounds are in the words, how quickly a reader judges spoken rhymes and how rapidly pronunciations change over time, which in turn promotes reading comprehension (Ehri, 1992). Therefore, the more words a learner can spell, the easier he or she can read (Joshi et al., 2009). Joshi et al. (2009) continued to argue that spelling instruction may also play a supportive role in vocabulary and language development. That is, good spellers have a good sensitivity of the meaningful parts of the words (e.g., *un –desir [e] – able*), the role of words in a sentence (e.g., *filmed* is a past tense verb but film is a noun) and the meaningful relationships among words that exist in spite of their pronunciations differences (e.g., *imagine - imagination*). Hence, spelling may enhance reading comprehension through its effect on the two determinants of reading comprehension: word reading and vocabulary.

Now, it is clear that word reading and vocabulary are two determinants of reading comprehension. However, the reading process is supported by a number of cognitive skills: these include phonological processing. Many studies have established the importance of phonological processing skills to reading skills, regardless of the nature of

language orthography (alphabetic or non-alphabetic language) (e.g., Goswami & Bryant, 1990; Smythe, Everatt, & Salter, 2004; Smythe, Everatt, & Al Menaye, 2008; Wagner & Torgesen, 1987). Phonological processing is an umbrella term that refers to cognitive processing operations that are closely associated with literacy skills. Wagner and Torgesen (1987) classified these cognitive processing operations into three types: phonological awareness which refers to reader's awareness of speech sounds, phonological recoding which refers to retrieval of lexical and phonological codes from long-term memory and finally phonological coding of immediate incoming sounds in short term memory. The next section of this chapter would discuss how phonological processing skills,mainly phonological awareness and phonological recoding are important for reading process.

Phonological processing skills

It is clear that during the journey of literacy acquisition, the child passes through stages starting with the logographic stage, then advancing to the alphabetic stages and finally progressing towards the orthographic stage. However, the real start of reading emerges once the child acquires the phonological skills at the alphabetic stage. Despite children's sensitivity to the sound structure of their language starting from infancy, their conscious awareness that spoken words consist of individual sounds and that these sounds can be manipulated starts at age 4 and continues to develop during the early school years (Dodd & Gillon, 200; Goswami & Bryant 1990).

However, children's perception of phonological skills is considered to be a progressive process beginning with the larger units and ends with the smallest units of the word (Gillon, 2004).That is, children's awareness of syllable emerges before their awareness of rhyme which emerges before their awareness of phonemes. Children progress through these three levels of phonological awareness during the preschool and early school years (Goswami & Bryant, 1990). Goswami and Bryant continued to argue that the child, who is able to recognize syllable level and phoneme level representations (abstract concept that captures the true essence of the sounds in words and sentences), will display more advanced sensitivity to components of words. This sensitivity is important for reading development.

Rapid automatized naming or naming speed is the second aspect of phonological processing skills. It is a term that refers to the individual's ability to retrieve these phonological codes rapidly and efficiently from long term memory. It is assessed by tasks requiring naming quickly a number of highly familiar visual stimuli such as digits, letters, objects and colour presented on one page (Wolf & Bowers, 1999).

Rapid naming is considered as one of many cognitive variables that underlie word recognition (Stanovich, 1988). Norton and Wolf (2012, p. 430) described rapid naming as "microcosm of reading" because both naming speed and reading partially share common underlying processes such as the sequentially movement of the eye across the page, that the stimulus in fixation be encoded and access it mental representation (Kirby, Georgiou, Martinussen, & Parrila, 2010).

However, phonological awareness and rapid naming are found to play a different role in literacy skills across languages according to the nature of language orthography (Kirby, Georgiou, Martinussen, & Parrila, 2010). For example, a large body of studies highlighted the pivotal role that phonological awareness skills play on word reading accuracy, non-word reading fluency and comprehension (Elshiekh, 2012; Gillon, 2004; Goswami, 2000). Despite, the ample evidence showing that the ability to retrieve the phonological codes rapidly and efficiently from long term memory is related to reading ability (word reading accuracy, fluency and reading comprehension) (Georgiou, Parilla, & Papadopoulos, 2008; Wolf et al., 2002), that relation is likely to be affected by three different factors: (1) the nature of language orthography (Some researchers have reported that naming speed is a stronger predictor of reading in transparent orthographies than in opaque orthographies(Wimmer, Mayringer, & Landed, 2000); (2) the developmental stage of reading. Researchers have argued that the relationship between naming speed measures and reading achievement seems to decrease over time (de Jong & van der Leij, 2002; Kirby, Parrila, & Pfeiffer, 2003; Wagner, Torgesen, & Rashotte, 1994). They found that the effect of rapid naming on the development of word reading speed was limited to the first year instruction. Walsh, Price and Gillingham (1988) interpreted the decreased role of naming speed in reading in older children as an outcome of developmental changes in the cognitive demands underlying both letter naming and reading skill; and (3) the task used to assess reading skills (fluency or accuracy); previous findings found that rapid naming is more related to measures that

assess reading fluency rather than reading accuracy (Swanson, Trainin, Necoechea, & Hammil, 2003).

Phonological processing in Arabic

There is a general agreement among researchers that phonological processing skills play an important role in developing reading skills in Arabic; and tasks assessing phonological processing skills, especially phonological awareness, are found to be strong predictors of reading skills (Elbeheri & Everatt, 2007; Elshiekh, 2012; Taibah & Haynes, 2011). In this sense, findings from Arabic studies are in accordance with English studies. This consistency leads Elbeheri and Everatt (2007) to postulate that English models of literacy can be applied to Arabic language. As with English, Arabic literature showed variation between phonological awareness and rapid naming in contributing to reading skills. The results showed that rapid naming influence was more evident at early stages of reading; and this role decreased on later stages of reading development (Elsheikh, 2012; Taibah & Haynes, 2011). In contrast, the phonological awareness skills especially phoneme deletion was found to play an important role in reading skills, regardless the stage of reading the child reaches. With reference to context, Elsheikh (2012) found that phonological awareness was a strong predictor for Arabic children and adolescents. In contrast, he found that rapid naming was only significantly related to reading with young children (ages 6-9); and this role vanished with older children (ages 11- 14).

However, many researchers argued that phonological awareness and rapid naming cannot alone explain all that is known about the reading process (Share & Stanovich, 1995; Smythe el al., 2008). Many researchers (Goswami et al., 2002; Nation & Snowling, 2004; Smythe el al., 2008) have turned their interests to more fundamental cognitive processing skills that may underlie phonological process and reading .The potential cognitive system that is found to underlie word reading skills and vocabulary; and supports reading comprehension by providing a temporary storage to hold and manipulate comprehension processes is working memory. Working memory (Baddeley's model) and its relationship with literacy skills therefore, will form the focus of the next chapter.

2.4 WORKING MEMORY AND ITS IMPACT ON LITERACY

Traditionally working memory is defined as an active memory system that is responsible for temporary maintenance and simultaneous processing of information (Bayliss, Jarrold, Gunn, & Baddeley, 2003). Working memory theory is underpinned by different and complimentary theoretical models. Some focus on its structure and function (Baddeley & Hitch, 1974; Cowan, 1997; Oberauer, Sub, Wilhelm, & Wittman, 2003), or its processes (Lovett, Reder, & Lebiere, 1999); or the connections between working memory and long term memory (Ericsson & Delaney, 1999; Ericsson, Delaney, Weaver, & Mahadevan, 2004). One model of working memory that characterizes the development of memory during childhood and schooling, and specifies active as well as passive storage of information in memory is the working memory model of Baddeley and Hitch (1974), revised by Baddeley, (1986). This model is taken as a framework for this work. Discussing this model in some detail and its relationship with reading comprehension is the main focus of this chapter. However, establishing the distinction between working memory and short term memory will be useful to remove any confusion between the two memory systems.

Short term memory versus working memory

Short term memory refers to our ability to store a stimulus for a short period. Remembering a telephone number for a short time is a good example of an activity that depends on short term memory. Therefore, short term memory is working to store information within specific domains (verbal or visuo-spatial) for a short period of time (Alloway, Gathercole, & Pickering, 2006). But if the temporary storage of stimulus is accompanied by processing such as rehearsing (e.g., rehearsing a telephone number until you find a pen to write it down), then it is working memory activity. Thus, working memory involves both the retention and processing of information. Baddeley (2003) defined working memory as our ability to briefly hold information while processing the same or other information. Despite both short-term memory and working memory sharing a common function (storing information for a short period), Gathercole and Alloway (2008) place stress upon differentiating working memory from short term memory. They used short term memory to refer to Baddeley's passive storage components (phonological store & visual cache), and working memory to refer to active

processing components or the articulatory rehearsal and inner scribe. The next section discusses the separate elements of Baddeley's model of working memory.

Baddeley's Model of Working Memory

As originally proposed, Baddeley and Hitch's working memory model is a hierarchical tripartite model comprised of a central executive that controls two subsystems: the phonological loop and the visuo-spatial sketchpad. In 2000, Baddeley added the episodic buffer to his model. These components of working memory develop through the life span. The significant developmental changes in working memory happen in the first ten years of childhood. However, working memory reaches its peak at adult level (Alloway, 2011). The next section discusses some developmental changes in working memory.

Developmental changes in working memory

All working memory components are in place by age four (Alloway, 2011). However, the different components of working memory contribute at different stages to the developing process (Gathercole & Alloway, 2008). For example, young children could not rehearse verbal information until they reach age seven or eight, despite being able to store verbal information at an earlier age. Similarly, young children are likely to remember objects by storing their images; but when they reach age seven, they are likely to use their verbal ability (rehearsing the names of the objects) to remember visuo-spatial material.

As for working memory capacity, Gathercole and Alloway (2008) stated that the dramatic changes in working memory capacity take place in the first ten years (between 5 and 11 years) followed by small but significant increases up to 15 years when the adolescent reaches adult levels. Alloway (2011) showed how the growth of working memory is related to the classroom when she stated that a child at age 5 can retain one item (such as a list of words or instructions), a 7-year old can hold two items, a 10-year-old can remember three items and a 14-year-old can remember 4 items.

However, increase in working memory capacity with age is likely to be related to improvements in the efficiency of processing and of attention (Gathercole & Alloway, 2008). As the child grows older, he or she becomes more efficient at carrying out mental processes. For example, once the child reaches the orthographic stage, the

developmental stages of literacy acquisition, Frith (1986) states that reading becomes more accurate and faster. This efficiency of the reading process leads to superior working memory performance by allocating more resources to the capacity of working memory to store materials and carry out processing activities. Attention can be a determinant of working memory capacity (Gathercole & Alloway, 2008). The attention function of the working memory central executive may enable the child to focus on a particular activity, to inhibit irrelevant and distracting information that may overload working memory capacity. Individual differences in working memory capacity among children in different ages, and even of the same ages are likely to be related to the children's level of efficiency of processing and to attention ability. This difference between individual children can be large (Alloway, 2011). Working memory intervention programs are a coordinated set of approaches and strategies (Gathercole & Alloway, 2008). Thus, the current working memory intervention programmes work on three strands: developing phonological skills to support phonological loop function, developing strategies to support recall and adapting the way in which material is taught (Vance, 2008).

Baddeley's Model of Working Memory

Phonological loop

The phonological loop refers to a speech store of verbal information. It is responsible for the temporary storage of sound patterns of language, such as familiar or unfamiliar words. The phonological loop has been presumed to be located in the left hemisphere which is specialized for language (Gathercole & Alloway, 2004). Baddeley (1986) divided this loop into two subcomponents: a phonological or speech passive store which holds information in verbal form, and the active articulatory rehearsal process which serves to maintain representation in the phonological store. The hypothesis that the phonological loop has two components receives additional support from neuropsychological evidence.

The phonological store is limited because memory traces appear to decay rapidly, usually in less than two seconds (Baddeley, 2000a; Gathercole & Alloway, 2008). This rapid decaying can be prevented by rehearsing the memory traces either aloud or silently. In addition, the articulatory rehearsal process also translates written symbols

into phonological correspondence which in turn records into the phonological store. Therefore, the articulation rate is likely to determine how much information can be repeated before it decays (Baddeley, 1986; Hulme & Mackenzie, 1992).

Relatively, word length may play a role in determining the number of items that can be uttered in about two seconds. Baddeley (1986) found that the participants' ability to repeat a sequence of words was better with short words than with long words. Longer words take longer to articulate, and therefore take up more of the estimated 2 seconds of time available. However, the word length effect may primarily depend on the complexity and distinctiveness of the items rather than merely their length, since word length differences disappears when very distinct and complex items are used (Hulme, Surprenant, Bireta, Stuart, & neath, 2004).

Visuo-spatial sketchpad

The visuo-spatial sketchpad is the second system of Baddeley's working memory model. It is responsible for holding the visual and spatial information for short time. Furthermore, the visuo-spatial sketchpad is believed to play a key role in the generation and manipulation of mental images (Baddeley, 2003). The visuo-spatial sketchpad is considered to be located in the right hemisphere of the brain (Gathercole & Alloway, 2004). Like the phonological loop, the visuo-spatial sketchpad is divided into two subcomponents. The first component is a passive temporary visual store. It is responsible for maintaining static visual information such as shapes and colours. The other component is an active spatial or inner scribe. The inner scribe subsystem of the visuo-spatial sketchpad is also responsible for a rehearsal process to refresh the information held in the visual store and prevent it from decaying, in addition to its function as storage of spatial information. Moreover, the inner scribe is also responsible for continuously updating dynamic information (Olive, 2004). Evidence for this functional division of the visuo-spatial sketchpad comes from clinical studies which suggested that some brain-injured patients show impairment of the visual cache but not the inner scribe (Hanely, Young, & Pearson, 1991), and alternately impairments in spatial but not visual cache memory (Della Sala, Gray, Baddeley, Allamano, &Wilson, 1999).

The central executive

The central executive is presumed to be placed in the frontal lobe and is viewed as a general domain. The central executive working memory component is responsible for overall regulating and controlling of the other components (systems) of working memory. It also allocates resources between processing, activation and retrieving information from long term memory. Defining the types of executive functioning undertaken by the central executive of working memory has led Baddeley (1996) to suggest that the working memory central executive is similar to the Supervisory Attention System (SAS) described by Norman and Shallice (1986). Baddeley ((1986, 1996 & 2003) assigned different functions to the working memory central executive. These functions are; (1) selective attention which enables the individual to focus on related information and inhibit the disruptive effects of unrelated ones; (2) switching, which is the ability to coordinate multiple simultaneous cognitive tasks such as timesharing during dual tasks; (3) selecting and executing plans and flexible strategies; (4) allocating resources to other parts of the working memory system; and (5) retrieving, holding and manipulating temporarily activated information from long term memory.

However, Baddeley (2003) argued that the functions assigned to the central executive seemed to be too complex to be represented by a single component. For that reason, he suggested that the central executive could be divided into different processes or systems. Within this context, Miyake et al. (2000) divided executive functions into three sub skills: shifting attention, updating information and inhibition. However, Miyake et al. (2000) stated that these three central executive functions do not cover all the central executive functions, only the frequent ones. Miyake et al. (2000) used several tasks to assess each of the three major executive functions and found that the three sub-skills of executive functioning (shifting attention, updating information and inhibition) were moderately correlated with each other, but were separable. However, they found that dual tasks, which require the simultaneous performance of visual and verbal items (visual maze and verbal word generation), were not correlated with any of the individual central executive functions. In that context, Collette and Van der Linden (2002) argued that the complex tasks used to assess the three functions of the central executive (shifting attention, updating information and inhibition) showed that these functions are not completely identical in the sense that these functions contribute differently to

performance on these complex executive tasks (Miyake et al., 2000). For example, Miyake et al. (2000) found that performance on the Wisconsin Card Sorting Test (WCST) was significantly related to the central executive shifting function; whereas performance on the Tower of Hanoi test (TOH) is considered to depend on inhibition processes.

A brief description of the tasks in these 2 test items may show exactly how they differ and therefore what skills they might demand. In the WCST test, the participant is presented with four stimulus cards with shapes on them. The shapes in these stimulus cards differ in colour, form and number. The participant is required to match the target card with the four reference cards following one of the three possible rules (colour, form, or number). The participant is not told which stimulus dimension to use in order to match the cards, but he or she is informed whether the answer is correct or not. During the test, the sorting rules are changed and the participants must discover the new sorting rules in order to be successful. Series vary randomly between the trials so the start of a new series cannot be anticipated. In this sense the failure to complete a category could reflect an inability in attention shifting. However, the skill that is assessed by involved the WCST test could also be closely linked to updating.

The Tower of Hanoi test consists of a flat board, three evenly vertical iron pegs of equal height and four disks of different seizes and colour. The participant is required to make disks from a prearranged sequence on three different pegs to match a goal determined by specific rules in a minimal number moves. These specific rules that the participant has to follow are (1) only move one disk at one time; (2) each disk must be placed on one of the pegs and (3) no larger disk can be placed on a smaller one. In this sense, the inhibition ability is needed to inhibit the tendency to make perceptually congruent, yet incorrect moves (moves that transfer a disk in the incorrect direction (Morris, Miotto, Feigenbaum, Bullock, & Polkey, 1997), and or to block the goal peg with a disk that must later be cleared (Goel & Grafman, 1995).

In an attempt to further explore the demands that central executive tasks make, Oberauer et al. (2003) analysed selected working memory central executive tasks such as backward digit span and reading span task. They argued that backward digit span may be unlikely to require much supervisory function and coordination between materials. On the other hand, reading span task is considered to require coordination to construct

propositional structures in addition to assessing executive function of simultaneous storage and transformation of language information. Further evidence that supports the perspective of dividing the central executive into separate functions comes from neuropsychological studies of patients with frontal lobe damage. Findings of these studies argued for dissociation in performance among the executive tasks and suggested that different brain areas may be involved in the different functions of the central executive; and consequently executive function may not be a completely unitary system (Baddeley, 1996; Collette & Van der Linden, 2002).

The episodic buffer

The episodic buffer is the fourth component of Baddeley's model of working memory and has been proposed in order to answer criticisms of the original three component model (Groome et al., 2014). The main criticisms were that the three component model did not clearly show how information derived from the visuospatial sketchpad and phonological loop subsystems of working memory was combined or integrated. It also did not explain how information processed in working memory was integrated with relevant information activated in long term memory. In 2000, Baddeley proposed the episodic to accomplish both of these processing requirements. According to Baddeley (2000), the episodic buffer is a store that is multidimensional, limited, temporary and controlled by the central executive. However, the episodic buffer has greater capacity than other working memory stores due to the need to store information in chunks or episodes (Baddeley, 2012). In this sense, Baddeley (2012) suggested that the episodic buffer supplements information currently processed in working memory. Hence, given the potential role of working memory in reading processes, and the specific feature of the episodic buffer that it integrates information from long-term memory with that in working memory, it is plausible that this additional subsystem is involved in text comprehension processes (Almenaye, 2009; Best, 2010).

However, despite this potential role of the episodic buffer in reading comprehension and learning in general (see Dehn, 2008), measures of this subsystem will not be included in this thesis work. The main reason for this is that at the time of conducting this research, there were no standardized, agreed assessment tools to measure specifically the functions of Baddeley's episodic buffer (see discussions in Henry,

2012). In the absence of such a standardized measure, and the current disputes over the way of measuring the episodic buffer (for example, procedures involving the binding of verbal, visual and/or visuo-verbal information), the current work focused on exploring the relationship between literacy skills in this relatively understudied context of Arabic and the most widely acknowledges aspects of Baddeley's model of working memory; basically, the models from Baddeley & Hitch, 1974, and Baddeley, 1986. Including disputed measures of the episodic buffer may have led to the thesis work being a study of how to measure the functions of this system, rather than its focus on assessing potential relationships between working memory and Arabic L1 literacy levels, as well as L2 literacy levels. Therefore, the current work focused on more widely agreed measures of the phonological loop, visuospatial and central executive that have been argued to be involved in vocabulary development, literacy skills and arithmetic test performance, particularly in English L1 cohorts (Pickering & Gathercole 2001).

From the discussion above, working memory can be seen as a complex system responsible for both the temporary maintaining and the processing of information. These two functions of working memory (storage and processing) work simultaneously. However, there is a trade-off relationship between them. That is, if processing is more efficient and faster, more storage space is available and vice versa. Thus, any weakness in these two functions can prevent working memory from working properly. Thus, poor working memory performance could be either due to a deficit in working memory capacity or in processing. Processing deficits may be due to a neuro-psychological basis as in certain brain lesions which appear to cause an impairment of central executive functions (dysexecutive syndrome) or may originate with a function such as processing speed that underlies working memory performance (Dehn, 2008). Similarly, poor working memory capacity is likely to affect working memory performance. Low working memory capacity cannot meet the demands of complex tasks because of the heavy demands that these tasks impose on mental storage and processing (Gathercole & Alloway, 2008). Furthermore, low working memory capacity could influence the effectiveness of the reading intervention programme (Swanson, 1993). Swanson argued that children with reading problems are resistant to intervention because of their deficit in working memory capacity.

Furthermore, Alloway (2011) argued that the influence of poor working memory is incremental across development, leading to a decrease in learning as the student gets older. She continued to argue that despite each learning disorder having its own distinctive profile that discriminates it from other disorders, (e.g., dyslexia is characterised by problems in reading skills, dyscalculia by problems in math skills and ADHD by problems with behaviour), they all have common weakness in working memory resources (Alloway, 2011). For example, students with dyslexia have difficulty in discriminating the sounds of words, which in turn make them take much longer to read and repeat phrases than the normal reader. As a result, they run out of time to rehearse. For that reason, Gathercole et al. (2006) describe working memory as the bottleneck for learning; and those working memory component measures can provide useful information in predicting and defining those children who are probably at risk of learning problems. For example, children with reading problems show significant low performance on working memory measures in contrast to normally developing individuals (Siegel & Ryan, 1989; Swanson, 1994; Swanson, Howard, & Sáez, 2006). The next section discusses the relationship between working memory and reading comprehension.

Working memory and reading comprehension

Reading comprehension is a complex process that starts with decoding words, then accessing the meaning of individual words, combining these words to construct meaningful units, integrating these meaningful units to form the text base level and finally, combining the text based knowledge with prior knowledge memory in long term memory for better understanding. To accomplish all these multilevel skills of reading comprehension, there is a need for an efficient workplace (working memory) to provide a simultaneous on- line temporary storage for information that has already been read and processing of the incoming information (De Beni, Pazzaglia, Meneghetti, & Mondoloni, 2007), until the meaning of the text content is completed. However, working memory has limited capacity to meet the raised demands of reading comprehension. Thus, this limited capacity has to be cleared once the reader gets the gist of the sentence, in order to be able to process the next proposition. However, the gist of the previous proposition (sentence) should be maintained in working memory in order to be combined with the next one, and so on, until all the text is processed. The key point here is where exactly

the knowledge of each sentence or sentences is being stored. Al Menaye (2009) argued that the knowledge the reader grasped from each processed sentence is transferred to long term memory while working memory contains the gist of the information and joins it with the next sentence that is being processed.

However, successful reading comprehension does not only depend on working memory capacity, but also on the efficacy of working memory central executive functions (Conway, Cowan, & Bunting, 2001). The working memory central executive functions play a prominent role in coordinating a number of different processes that are involved in reading comprehension such as integrating the information of the processed text with the existing knowledge in long term memory. Again, the inhibitory function of the working memory central executive is needed for good comprehension (De Beni et al., 2007) preventing irrelevant, distracting information from interfering with the relevant information that is being processed in working memory. Alternately, inefficient working memory would make the reader struggle to meet these comprehension processes (Gathercole & Alloway, 2008; Seigneuric, Ehrlich, Oakhill, & Yuill, 2000). Much evidence confirming the link between children's performance on working memory measures and reading comprehension has come from monolingual and bilingual studies conducted with different orthographies on different participants (children or adults), (e.g., Al Menaye, 2009; de Jong, 2006; Swanson & Berninger, 1996; Walter, 2004).

However, there is an argument that working memory could play a more important role in a second language than in the first language. Wen (2007) argued that the second language processing is characterized by controlled processing. Controlled processing is defined as a, "process that is under the flexible, intentional control of the individual that he or she is consciously aware of, and that is effortful and constrained by the amount of attention available at the moment" (Uleman & Bargh, 1988, p.4) .When the L2 learner reads a text in L2, for example, his first language is likely to be activated in parallel. That means that the reading process in L2 may be interfered with by other concurrent thought processes (L1). Thus the L2 reader has to be more attentive and more conscious of what he selected from L1 (lexical representations) to help him or her in understanding L2 reading and inhibited the irrelevant ones as well. In this sense, second language learning seems to be a tedious and effortful process in contrast to first language learning (Wen, 2007). Accordingly second language learning may demand more cognitive

resources and depend more on working memory than the first language. Within this context, Wen suggested that the processing of the first language is dominated by automatic processing. Therefore, it might impose fewer demands on working memory resources in contrast to the second language.

Despite the general consensus among researchers that working memory is necessary for successful reading comprehension (e.g., Al Menaye, 2009; Gathercole, Pickering, Knight, & Stegmann, 2004; Seigneuric & Ehrlich, 2005), there is still debate regarding its contribution to reading: whether the type of working memory implemented in reading comprehension is specific to language or general. That is, whether individual differences in reading comprehension are explained in terms of the efficiency of a specific process (such as verbal working memory) or in terms of the attentional control implicated in working memory tasks, regardless of the task modality (verbal or non-verbal tasks).

Research into the relationship between working memory and reading comprehension has presented two competing views. The first view argues that the relationship between working memory and reading comprehension is mediated by the ability to manipulate and remember verbal items rather than the ability to manipulate and remember visuo-spatial items (Seigneuric et al., 2000). Findings of many researchers (e.g., Daneman & Carpenter, 1980; Seigneuric et al., 2000) supported this view when they found that verbal working memory tasks are better predictors of reading comprehension performance than visuo-spatial tasks. For example, Seigneuric et al. (2000) in a study investigating the relationship between working memory and reading comprehension in fourth grade children, found that verbal and, to a lesser extent, digital working memory tasks were significant predictors of reading comprehension. Moreover, Seigneuric et al. found that visuo spatial working memory was poorly related to reading comprehension. Further support for the implication of verbal working tasks in reading comprehension comes from a recent meta-analysis study conducted by Carretti, Borella, Cornoldi and De Beni (2009) which aimed to clarify the specificity of the role of working memory in reading comprehension difficulties of children and adults with normal decoding and intellectual abilities. They noted that those who poor comprehenders performed worse on verbal working memory measures than good comprehenders; whereas their performance (poor comprehenders) on visual tasks was comparable to that of those with good comprehension. Therefore, they concluded the working memory deficits in those

with poor comprehension were primarily related to working memory tasks that require both storage and processing of verbal information rather than visual processing.

In contrast, the second competing view proposes that both verbal and non-verbal working tasks are implicated in reading comprehension. In this sense, Engle, Kane and Tuholski (1999) stated that it is the working memory general capacity resources, which keep active a limited number of elements regardless of their nature (verbal or visuo-spatial) that explain the individual differences in reading comprehension (Engle et al., 1999). Therefore, according to this view, what discriminates between good and poor comprehension is the quantity of resources that are available rather than the proficiency of certain processes (Engle et al., 1999). Swanson (1992 &1996) lends further support to this view when he found that both verbal and visuo spatial working memory tasks had comparable correlations with text reading comprehension of cohorts of skilled and less skilled participants aged from 5 to 19. However, in another study investigating the role of working memory in skilled and less skilled readers' comprehension, Swanson and Berninger (1996) found a less clear cut role for visuo-spatial working memory in reading. Their results showed that the magnitude of correlations of both verbal and visuo-spatial working measures with reading comprehension task were the same. However, children's performance on visuo-spatial measures did not differentiate between good and poor readers; whereas their performance on verbal working memory measures did.

Therefore, the picture does not provide clear indications of the contribution of visuo spatial working memory to reading comprehension. More work investigating the involvement of working memory components may help in clarifying the role that each component (verbal or visuo-spatial) may play during reading. However, performance on verbal working memory measures is likely to be affected by linguistic proficiency. That is, one's level of language competence is likely to play a role in his or her performance on verbal working measures. Daneman and Green (1986) support this view. They suggested that the variation in working memory capacity among individuals may be a product of their efficiency level at the specific linguistic process required by the task to which working memory is being applied. Ardila (2000) justified the potential influence of linguistic proficiency when she stated that verbal working memory measures include both phonological and semantic representation in addition to the

elements provided by the different functions of central executive system. Hence, an individual's expertise in the content area (language) is likely to boost working memory capacity by allowing the grouping of items or units into chunks. Chunking enables the adult to remember a sentence consisting of 15 items, while he or she can recall only about five or six separate items, (Gathercole & Alloway, 2008). An individual's expertise may also increase the speed of processing information (Cowan, 2005). A reader who has efficient reading skills may be able to process reading information automatically and effortlessly; resulting in allowing attention to be directed towards higher level text constructions rather than towards basic decoding skills. Thus more working memory capacity can be devoted to the storage of the products of reading task in long term memory for future use (Turner & Engle, 1989).

Further evidence of the impact of language proficiency level on working memory performance comes from bilingual studies where the two languages are not equally fluent. These studies showed significant differences between first and second language working memory span tasks. Data from these studies showed that subjects' performances on L1 verbal working memory span tasks were better than their performances on L2 versions. Researchers hypothesized that this difference between L1 and L2 verbal working memory span performance was an outcome of the better level language proficiency of the first language (Service, Simola, Metsänheimo, & Maury, 2002; Walter, 2004). The superiority of L1 verbal working memory may be because second language learners are likely to be less automatic in phonological and semantic skills than L1 learners. Consequently, processes such as articulation speed or rehearsal within L2 are expected to slow down and consume more of working memory resources than within the first language. In support of this view, Van den Noort, Bosch and Hugdahl (2006) carried out a study investigating the effect of language proficiency on working memory capacity (digit spans) on Dutch (L1) participants who were skilled in speaking Norwegian (L2) and had recently learned German as a third language (L3). He found that participants had higher scores on L1 working memory measures, compared to Norwegian (L2) and to German (L3). He also found that children's performance on Norwegian working memory measures were better than their performance while using the German language.

An important issue related to the interaction between verbal working memory measures and children's language proficiency levels is the role of L1 and L2 working memory in predicting L2 reading comprehension. Previous studies provided inconsistent findings. While many studies showed that L2 working memory measures were associated more with L2 reading comprehension measures than with L1 working memory measures (e.g., Harrington & Sawyer, 1992; Alptekin & Ercetin, 2010), Pae and Sevcik (2011) found that L1 working memory accounted for significant variance in reading fluency and comprehension for two groups of bilingual children from international sites (one group was English-Korean bilingual in the USA and the other group was Korean-English bilingual in Korea). Further support of the cross language transfer effect of L1 working memory in L2 reading comprehension comes from a study conducted by Swanson et al. (2006). In this study, they investigated growth in reading, vocabulary and memory in Spanish children (ages 5 to 10) learning English as second language and who had been identified at risk for reading for reading disabilities, they (Swanson et al., 2006) found only Spanish measures of working memory growth predicted growth in the second language (English). This inconsistency of results in terms of L1 working memory in L2 reading comprehension might be due to the differences in the level of language proficiency of L2 language among the participants of these studies. Thus, it might be possible to presume that L2 language proficiency level could determine the contribution of L1 or L2 working memory in predicting L2 reading comprehension.

The mediating role of language proficiency skills such as vocabulary (used as a language proficiency indicator in this current work) in the working memory/reading comprehension relationship could be initially manifested through the role of vocabulary in facilitating word reading and reading comprehension (See chapter 3). It has been found that the ability to recognize words accurately and quickly (reading fluency) is the product of good vocabulary and automated phonological skills. Word reading fluency or speed may affect the reading comprehension/working memory relationship. It has been found that reading speed allows more working memory capacity to be allocated to higher comprehension skills (Best, 2010; Perfetti, 1985; Stanovich, 1980). Alternatively, lack of fluency is considered to hinder reading comprehension, because much of the working memory resources may be consumed at the basic level of decoding skills, and consequently few resources were left for comprehension. Within this context, La Berge and Samuel (1974, cited in Perfetti, 1985) have argued that lack of reading fluency is

associated with poor decoding; and poor readers tend to spend a lot of time on decoding. Consequently, they are likely to lose the meaning before they complete the sentence as a result of the information decaying.

The mediating role of vocabulary in the working memory/reading comprehension relationship may also operate through the automatic activation of earlier semantic representations in long term memory. Dehn (2008) has argued that the level of semantic knowledge mediates comprehension and allows working memory to function more effectively. Evidence for this view comes from studies that found that remembering words is easier than remembering non-words; or that remembering words in a meaningful sentence is better than remembering jumbled words (Cain, Oakhill, & Bryant, 2004). Stanovich (1980) lent further support to the influence of vocabulary on working memory when he stated that the influence of working memory in older children is likely to be influenced by top down language skills such as vocabulary knowledge.

However, the relationship between language proficiency skills and working memory could be described as a complex reciprocal one. While the way that vocabulary and automated decoding for example, contribute to retention of information in working memory, this does not mean that working memory has no role in developing these skills. There is ample evidence that the phonological loop, the language component of Baddeley's working memory model (1986), facilitates both decoding and vocabulary acquisition by providing temporary storage to carry out the decoding skills.

Word decoding is primarily dependent on phonological processing which in turn depends on working memory resources. Tunmer and Hoover (1992) argued that working memory capacity is important in phonological awareness tasks, such as phoneme deletion. The storage and processing requirements of phonological awareness tasks require working memory resources. To elaborate, beginning readers retrieve the appropriate grapheme-phoneme correspondences from long-term memory, then hold those in memory in a sequential order, and blend them to produce the correct pronunciation of the target word. Therefore, word decoding depends on both the processing and storage of phonological information (working memory); and relatively any deficits in working memory capacity might cause delays in reading acquisition (Bayliss et al., 2003; Gathercole & Pickering, 2000).

As for the role of working memory in vocabulary development, it is considered that better vocabulary knowledge is associated with better phonological working memory. Phonological working memory provides temporary storage of unfamiliar sound forms until more permanent representations are constructed in long term memory (Gathercole et al., 1999). Therefore, an association between working memory and vocabulary measures in L1 and L2 was found (Gathercole & Adams, 1993; Gathercole, Service, Hitch, Adams, & Martin, 1998; Service, 1992). Consequently, deficits in working memory may impede word recognition, which in turn impedes semantic retrieval and finally disturbs reading.

Another potential variable that might affect the contribution of working memory to reading comprehension is the task used to assess reading comprehension. Pearson and Hamm (2005) argued that the contribution of different cognitive skills to reading comprehension may depend on the demands of the reading task (how children are asked to assess their understanding of what they read). Francis et al. (2006) clarified this view when they stated that the performance on some measures of reading comprehension may be so over determined by word reading skills; and consequently may not require complex cognitive skills (working memory) or at least that this may limit the contributions of other skills such as working memory. Hence reading comprehension difficulties due to skills and processes other than word recognition may not be discovered (Cutting & Scarborough, 2006). Evidence of the impact of reading tasks on the contribution of working memory to reading comprehension came from the findings of Seigneuric et al.'s study (2000). In their study investigating the relationship between working memory capacity and different reading comprehension measures (literal and inferential) in fourth grade children, they found that working memory played a more important role in inferential questions than it played in literal ones.

In summary, working memory plays an important role in reading comprehension. However, this role appears to be affected by several factors including the level of language proficiency and the demands of the reading task used to assess reading comprehension. Despite the acknowledged importance of working memory for reading in different languages, there is a lack of research in the Arabic context investigating the role of working memory in literacy skills. The next section discusses the findings of these few studies.

Research on working memory /Arabic reading comprehension

Little work has been conducted to explore the impact of working memory in the Arabic context. However, the existing data shows inconsistent results. On the one hand, Al Rashidi (2010) in a study investigating the predictors of reading comprehension in Arabic found that working memory measures were not strong predictors. On the other hand, Al Menaye (2009) found that working memory was an independent predictor of reading comprehension. However, Al Menaye found that only listening span, the working memory measure that requires the retention and processing of language items for deriving meaning, was a significant predictor of reading comprehension. In contrast, backward digit span, which involves processing random numbers, was poorly related to comprehension in Arabic. In a recent work exploring the predictors of L1 and L2 reading comprehension for native Arabic learners of English (ages: 9, 11, 13 and 14), the results showed that L2 working memory explained variability in L2 reading comprehension. On the other hand, the results showed that L1 working memory (listening span and backward digit span) did not contribute significantly to L1 reading comprehension, after controlling for the influence of morphological skills, syntactic awareness and decoding fluency in both languages (Elsheikh, 2012). Therefore, the aim of this current work was to explore further the role of working memory in Arabic literacy skills, in particular reading comprehension, and the variables that might affect that role.

In conclusion, research into reading derived from monolingual and bilingual children and adults has demonstrated that working memory plays an important role in predicting variance in literacy. Despite, the acknowledged importance of working memory for reading, there are still unresolved issues regarding its contribution. However, there is less research into Arabic, the language at the heart of the current study. Therefore, the current work investigates the relationship between working memory and literacy skills, mainly reading comprehension of grade 6 children (aged 11) speaking Arabic as a 1st language and English as a 2nd language in Kuwait.

Overview of the literature

Without literacy, all other learning in school (and similar educational contexts) would be difficult. Literacy depends on a range of cognitive skills that can influence acquisition. The previous research, described in the above reviews of the literature, has proposed that those processes associated with the functioning of working memory can support reading development, as well as being a potential cause of literacy learning difficulties. In addition, this research has also indicated that the context in which a child has been raised, and the cultural activities that shape that context, play a significant role in developing literacy skills.

Reading comprehension (the focus of the current work) is one aspect of literacy that has been considered to be particularly influenced by working memory. However, in addition to working memory, there are additional skills that have been found to contribute to L1 and L2 reading comprehension (Goff et al., 2005; Seigneuric et al., 2000). These skills include word reading (accuracy & fluency), phonological skills and vocabulary. Although each one of these three skills has been argued to improve reading development more than working memory (Almenaye, 2009; Seigneuric et al., 2000), working memory has been found to be related to these three areas of literacy and language (Bayliss et al., 2003; Gathercole & Adams, 1999; Tunmer &Hoover, 1992) and, therefore, may support the development of those skills underlying reading comprehension. Accordingly, working memory has received increased attention for its potential role in reading processes, including those involved in second language literacy acquisition (see Alptekin & Ercetin, 2010; Pae & Sevcik, 2011).

However, features associated with different orthographies, as well as factors related to second language learning or bilingualism, have been found to determine the contributions of working memory to reading skills (Almenaye, 2009; Wen, 2007). In the case of Arabic (the focus of the current work), processing a devowelised text may require more involvement of working memory resources than processing a vowelized one (Almenaye, 2009) – hence, theories on the relationship between literacy and working memory may need to be modified following more extensive research in Arabic (for example, work looking at older cohorts of children than those involved in the work of Almenaye, 2009). Furthermore, it has been presumed that processing a text in a

second language (L2) may impose heavy demands on working memory resources, especially those of the central executive (Wen, 2007) – hence, the relationship between working memory and literacy may vary dependent on whether first or second language literacy is the focus of study. Relationship between working memory and literacy have also been influenced by the task used to assess reading and the level of language competency (e.g., Seigneuric et al., 2000; Van den Noort et al., 2006) – hence, more research would be useful contrasting different measures of working memory, particularly for use in different orthographies/languages, as well as controlling for language proficiency. Language skills are rooted in the early years, before schooling; and the child's context, and the culture activities that shape that context, are likely to influence the development of literacy skills. In this sense, the literature review points to the importance of viewing both cognitive and socio-cultural factors as foundations for literacy learning. Given that, the current work adopted mixed methodology in order to investigate the influence of cognitive factors (working memory) and the socio-cultural aspect of literacy (the child context and cultural activities) in literacy skills.

The literature reviewed in this and previous chapters has indicated that word reading skills play an important role in reading comprehension. Therefore, the starting point of this thesis work involved comparing working memory and word reading skills in terms of their ability to predict variability in reading comprehension. Baddeley's working memory model (Baddeley's & Hitch1974; Baddeley's, 1986) and Firth's model (1985) of word reading development were used as frameworks to contrast these potential predictors. Baddeley's model of working memory was used because of its inclusiveness and its clear construct that accounts for various kinds of remembering (visual & verbal) (Henry, 2011). Besides, working memory measures that based on the three components model have been found to significantly associate with literacy skills. Frith's model has provided a very useful description of children's strategies when reading. Besides, it may serve well for Arabic literacy (Azzam, 1990). However, the literature argued that word reading skills is not sufficient by itself for understanding a text (Cain et al., 2007). Therefore, the Simple View of Reading model (Gough &Turmer, 1985) had evolved to provide the second component of reading comprehension mainly vocabulary (an aspect of language comprehension). That model was used in the current work because it places equal importance on word reading skills and language comprehension in reading

comprehension performance. Additionally, it has the potential to permit comparisons across languages / orthographies and categories literacy problems (Sadegi et al., 2014).

Additionally, the literature review points to the potential interdependence between working memory and the level of language competence (e.g., Van den Noort et al., 2006). However, data from literature review showed that language skills are influenced by the early literacy and language experiences which children are exposed to in home (Sénéchal & LeFevre, 2002). Accordingly to The Home Literacy Model proposed by Sénéchal & LeFevre (2002) evolved to explore the influence of child's context on the development of literacy and language skills.

In summary, the literature review highlighted the role that both working memory and home literacy environment play as two foundations of literacy acquisitions. Understanding how these factors contribute to literacy achievement could provide us with information that may help in enhancing children's attainment in literacy skills. The design and methodology adopted to investigate that potential role of both working memory and child's context in literacy skills in Arabic and English is discussed in chapter 6.

Chapter 3

METHODOLOGY

Introduction and rationale

This work aimed to investigate the potential role that working memory may play in reading comprehension for Arabic children from governmental schools learning Arabic as a first language and English as a second language. Investigating the role of working memory in the Arabic context may add valuable information to theories of literacy since the Arabic language has specific features which differ from English and have been less investigated. Moreover, the current thesis may reveal how working memory contributes to reading comprehension in bilingual learners and may also add clarity to the debate concerning the nature of the potential relationship between working memory and reading comprehension, whether it is mainly through verbal measures or both verbal and nonverbal ones.

The current work also investigated the influence of home literacy practices on literacy skills development and working memory performance in Kuwait. The potential findings that emerged from this work could help both teachers and families with promoting children's literacy skills. Finally, this work is a step towards developing diagnostic tools for Kuwaiti mainstream schools, which in turn may help in identifying children who are at risk of failing to acquire literacy. This may provide useful information that could help in designing remedial intervention.

The research aims

The aims of the current research were firstly to explore the relationship between working memory and the reading comprehension of grades 6 children speaking Arabic as a 1st language and English as a 2nd language in Kuwait; secondly, to determine the nature of this relationship (i.e. does it only exist through verbal working memory measures or through both verbal and nonverbal working memory measures?); thirdly, to

explore the variables that might influence the relationship between working memory and reading comprehension; fourthly, to map the relationship between the home literacy environment (literacy activities in the home and parents' beliefs and attitudes towards literacy) and children's performance in literacy skills' development, and to establish whether home literacy activities, mainly learning the Qur'an, has an impact on working memory performance.

Research questions

The principal research questions guiding the current work are as follows:

1. Is there a relationship between working memory and Arabic and English reading comprehension?
2. Is the contribution of working memory to reading comprehension dependant on the task modality (verbal tasks being more predictive than visuo-spatial tasks)?
3. Is the relationship between working memory and reading comprehension influenced by variables, such as the level of language proficiency and the nature of reading task used to assess comprehension?
4. Is working memory a significant predictor of reading comprehension performance, even after controlling literacy skills measures?
5. Does working memory play the same role in Arabic as it plays in English?
6. To what extent do the social context, mainly the home literacy environment, influence children's performance in literacy tasks and working memory performance?

Research design

Generally, educational research is grounded in quantitative, qualitative and mixed methods. Basically, the choice of research methods affects the veracity of the findings, and each research method is suited to answering specific types of questions, but may not be appropriate for answering other types (Thomas, 2003).To take this into consideration, three out of the four studies of this work were located in quantitative method using correlational studies (studies 1, 2 & 3) to investigate the relationship between working

memory and reading comprehension. Regression analysis was conducted to identify the predictive power of working memory measures to literacy measures, mainly reading comprehension; and also to explore whether working memory plays the same role in the Arabic language as it plays in English language. The fourth study introduced a mixed method (quantitative & qualitative) into the design to investigate the influence of home literacy environment (literacy activities and parents' beliefs and attitudes towards literacy) on children's performance in literacy skills. The study also investigated the influence of home literacy activities, mainly learning the Qur'an, on working memory performance. Data derived from parents' responses to a questionnaire about home literacy activities was compared with their children's performances on measures of literacy skills, vocabulary and working memory using SPSS software. Based on the results of the questionnaire, semi structured interviews with several of the children's parents were conducted to explore in more depth the influence of parents' beliefs and attitudes on the literacy activities in children's homes, which in turn could have an impact on both literacy skills development and working memory performance.

The clearest way to investigate the first five questions was a carefully designed correlational research. This enabled:

1- The measurement of working memory skills and comparing these measures with literacy measures and language skills (reading comprehension task, word reading skills, word spelling accuracy and vocabulary.

2- The setting up of a research situation where conditions could be identical for all the participants.

3- The potential for collecting data from a sufficient sample of children to allow statistical analysis.

However, to provide a full answer to question six, there is a need for both quantitative and qualitative elements to this study. Thus, a combination of quantitative and qualitative methods was used to investigate the influence of the social context, mainly home literacy activities on literacy skills development and working memory performance.

As a doctoral student, conducting research into education, the researcher has the opportunity to explore different research methods out of an array of research methods available. Hence, the researcher must handle these methods with care because choosing inappropriate research methods (ill-suited to the context of one's research) can have a profound impact on the validity and reliability of the data collected. Within this context of care, the researcher's initial work was located in the empirical research paradigm using correlation and regression analysis. The reason for choosing the quantitative method is the belief that data collected through quantitative methods would provide more objective and accurate information as a result of using standardized methods. This is because quantitative approach tends to measure 'how much', or 'how often' (Nau, 1995). Furthermore, this design allows flexibility in the treatment of data, in terms of comparative analyses, statistical analyses, and repeatability of data collection in order to verify causal relationship between variables. However, this does not mean that it is always or even often the ideal research method (Howitt & Cramer, 2008). Miles and Huberman (1994) stated that quantitative method can test hypotheses, but may miss contextual details because it cannot explore it. Glymour et al. (1987 cited in Gorard, 2001) argued that much of what we know is not empirical, and what we want to know cannot be.

With this in mind and following the advice of Mortimore (2007), the researcher started to develop a more qualitative aspect to the study. This was for many reasons: firstly, exploring the influence of the social context in which literacy skills developed could not be investigated with only quantitative methods; secondly, to avoid the criticism that attempting to apply scientific methods to social science research with people (Silverman, 1997) ignores the 'real lives' and experiences of the children involved in the study. Within the same context, Smeyers (2008) stated that a science whose foundations and principles are only experiential can produce false information. Therefore, expanding the quantitative method with elements of the qualitative can support and clarify the meaning of quantitative research. Borg, Gall and Gall (1993) argued that the purpose of qualitative research is to develop understanding of individuals and events in their natural state. Consequently, both quantitative and qualitative methods should be considered as "complementary rather than antagonistic" (Thomas, 2003, p. 6).

By combining the two methods, the researcher aimed to achieve good research. Rudestam and Newton (1992) defined good research as a, "constant balancing act between control and meaningfulness" (p. 29), and cautioned against the danger of giving up one for the other. Johnson and Onwuegbuzie (2004) lend a support of this view when they stated that a mixed methodology "is an expansive and creative form of research, not a limiting form of research. It is inclusive, pluralistic, and complementary" (p. 17). Tashakkori and Teddlie (1998) considered mixed methods as a third methodological approach alongside qualitative and quantitative research. By adopting the mixed method, the researcher was free to use the methods most appropriate to his research questions. In a word, there is no method which is superior to another because each research method is appropriate to answering specific types of questions but not appropriate to answering other types (Thomas, 2003).

The fourth study used a 'mixed methods' approach which, according to Creswell (2003), "focuses on collecting and analysing both quantitative and qualitative data in a single study" (p.210). The study incorporates elements of both quantitative (questionnaires, measures of literacy, language and working memory skills) and qualitative (interviews) techniques. Blending both approaches may yield convincing answers to the questions that the current work was intended to address.

Creswell (2003, p.16) mentioned three general strategies/procedures used in the mixed methods approach; (1) sequential procedures, in which the researcher starts with a qualitative method for exploratory purposes and follows up with a quantitative method with a large sample to generalize results to a population (using the results of one method for planning the next method). Otherwise, the study may start with a quantitative method in which a theory is tested and then is followed by a qualitative method including in depth examination with a few cases or individuals. (2) concurrent procedures, in which the researcher combines qualitative and quantitative data in order to provide a comprehensive analysis of the research problem (collecting both forms of data at the same time during the study), and (3) transformative procedures, in which the researcher uses a theoretical lens or perspective as an overarching perspective within a design that contains both qualitative and quantitative data (theoretical lenses related to gender, race/ethnicity, and class). The present study uses the first type of these procedures, the sequential procedure. The fourth study started with the quantitative, to explore the

relationship between home literacy activities and both literacy skills development and working memory performance. This was achieved by comparing parents' responses on a questionnaire with their children's scores on measures of literacy and working memory skills. This was then, followed by the qualitative method (semi-structured interviews with children's parents) to understand what was happening in children's houses and explore how parents' beliefs and attitude might have an impact of the efficacy of the literacy activities conducted in children's houses. Collecting diverse types of data could best provide an understanding of literacy skills development.

Participants

The participants for all the four studies were independent samples and were recruited as follows:

Fifty-five children for study one; ninety-nine children for study 2; forty four for study 3 and finally, ninety nine children with their parents were the sample of study 4. Children were chosen from governmental mainstream schools. Governmental schools were chosen specifically because they are not biased towards any particular SES group, and are characterized with a more balanced SES cross-section in comparison to the private education sector found in Kuwait. Children enter a school based on the catchment area. This catchment area varies in wealth and in population and therefore, the school samples were representative of typical SES levels.

All the children were boys (age 11) because of the segregated educational system that is followed in Kuwait, and because it is difficult for a male researcher to recruit female participants in a conservative society like Kuwait. All the children are Arabic speakers from grade 6, and had been learning to read and write in Arabic and English from primary. The choice of 11 year olds as the focus of this work in the first three quantitative studies stemmed from the premise that children in grade 6 (age 11) are in a transition period in literacy and working memory skills development (Alloway, 2011). By grade 6, the Kuwaiti children would have completed primary education, and would be in their first year of intermediate school leading to higher school. This period, therefore, is expected to be the one in which reading comprehension skills have developed to near adult levels (see discussion of this point in relation to Arabic in Al Menaye, 2009). Furthermore, Arabic children at this stage of literacy learning will have

experienced one or more years of having to read devowelized text. Given that non-vowelized text can contain a large number of homographs, the child at this age will have had to develop skills to support word decoding probably through the use of sentence or passage context. Therefore, by age 11, there may be a change in relationship between reading and working memory as the child is required to use text inference processes to support word as well as text meaning processes. Given that such inferential processes have been related to working memory functioning, there may be an increase in the role of working memory at this stage of literacy acquisition (again see arguments related to this point in Almenaye, 2009).

Additionally, Gathercole and Alloway (2004, 2008) argued that working memory capacity develops dramatically in the first ten years of the child's life and is then followed by minor but significant increases up to age 15 (see also Alloway, 2011). Hence, children at age 11 should have passed through the steep rise in working memory capacity argued to occur before the age of 10 years old and be experiencing the more gradual increases that are suggested to occur between 10 and 15 years of age. This would suggest that, by age 11, children's working memory capacity should have developed to roughly adolescence levels, potentially allowing working memory to be used more reliably and efficiently than in younger years. Hence, the combination of these developmental features of working memory together with the developmental and experiential processes found in reading comprehension, particularly among those learning the Arabic orthography, makes age 11 a useful target age in which to study the potential relationships between literacy and working memory in a rarely studied cohort of children (i.e., those from an Arabic speaking and cultural background). Given this focus, and for consistency of interpretation, children at age 11 were also chosen for study 4, which explored the influence of the child's context and cultural activities on literacy and working memory by contrasting findings from parent surveys with the performance of the age 11 children on the measures of reading, language and memory used in (and developed for) this research.

However, clearly, the focus only on 11 years olds places limitations on the wider applicability of the findings: relationships between working memory and literacy development may differ within younger or older cohorts. Additionally, surveys of the parents of these 11 year old children about early literacy experiences which may have

occurred five years prior to the interview relies on memories that may be less reliable over this period of time and, hence, may not show clearly how these literacy experiences may influence literacy acquisition. Despite these problems, focusing a body of research on a theoretically targeted age cohort, as well as allowing contrasts between parental reports and children's task performance, has advantages that should lead to the thesis work providing a body of data that will inform the field in terms of theory development and future research manipulations.

Permission was given by the appropriate authorities (See appendix I). First, a letter was sent out to the Educational research centre office, Kuwaiti Ministry of Education, which in turn sent it to Hwalli educational area to specify the schools to conduct the research. Permission was obtained from the children's parents after sending a letter describing the nature of this research. As for children who participated in the research, they were informed about the relative information about the work and they had the right to withdraw at any time. Selection procedures ensured that none of the children from whom the present data set were obtained had reported evidence of difficulties with literacy learning. This information was obtained from teachers or parents. All the ethical onsiderations contained in Bath Spa School of Education Research Ethics policy were adheredto(Seehttp://www.bathspa.ac.uk/schools/education/research-in-education/useful-documents).

Materials

The researcher was motivated by the hypothesis driven assessment approach when considering the instruments and materials used in this work; materials of this work included selective subtests from different resources.

Measures of literacy skills, phonological processing skills and vocabulary were derived from different sources. Measures of literacy skills (word reading, spelling and sentence reading comprehension), phonological skills and decoding were derived from Al Rashidi (2010), Text reading comprehension measures were based on Mahfoudhi's manual script of a reading comprehension test (2010) to assess comprehension at the text level and finally, vocabulary tests were based on Nation's Vocabulary Levels Test, 2000 (Schmitt, Schmitt & Clapham, 2001). This test was selected because it was suitable for

the level of participants and was frequently used in many bilingual studies. The Arabic vocabulary test was designed based on school textbooks.

Measures of working memory were taken from the Working Memory Test Battery for a child (WMTB-C) and its Arabic version were taken from Al Rashidi (2010) to assess Baddeley's working memory frame. The reasons for choosing this battery of test are:

1- The measures assess working memory abilities of children aged between 5-15 years.

2-The measures of this battery test (phonological loop, visuo-spatial and central executive) have significant predictive validity for vocabulary development, literacy skills and arithmetic test performance (Pickering & Gathercole, 2001).

3-There is ample evidence that the WMTB-C can be a useful tool for diagnosing low literacy levels (Gathercole & Pickering, 2001).

To investigate the influence of home literacy activities and parents' beliefs and views about literacy on children's performance on literacy, vocabulary and working memory tasks, a questionnaire (quantitative method) and semi-structured interviews (qualitative method) were used. Details of the measure are explained below.

Measures of working memory

Working memory in this study was measured by using tasks involving simple retention and tasks involving both retention and processing information. Furthermore, multiple tasks were used to assess each component of working memory except visuo-spatial to explore whether these measures contribute differently, and also to distinguish whether individual students have problems with working memory or in processing particular types of material (Alloway, 2011).

Forward digit span

This task was used in studies 1 and 2. It is used as a measure of simple retention of digits and recalling them in a sequence without manipulation. At the start of the test, the examiner explained to the child what was required. The examiner said the digits at a rate of one per second. The test began with 2 digits and progressed to a maximum of 7(See appendix B). The test was stopped when two lists of a particular length were recalled incorrectly.

Non-word repetition

This task was used in studies 1 and 2. It is another measure of simple retention of verbal items. This test is also known as a pseudo words test because it is considered to be relatively free from word lexical effects. The task comprised of 25 pronounceable non-words that were not meaningful in Arabic and English language. The examiner verbally presented each non-word for the child to repeat (See appendix C.1 & 2). The task began with non-words of one syllable increasing to words of seven syllables, with the number correctly repeated being used as the measure for this task.

Backward digit span

This task was used in studies 1 and 2. It was used as a measure of working memory that assesses both retention and processing of digits. It is identical to the forward digit span test in all respects except that the child is required to recall the sequence of spoken digits in reverse order (See appendix D). Practice trials were given in order to ensure that the child understood the concept of reverse.

Listening span

This task was used in studies 2 and 3. It is used to assess both retention and the processing of linguistic information. It is like reading span, the complex –span task originally developed by Daneman and Carpenter (1980). With listening span, the examiner says an increasing series of meaningful short sentences starting from 1 -2 – 3 till 6 sentences. Only some of these sentences make sense. The child immediately stated whether the sentences are true or false after hearing them. After hearing all the sentences in a trial (1-6), the child was asked to recall the final word of each sentence in order they were presented (see appendix E). This task requires processing along with recall information from longer term memory. This additional processing requirement requires involvement of the central executive.

Block recall

This task was used in study 1. It was used to assess visual working memory. The test used a sheet of A4 paper on which were drawn an array of nine black circles with the page being placed between a child and the assessor so that both could see the circles. The examiner used a similar A4 sheet with identically placed circles numbered 1 to 9 to

make the correct pointing movements and to help record responses: the child was not allowed to see the numbered version of the circles. In the task, the examiner pointed to a sequence of circles, and then removed his hand from the page. The child then was required to point at the same circles in the same order. In the measure items, the sequences began with two pointing movements and increased by one after every three items up to maximum sequences of eight pointing movements. The measure continued until a child failed all three items within a block or until the measure was completed. The examiner recorded the participant's response and the total number of correct responses was used as the score for this measure.

Measure of literacy

Sentence reading comprehension

This task was used in studies 1 and 2. It was used to assess comprehension at the sentence level. It was comprised of 25 incomplete sentences. Children were given 90 seconds for Arabic and English to indicate the completion word (usually by circling or underlining their choice) for as many sentences as possible, with the correct number giving an indication of speeded comprehension (See appendix F.1 & 2). Therefore this test can be described as a reading comprehension fluency test.

Text reading comprehension

The English version of the text reading comprehension task was used in study 2. This task is similar to other reading comprehension tasks, which contain both literal and inferential questions. It involved a series of five passages of increasing length and grade level, which the children were required to read silently. The child was required to answer a series of multiple choice questions concerning the passage just read (See appendix G.3).

The devowelized Arabic reading comprehension task was used in studies 1, 2 and 3; whereas the vowelized version was used in study 3. (See appendix G.1&2).

These tasks are like other reading comprehension tasks, which contain both literal and inferential questions. They involved a series of five or six passages of increasing length and grade level, which the children were required to read silently. The child was

required to answer a series of multiple choice questions concerning the passage just read.

Word reading accuracy

This task was used in study 1. It was used to assess participants' ability to apply knowledge about phonemes and graphemes to meaningful combinations of sounds. The word reading test consisted of 40 isolated words in Arabic and English (See appendix H.1&2). Words used in this measure were arranged from simple to complex. The child was asked to read the words aloud one at a time. The measure was done individually so that the examiner can write down the responses of the child. The number of correct responses was the score of each child for this task.

Word reading fluency

This task was used in studies 2 and 3. It was used to assess the ability to read words at an accurate and appropriate rate. An A4 sheet of 30 words in Arabic and another one in English with 30 words were presented to the children to read and the time was recorded for each session of reading (See appendix I.1 &2). The test was done individually in a quiet room. The score was two-fold: the number of correct words and the time of reading in seconds. The number of correct words was divided by the time taken to produce a measure of fluency.

Word spelling

This task was used in study 1. It was used to assess the child's ability to master the phonemes of a language and their grapheme correspondences. This measure was comprised of 40 isolated words in Arabic and in English (See appendix J.1&2). The examiner dictated the words to children, saying the word two times. The number of words written in correctly was the score of each child for this task**.**

Phonological measures

Non-word reading

This task was used in study 1. It was used to assess the ability to translate printed symbols into sounds. Pseudo words or Non-words are pronounceable combinations of letters which lack semantic meaning, This measure is considered unreadable using either

contextual clues or previous sight word familiarity but can be decoded and pronounced via phonological processing and alphabetic (letter-sound) knowledge. By using non-words, the test guarantees that the child has never heard the particular sequence of phonemes before. So there is no stored phonological representation of the non-word in the mental lexicon (Snowing, 2000).The English non-word reading test had 17 non-words and the Arabic test had 25 non-words. (See appendix K1&2). No time limits were imposed and the score given was the number of non-words read correctly.

Phoneme deletion

This task was used in studies 2 and 3. It was used as a measure of the ability to recognize sounds within words; i.e., to assess phonological awareness skills. The task was comprised of 30 items (See appendix L. 1&2); ten requiring the first sound in the word to be deleted, ten requiring the middle sound to be deleted, and ten requiring the final sound to be deleted. The task began with the examiner stating the word, and then asking the child to say the word (the word is repeated at this point) without the target sound (an English example would be to 'Say 'cat' without the 'K' sound'). The number of items correctly pronounced was the score of each child.

Rapid naming

This task was used in study 3. Rapid naming was used to assess children's ability to retrieve the phonological code from the long-term memory. In naming speed tasks, participants must verbally name a set of letters as quickly as possible. The children were given the nine letters before speeded naming began to make sure that they could name them. The nine letters were presented in one line. (See appendix M). The test was done on a sheet of paper that contained nine familiar letters repeated four times in a different order. Before testing, the children were given each of the nine letters and asked to name each to ensure familiarity and accuracy of response. A timer was used to count the time in seconds. The number of seconds spent in naming the thirty six letters was the score of the task. The test was done individually in a quiet room during the school day.

Langaue measure

Vocabualry

This task was used in studies 2 and 3. This task was to assess children's knowledge of word meaning. The test included 40 sentences. Each sentence had an underlined word which was paraphrased at the end of the sentence between brackets. This paraphrase explained the meaning of the underlined word and it (the paraphrase) needed to be judged with a (yes-no) response by children (See appendix N). The number of correct responses was the score that the child got.

The questionnaire

This task was used in study 4 (See appendix. O). It was used to discover the influence of the home literacy activities on literacy acquisition and working memory performance. Using questionnaire measures enabled the researcher to obtain a large amount of information about home literacy factors from a large number of participants in a short time. It could also yield truthful responses from the participants since confidentiality is assured when answering questionnaires, (Ary, Jacobs, & Razavieh, 2002).

The questionnaire used in the current thesis work was based on an Arabic language questionnaire used by Tibiah and Haynes (2011) that asked parents questions regarding the literacy and language experiences of their children in their home environment. Tibiah and Haynes administered their questionnaire to native Arabic speaking parents of 237 Saudi Arabian children from kindergarten to grade 3 whose native language was also Arabic. Their findings suggested relationships between measures of literacy (word reading and reading comprehension) and home exposure to literacy and language practices (e.g., the language used in daily conversation at home, the amount of literacy materials reported in the home, etc). Hence, this questionnaire provides a basis on which to conduct the current work. However, although this questionnaire included questions regarding the literacy and language experiences in the home environment, these data were gathered in order to control for their effects on literacy levels, rather than specifically study them (which are the aim of the current work reported in this thesis). Additionally, the Tibiah and Haynes study aimed to identify the children who had previously received special education services, which was not a focus of the current

work. Hence, the Tibiah and Haynes questionnaire was modified to fit the aims of the thesis research, with individual questions been deleted, when unrelated to the focus of this work, and added or changed based on the Home Literacy Model proposed by Sénéchal & LeFvre (2002). According to this model, home literacy activities can be categorized into two types: storybook reading and direct teaching of literacy skills. Each type of home literacy activity has been linked to children's literacy and language development: storybook activities are presumed to support improvements in vocabulary and reading comprehension, whereas parents' direct instruction of literacy skills are presumed to lead to the development of word reading skills (Sénéchal, 2006). However, an additional area of literacy and language learning not explicitly included in the Tibiah and Haynes (2011) questionnaire, and not specifically considered by Sénéchal & LeFvre (2002), but which is a feature of Arabic culture, is the learning of the holy book of Islam, the Qur'an. For many Arab families, particularly in Kuwait, this may be one of the main books with which most families will interact. Given this potential importance as a source of home literacy learning, questions related Qur'an learning experiences were added to the current questionnaire, along with items focusing on exposure to storybooks and parents' literacy instruction practices.

The questionnaire items contained 8 questions which assessed a range of aspects of home literacy. These questions mainly explored parents' educational level, the literacy resources available in their home environment, frequency of parental involvement in literacy activities (mainly parent-child book reading), children self-reading, and teaching activities such as helping children with their homework and teaching the Holy Qur'an. The inclusion of these questions in the current questionnaire was based on strong evidence (See chapter 3), which establishes the influence of home literacy activities on literacy development.

The questionnaire was designed to be closed-ended. The rationale for choosing closed-ended question design was to ensure that all people would have the same frame of reference in responding (Ary et al., 2002) and to produce highly valid answers to these questions. Another reason for adopting the closed-ended questions was that participants' responses on these questions are easier to categorize and analyse statistically. For example, parents' responses on question 2 which asked about their own level of education was coded: undergraduate was coded 1 and graduate was coded 2 (See

appendix O). Parents' responses on the questionnaire were compared with their children's scores on measures of literacy, vocabulary and working memory.

Personal interviews

Based on the results of the questionnaire, semi-structured interviews were conducted to get elaboration on the parents' responses to the questionnaire; and to get more insight into their beliefs and attitudes towards literacy. Using the interviewing method permits personal contact between the researcher and the parents which in turn enhances the opportunity to press for additional information, especially when the responses seem incomplete or not relevant.

The interview questions were open ended and based on the parents' responses to the questionnaire. The questions were specific to the parent-child interaction, the parents' views about literacy and the child's functioning in the home environment to make the interview more relevant. Questions about the role of learning the Qur'an and Diwaniya (a specific Kuwaiti activity) were raised and how these might potentially influence oral language, literacy skills and working memory performance. (See appendix P.1 &2).

Procedure

All measures used in this work were based on pilot studies and previous research from the literature around both English and Arabic. All the instruments were piloted on a group of children and a group of parents similar to the eventual sample used in the thesis to ensure that the measures are reliable, and the procedures were manageable, intelligible and easy to interpret. In response to the results of the pilot studies, minor modifications were made to some tests. For example, some items of the word reading accuracy test showed little variation. Thus, these items were dropped since they may contribute little or nothing to variation in the total score in the test. An instruction manual, a record form, and the necessary materials for the tasks were prepared.

Testing was performed either in small groups or individually in a quiet classroom supervised by the researcher. That is, tests were individually administered to children in a quiet room away from distractions except for the comprehension and spelling tasks, which were given to groups. Group testing occurred in a classroom setting, but children were not allowed to talk or see each other's work. Each task was preceded by

verbal/visual instructions, together with one or more examples of the task required. Items and instructions were presented in standard written Arabic and English and were understood by the children tested. Practice items were used throughout to ensure understanding. Children's scores on measures of literacy and working memory were analysed by SPSS software programme.

The questionnaire was initially piloted with 27 Kuwaiti mothers who were randomly chosen with the help of a school social worker. Respondents answered the questionnaire one at a time and provided feedback on any difficulties or ambiguity they had with the items. Accordingly, appropriate language for the likely participants was chosen in the final version to avoid the possibility of misinterpretation of the questions by some respondents. That is, short and simple sentence structures which consisted of every day words were used in writing questionnaire items. The final version of the questionnaire was distributed to the parents who agreed to participate via the child of each parent, who had participated in the study. A week was given to fill the questionnaire. All these procedures taken in constructing the questionnaire aimed to achieve reliability and validity.

As for the interviews, ten adults (parents of children) were chosen. The criterion for choosing parents for the interviews was based on their children's performance on literacy and vocabulary tasks. To elaborate, five adults who represented the parents of children who had below average scores on literacy measures. The second five represented parents who had children with above average scores in literacy measures. That is, they represented all of the skills levels (parents of skilled or less skilled children). Ten consent letters were sent to these parents informing them about the nature of the interviews. Furthermore, parents were free to set the date that suited them. Confidentially was assured to the parents. Only four adults agreed to be interviewed - two mothers and two fathers. All the interviews were conducted in their children's school library.

In conclusion, chapter 6 has discussed the rationale in conducting the work and the research questions. It also tackled the methods that were adopted to investigate the research questions. The participants, material, procedures and ethical considerations were also explained. The next chapters will describe the studies that were conducted during the research.

Chapter 4

FINDINGS FROM EMPIRICAL STUDY NO 1: THE RELATIONSHIP BETWEEN WORKING MEMORY AND L1 AND L2 READING COMPREHENSION

Summary of the aims

The initial study of this thesis examined the relationship between working memory (WM) and the basic skills of literacy in general and reading comprehension in grade 6 children (age 11) speaking Arabic as a 1st language and English as a 2nd language in Kuwait. It also investigated the nature of this relationship to see whether it operated mainly through verbal working memory measures or through both verbal and nonverbal working memory measures. The methodology has been described in chapter 6. Children were tested on their WM skills (phonological loop, visuo-spatial and central executive), their literacy skills (word reading accuracy, spelling and comprehension (timed) and a decoding measure (non-word reading) in both languages.

The findings

All scores for performance on the measures for the current study were collected and entered into an SPSS database for statistical analysis using correlation and regression analysis. The data is analysed in the following Tables. In Table 7.1, a descriptive analysis is presented. Then in Tables 7.2, 7.3 and 7.4 within-language and across-languages correlations are presented. Regression analyses are presented in Tables 7.5 and 7.6.

Table 7.1 Descriptive statistics: means and standard deviations with minimum and maximum scores in brackets

Measures	Arabic	English
Word reading	30.80 7.15 (12-40)	25.61 5.58 (10-39)
Word spelling	30.41 6.47 (15-40)	21.01 6.04(7-39)
Non-word reading	13.14 4.03(2-22)	13.49 3.97 (3-21)
Sentence reading comprehension	17.34 4.30 (9-25)	13.14 4.12 (6-25)
Forward digit span	4.89 1.90 (3-12)	4.14 1.61 (2-11)
Backward digit span	6.83 2.29 (2-10)	5.94 2.10 (2-7)
Non-word repetition	12.16 2.70 (5-17)	14.80 2.97 (9-23)
Block recall	28.76 5.59 (21-48)	

Table 7.2 Correlations between the Arabic measures used in the study

Variable	Sentence reading comprehension	Word reading	Word spelling	Non-word reading	Forward digit span	Backward digit span	Non-word repetition
Sentence reading comprehension							
Word reading	**.833**						
Word spelling	**.741**	**.747**					
Non-word reading	**.608**	**.624**	**.505**				
Forward digit span	**.468**	.316	.299	**.513**			
Backward digit span	.073	.065	.026	.222	.331		
Non-word repetition	.162	.130	.222	.332	**.440**	.314	
Block recall	.220	-.131	.091	.184	.179	-.164	.120

Note: Values in bold are significant at .01 level

Note: The underlined correlations were significant at .05 level.

Table 7.3 Correlations between English measures in the Study

Variables	Sentence reading comprehension	Word reading	Word spelling	Non-word reading	Forward digit span	Backward digit span	Non-word repetition
Sentence reading comprehension							
Word reading	**.808**						
Word spelling	**.773**	**.762**					
Non-word reading	**.517**	**.398**	**.354**				
Forward digit span	.325	**. 398**	. 308	.052			
Backward digit span	**.**230	.329	.183	-.098	.299		
Non-word repetition	**.361**	**.440**	**.398**	.062	. **478**	291	
Block recall	.134	.172	.214	.174	.211	.184	.222

Note: Values in bold are significant at .01 level.

Note: The underlined correlations were significant at .05 level.

Table 7.4 Correlations between the Arabic and English measures used in the study

Arabic							
English	Sentence reading comprehension	Word reading	Word spelling	Non-word reading	Forward digit pan	Backward digit span	Non-word repetition
Sentence reading comprehension	**.689**	**.713**	**.695**	**.699**	**. 376**	. 219	.164
Word reading	**.724**	**.716**	**.826**	**.667**	**.382**	.033	.224
Word spelling	**.623**	**.645**	**.615**	**.746**	**.549**	.073	.175
Non-word reading	**.372**	**.507**	**.408**	**.406**	.074	.069	.065
Forward digit span	.278	.207	.207	**.**337	**.613**	.063	-.002
Backward digit span	.214	.172	.286	.326	.362	.373	.168
Non-word repetition	.263	.228	**.387**	**.374**	.201	-.213	**.549**

Note: Values in bold are significant at .01 level.

Note: The underlined correlations were significant at .05 level.

Note: From now on through the studies, significant beta score values at *p* .05 levels are reported. The beta values provided were related to the specific language mentioned in the header unless it was mentioned clearly in the other language.

Table 7.5 Regression analysis to investigate working memory variance in Arabic (L1) reading comprehension

	Variables	**R^2**	**R^2change**	**Sig R^2 change**	**Final Beta**
I					
1	Working memory	.287	.287	F(7,47) = 2.703 , p =.019	
2	Literacy skills (Word reading and spelling)	.777	.490	F(4,43) =23.577, p <.001	
3	Non-word decoding	.783	.006	F(2,41) = .576, p .567	
II					
1	Literacy skills (Word reading and spelling)	.735	.735	F(4,50) =34.651 , p <.001	Word reading =.572 Word spelling = .203
2	Non-word reading	.745	.010	F(2,48) =.963, p =.389	
3	Working memory	.783	.038	F(7,41) = 1.017, p =.434	Forward digit span =.274

Table 7.6 Regression analysis to investigate working memory variance in English (L2) reading comprehension

	Variables	R^2	R^2change	Sig R^2 change	Final Beta
I					
1	Working memory	.322	.322	F(7,47) = 3.182, p =.008	
2	Literacy skills spelling)	.794	.472	F(4,43) = 24.689, p <.001	
3	Non-word reading	.806	.012	F(2,41) = 1.267, p =.293	
II					
1	Literacy skills (Word reading and spelling)	.732	.732	F(4,50) = 34.212, p <.001	Word reading =.418 Word spelling =.298
2	Non-word decoding	.760	.028	F(2,48) = 2.761, p =.073	
3	Working memory	.806	.046	F(7,41) = 1.395, p =.234	Arabic backward digit span =.205

As shown in Table 7.1, the results showed that most of the Arabic measures (i.e., in word reading, reading comprehension, spelling, and backward and forward digit span) produced higher mean scores than the English-language equivalents. The exceptions were the non-word reading and non-word repetition measures, where average scores in the Arabic version were slightly lower than in those in the English measures. Despite these exceptions, the general trend was for L1 scores to be better than L2.

Pearson correlation coefficients were calculated to determine whether there was a relationship between working memory and literacy skills measures, mainly reading comprehension and the nature of this relationship. Correlations between the measures within and across languages were presented in Tables 7.2, 7.3 and 4. Tables 7.2 and 7.3 showed correlation within language. Table 7.4 showed correlations between Arabic and English measures.

In Arabic, the results showed that measures of word reading; word spelling, non-word reading and reading comprehension were correlated (see, Table 7.2). The results also showed that working memory measures, forward digit span, non-word repetition and backward digit span were correlated. However, block recall was poorly correlated with other working memory measures used in the study.

Regarding the relationship between working memory measures and reading comprehension measures in Arabic, the results showed that forward digit span was correlated with measures of reading comprehension, word reading and spelling, whereas non-word repetition was related to non-word reading. Backward digit span and block recall was poorly correlated with all the measures used in the study.

In English, correlations were observed among measures of word reading, word spelling, non-word reading and reading comprehension (See, Table 7.3). Working memory measures forward digit span, non-word repetition and backward digit span were correlated. However, block recall was poorly correlated with other working memory measures used in the study. With respect to the relationship between working memory and literacy measures, the results showed that forward digit span and non-word repetition were correlated with reading comprehension, word reading and spelling. Backward digit span was correlated with reading comprehension and word reading. Block recall was poorly correlated with all the measures used in the study.

Table 7.4 showed correlations between Arabic and English measures. The results showed that measures that tap the same construct were correlated across languages. Therefore, literacy skills and working memory measures in Arabic were correlated with the English versions. Correlations were observed between Arabic measures of reading comprehension, word reading, word spelling and non-word reading and their English equivalent versions. Again, cross correlations were observed between the Arabic version

of working memory measures forward digit, backward digit span and non-word repetition and their English equivalent versions.

To investigate the predictive role of working memory to comprehension measures in Arabic and in English, a pair of hierarchical regression analyses was conducted for each comprehension measure to assess the level of prediction of reading comprehension in English and Arabic provided by the other measures, specifically working memory. In each step of the regression equations, the reading comprehension measure for each language was the dependent variable in the analyses. In the first analysis (I), all the three working memory measures in L1 and L2 were entered alone to investigate the unique variance of working memory in comprehension measures. In the second analysis (II), literacy skills and decoding in both languages were entered prior to working memory to find if working memory still predicts reading comprehension even after controlling literacy skills. The order of variable entry in the second analysis was word reading and spelling in both languages was entered first because they are considered as foundation skills that promote reading comprehension. This was followed by the decoding measures that word reading is partially relying on. Finally, measures of working memory, a construct that is considered to support complex cognitive activities (Baddeley & Hitch, 1974). The final beta column presents the beta values for the final model (i.e., after all variables have been entered). Therefore, it can be interpreted as the association between the variable and the comprehension measure after controlling for all other variables in the final model.

The regression results in Table 7.5 showed that working memory explained 28% of the unique variance in Arabic reading comprehension in the first analysis (I). This level of prediction was reduced to 3% in the second analysis when measures of word reading, spelling and non-word reading measures were respectively entered (see II) and to non-significance. The results of the second analysis (II) showed that word reading and spelling accounted for 73% of variability, with non-word reading adding a further about 1% to the variability explained. The beta scores for the final model suggested that word reading (Beta score = .572) and spelling (Beta score =.203) measures were significant predictors of reading comprehension. Within working memory measures, the final model suggested that forward digit span was a significant predictor of reading comprehension (Beta score = .274).

In English, as shown in Table 7.6, working memory measures explained about 32% of variability in sentence reading comprehension in the first analysis (I). However, this level of prediction provided by working memory was reduced to about 4% and to non-significance when measures of word reading, spelling and non-word reading were respectively entered into the equation before working memory. The results of the second analysis (II) suggested that word reading and spelling accounted for 73% of variability (see Table 7.6), with non-word reading adding a further about 2% to the variability explained. The beta scores for the final model suggested that word reading (Beta =. 418) and word spelling (Beta =. 298) were significant predictors of English comprehension measure. Within working memory measures, the final model suggested that Arabic backward digit span was a significant predictor of reading comprehension in English (Beta score =.205).

Summary of the findings

Overall, the results showed that word reading and word spelling was strong predictors of comprehension measures in Arabic and English. Furthermore, the results showed cross language correlations between Arabic and English measures that assess the same construct. The results showed that the relationship between working memory and L1 and L2 reading comprehension was mainly through verbal measures. The results also suggested that this relationship was mediated by word reading skills and spelling. However, the results failed to find an overall independent predictive role for the working memory measures in either L1 or L2 sentence reading comprehension; although the final beta scores for Arabic forward digit span and Arabic backward digit span were significant for the comprehension in Arabic and in English respectively

Conclusion

The results of study 1 suggested many hypotheses that needed to be investigated in another study. First, working memory measures might play a different role in Arabic from English as the results showed backward digit span was a non-significant predictor of Arabic reading comprehension; whereas it was a significant predictor of English. The results also might argue for an interaction between the level of language competence and performance on verbal working memory measures since L1 working memory measure backward digit span was a significant predictor of L2 reading comprehension.

Investigating these hypotheses would be the focus of study 2 by using new measures of working memory (listening span), literacy skills (text reading comprehension & word reading fluency), oral language measure (vocabulary) and phonological awareness measure (phoneme deletion) in addition to the measures used in study 1 except block recall and word spelling, which were let out in study 2.

Chapter 5

FINDINGS FROM EMPIRICAL STUDY NO 2: IS THE WORKING MEMORY/READING COMPREHENSION RELATIONSHIP INFLUENCED BY OTHER VARIABLES (LANGUAGE PROFICIENCY AND THE READING TASK)?

Summary of the aims

Study 2 further investigated the relationship between working memory and reading comprehension and the variables that could affect that relationship such as language (proficiency level, reading task demands). The study also investigated the potential role that verbal working memory measures could play in predicting Arabic and English comprehension measures in Kuwaiti children aged 11, and whether their contribution (verbal working measures) could be varied between the two languages. Measures of vocabulary, word reading fluency and phoneme deletion were undertaken to find out the interaction between verbal working memory and language proficiency. Different reading comprehension tasks were used to assess reading comprehension: text reading comprehension and sentence reading comprehension were used to investigate the demands that each measure could impose on working memory resources. Finally, different measures of verbal working memory such as listening span, digit span measures and non-word repetition were used to find whether these measures were differently related to comprehension in Arabic and English. The methodology has been described in chapter 6.

The findings

The data were analysed in the following Tables. In Table 8.1, descriptive analysis was presented. Then in Tables 8.2, 8.3 and 8.4 within-language and across-languages correlations were presented. Regression analyses were presented in Tables 8.5 and 8.6

Table 8.1 Descriptive statistics: means and standard deviations with minimum and maximum scores in brackets

Measure	Arabic	English
Sentence reading comprehension	19.87 3.07 (11 -25)	16.72 3.21 (9-24)
Text reading comprehension	21.67 5.59 (8-30)	13.39 4.68(3-18)
Vocabulary	33.17 5.55 (13 -40)	26.77 5.57 (15 -37)
Word reading fluency	.79 .46 (.13 -1.70)	91.10 .53 (.27 – 1.82)
Phoneme deletion	23.62 4.94 (12 -30)	21.19 4.95 (8-29)
Forward digit span	7.76 2.10 (4-12)	7.69 1.99 (4-12)
Backward digit span	5.43 1.71 (2-11)	4.23 1.62 (2-9)
Non-word repetition	20.09 2.38 (12 -25)	18.55 2.54 (12-24)
Listening span	9.47 3.53(5-15)	6.52 1.91(3-12)

Table 8.2 Correlations between the Arabic measures used in the study

	Sentence reading comprehension	Text reading comprehension	Vocabulary	Word reading fluency	Phoneme deletion	Forward digit span	Backward digit span	Non-word repetition
Sentence reading comprehension								
Text reading comprehension	**.855**							
Vocabulary	**.559**	**.552**						
Word reading fluency	**.785**	**.827**	**.516**					
Phoneme deletion	**.667**	**.761**	**.429**	**.810**				
Forward digit span	**.562**	**.620**	**.479**	**.593**	**.458**			
Backward digit span	.187	.183	.197	.166	.120	**.273**		
Non-word repetition	**.322**	**.303**	**.474**	**.284**	**.275**	**.379**	.210	
Listening span	**.442**	**.445**	.244	**.358**	**.347**	**.408**	.167	.242

Note: Values in bold are significant at .01 level.

Note: The underlined correlations were significant at .05 level.

Table 8.3 Correlations between the English measures used in the study

	Sentence reading comprehension	Text reading comprehension	Vocabulary	Word reading fluency	Phoneme deletion	Forward digit span	Backward digit span	Non-word repetition
Sentence reading comprehension								
Text reading comprehension	**.815**							
Vocabulary	**.608**	**.534**						
Word reading fluency	**.860**	**.734**	**.596**					
Phoneme deletion	**.721**	**.635**	**.366**	**.648**				
Forward digit Span	**607**	**630**	**474**	**.596**	**440**			
Backward digit Span	**.259**	**.280**	.216	.240	.218	.234		
Non-word repetition	**.454**	**.384**	**.614**	**.393**	**.333**	**.287**	.226	
Listening span	**.419**	**. 471**	.171	**.312**	**.371**	**.266**	.164	.180

Note: Values in bold are significant at .01 level.

Note: The underlined correlations were significant at .05 level.

Table 8.4 showed the correlations between Arabic and English measures

Arabic									
English	Sentence reading comprehension	Text reading comprehension	Vocabulary	Word reading fluency	Phoneme deletion	Forward digit span	Backward digit span	Non-word repetition	Listening span
Sentence reading comprehension	**.553**	**.559**	.157	**.628**	**.551**	**.550**	.200	**.263**	**.339**
Text reading comprehension	**.641**	**.668**	.152	**.638**	**.550**	**.607**	. 230	.249	**.455**
Vocabulary	.141	. 143	**.305**	**.331**	.169	**.379**	.167	.133	.255
Word reading fluency	**.515**	**.489**	**.386**	**.305**	**.515**	**.541**	.190	.194	.267
Phoneme deletion	**.510**	**.487**	**.329**	**.523**	**.600**	**.416**	.137	.097	**.270**
Forward digit span	**.418**	**.399**	**.347**	**.414**	**.361**	**.589**	.225	191	**.266**
Backward digit span	.145	184	.134	.203	.133	**.338**	**.791**	.145	**.223**
Non-word repetition	.233	**.300**	**.365**	.233	.193	**.283**	. 184	**.366**	**.275**
Listening Span	**.315**	**.325**	.255	**.366**	**.362**	**.322**	**.299**	**.246**	**.370**

Note: Values in bold are significant at .01 level

Note: The underlined correlations were significant at .05 level

Table 8.5 showed the results of regression analyses which contrasted working memory, vocabulary and phonological processing predictors of reading sentence comprehension in Arabic.

	variables	**R^2**	**R^2change**	**Sig R^2 change**	**Final Beta**
I					
	Working memory	. 408	.408	F(8,90) = 7.769, p <.001	
II					
1	Vocabulary	.333	.330	F(2,96) = 23.600, p <.001	
2	Word reading fluency	.649	.319	F(2,94) = 47.768, p <.001	Word reading fluency=.620
3	Phoneme deletion	.657	.008	F(2,92) =1.094, p =.339	
4	Working memory	.700	.043	F(8,84) = 1.512, p =.165	Listening span =.175

Table 8.6 shows the results of regression analyses that contrasted working memory and vocabulary and phonological processing predictors of text reading comprehension in Arabic

	variables	**R^2**	**R^2change**	**Sig R^2 change**	**Final Beta**
I					
	Working memory	. 451	.451	F(8,90) = 9.234, p <.001	
II					
1	Vocabulary	.320	.320	F(2,96) = 22.686, p <.001	
2	Word reading fluency	.704	.384	F(2,94) = 60.999, p <.001	Word reading fluency=.461
3	Phoneme deletion	.728	.024	F(2,92) = 4.289, p =.017	Phoneme deletion =.242
4	Working memory	.782	.054	F(8,84) = 2.622, p =.013	Listening span =.155

Table 8.7 shows the results of regression analyses contrasting working memory, vocabulary and phonological processing predictors of sentence reading comprehension in English

	variables	**R^2**	**R^2change**	**Sig R^2 change**	**Final Beta**
I					
	Working memory	. 582	.582	F(8,90) = 15.636, p <.001	
II					
1	Vocabulary	.421	.421	F(2,96) = 34.841, p <.001	
2	Word reading fluency	.773	.352	F(2,94) = 72.891, p <.001	Word reading fluency= 260
3	Phoneme deletion	.811	.038	F(2,92) = 9.158 , p <.001	phoneme deletion =.245
4	Working memory	.838	.027	F(8,84) = 1.777, p =.093	Arabic backward digit span =.200

Table 8.8 shows the results of regression analyses contrasting working memory and vocabulary and phonological processing predictors of text reading comprehension in English

	variables	**R^2**	**R^2change**	**Sig R^2 change**	**Final Beta**
I					
	Working memory	. 574	.574	F(8,90) = 15.146, p <.001	
II					
1	Vocabulary	.440	.440	F(4,96) = 37.780, p <.001	Vocabulary =.214
2	Word reading fluency	. 648	.208	F(2,94) = 27.831, p <.001	Word reading fluency =.470
3	Phoneme deletion	.673	.025	F(2,92) = 3.460, p =.036	Phoneme deletion =.173
4	Working memory	.738	.065	F(8,84) = 2.612, p =.013	Arabic Listening span =.197

As shown in Table 8.1., children's scores on Arabic (L1) measures were better than their scores on English (L2) measures. Within and across languages, correlations were shown in Tables 8.2, 8.3 and 8.4. As shown in Table 8.2, the two Arabic comprehension measures (sentence & text) were correlated. Comprehension measures were correlated with vocabulary, word reading fluency and phoneme deletion. Within working memory measures, correlations were observed among measures of working memory that assess simple retention and those that assess both retention and processing. That is, both forward digit span and non-word repetition measures were correlated with backward digit span and listening span. However, the results showed that the correlation between working memory measures, which assess both retention and processing were poor. That is, the correlation between backward digit span and listening was poor. In terms of the relationship between working memory and literacy measures, the results showed that working memory measures (forward digit span, non-word repetition & listening span) were correlated with measures of vocabulary, word reading fluency and phoneme deletion. However, backward digit span was poorly correlated with word reading, vocabulary and phoneme deletion. With regard to the relationship between working memory and comprehension measures, the results showed that comprehension measures were correlated with all working memory measures except backward digit span. This was poorly correlated with the two types of comprehension measures (sentence & text).

As shown in Table 8.3, comprehension measures (Sentence & text) in English were correlated. Both comprehension measures were correlated with all measures used in the study. They were correlated with vocabulary, word reading fluency, phoneme deletion, forward digit span, backward digit span, non-word repetition and listening span. As for the relationship between working memory and word reading, phoneme deletion and vocabulary, the results showed that all the measures of working memory were correlated with word reading fluency and phoneme deletion. The results showed that all working memory measures were correlated with vocabulary except listening span measure. Within working memory measures, correlations were observed between simple retention measures (forward digit span and non-word repetition); whereas measures assessing retention and processing were poorly correlated (backward digit span and listening span).

Table 8.4 showed the correlations between Arabic and English measures. Within literacy measures, the results showed cross language correlations between measures that assess the same construct in both languages. Therefore, Arabic measures of comprehension,

vocabulary, word reading fluency and phoneme deletion were correlated with their English version. Similarly, measures of working memory forward digit span, backward digit span, non-word repetition and listening span in both Arabic and English were correlated. With regard to the relationship between comprehension and other measures across language, correlations were observed between comprehension measures in Arabic and comprehension measures, word reading fluency, phoneme deletion, forward digit span, , non-word repetition and listening span in English. The results also showed that comprehension measures in English were correlated with all variables in Arabic except vocabulary.

A pair of hierarchical regression analyses was conducted for each of the two comprehension measures to further investigate the relationship between working memory and reading comprehension measures; and whether working measures contributed differently to both languages; to explore if working memory/reading comprehension could be influenced by the nature of the reading task used to assess comprehension; and finally, to investigate the potential role that L1 working memory could play in predicting L2 comprehension measures. In each step of the regression equations, reading comprehension measures for each language were the dependent variables in the analyses. In the first analysis (i) working memory measures in L1 and L2 were entered alone to investigate the unique variance of working memory in comprehension measures. In the second analysis (II) vocabulary measures in L1 and L2 were entered followed by word reading fluency and phoneme deletion measure respectively, and finally, measures of working memory to investigate how these variables (vocabulary, word reading fluency and phonological awareness) may affect the relationship between working memory and reading comprehension. The final beta column presents the beta values for the final model (i.e., after all variables have been entered). Therefore, it can be interpreted as the association between the variable and the comprehension measure after controlling for all other variables in the final model.

As shown in Table 8.5, the first analysis (I) revealed that working memory explained 40% of the unique variance in sentence comprehension measure in Arabic. This level of prediction was reduced to 4% and became non-significant when measures of vocabulary, word reading fluency and phoneme deletion were entered prior to working memory measures in the second analysis (II). The results of the second analysis also showed that vocabulary accounted for 33% with word reading fluency adding a further 31% and

finally, phoneme deletion was marginally accounted to the variability explained. Final beta showed that word reading fluency was a significant predictor of sentence reading comprehension (Beta =.620); and within working memory, the final model showed significant beta of listening span with sentence comprehension measure (Beta=.175).

As shown in Table 8.6, the first analysis (I) in the regression analyses showed that working memory explained about 45% of the unique variance in Arabic text comprehension. However, this level of prediction was reduced to 5% and to significance when measures of vocabulary word reading fluency and phoneme deletion were entered prior to working memory measures in the equation. The results of the second analysis (II) indicated that vocabulary explained 32% of variability in text comprehension in Arabic. Word reading fluency accounted for an additional 38% of variance in text comprehension. Phoneme deletion added a further 2% to the variability explained. The final model showed word reading fluency (Beta=.461) and phoneme deletion (Beta=.242) were significant predictors of text comprehension. Within working memory measures, the final model showed a significant beta of listening span with to text comprehension (Beta=.155).

As shown in Table 8.7, the results of the first analysis showed working memory measures explained about 58% of variability in sentence reading comprehension in English. However, this level of prediction provided by working memory was reduced to about 2% and to non-significance when measures of vocabulary, word reading fluency and phoneme deletion were entered into the equation before working memory in the second analysis. The results of the second analysis (II) suggested that vocabulary accounted for 42% of variability, with word reading fluency adding a further 35% to the variability explained. Phoneme deletion accounted for an additional 3% of the variance in sentence comprehension. Final beta scores showed that word reading fluency (Beta=.260) and phoneme deletion (Beta =.245) were significant predictors of sentence reading comprehension in English. Within working memory measures, Arabic backward digit span measure (Beta =.200) was a significant predictor of sentence reading comprehension.

As shown in Table 8.8, the results of the first analysis showed that working memory predicted 57% of unique variance in text comprehension in English when it was entered prior other measures (see I in Table 8.7). However, the level of prediction provided by

working memory was reduced to 6% and to significance when vocabulary and phonological awareness were entered prior to working measures in the second analysis (II). The results of the second analysis also showed that vocabulary predicted 44% of unique variance in text comprehension. Word reading fluency accounted for 20%, Phoneme deletion accounted for 2%. Within literacy measures, the final model suggested word reading fluency (Beta =.470) and phoneme deletion (Beta score=.173) were significant predictors of text reading comprehension. Within working memory measures, Arabic listening span (Beta =.197) was a significant predictor of text reading comprehension.

The regression results showed that L1 working memory measures played a role in predicting L2 reading comprehension. These findings were consistent with findings of study 1 and could argue for an interaction between working memory and language proficiency level. This might be due to the switching between the languages that is likely to happen when a L2 reader processes a text in L2. The dependence on lexical representations of L1 is likely to happen with a bilingual learner as a strategy to compensate his L2 language incompetence and to understand the L2 text. To investigate this hypothesis, participants of this study were split into two groups according to their scores on L2 vocabulary task (as an indicator of language proficiency). Children who achieved above average were considered skilled readers, whereas those who got scores below average were considered less skilled readers. Coefficient correlations were calculated to determine the relationship between L1 and L2 working memory measures (listening span) and L2 comprehension measures across the performances of the two groups (skilled and less skilled readers). The results showed that the correlation value between L2 reading comprehension and L1 working memory was higher than it was with L2 working memory for L2 less skilled readers. (Arabic listening span = 482**; English listening span = 176**); whereas the correlation value between L2 reading comprehension and L2 working memory was higher than it was with L1 working memory for L2 skilled readers (Arabic listening span = 401**; English listening span = 563**).

Summary of the findings

The results showed that measures of vocabulary, word reading fluency and phonological awareness played an important role in predicting reading comprehension in Arabic (L1)

and in English (L2). Findings of study 2 also proved the relationship between verbal working memory measures and reading comprehension. The results showed evidence of an interaction between verbal working measures and the level of L2 language competence. Furthermore, data from the current study argued that working memory contribution varied according to the nature of the reading task used to assess reading comprehension; and its contribution might be also different according to the specific features of language script.

Conclusion

Study 2 suggested that working memory contribution might be affected by the demands of the reading task used to assess reading comprehension. To further investigate this hypothesis and to have a complete picture about the relationship between working memory and literacy in Arabic, there would be a need to investigate the relationship between working memory and the vowelized form of Arabic script (vowelized text), since the comprehension measures used in study 1 and 2 were devowelized text. Investigating whether working memory contribution could vary according to the form of Arabic script (vowelized or devowelized) would be the focus of study 3.

Chapter 6

FINDINGS FROM EMPIRICAL STUDY NO 3: IS WORKING MEMORY MORE INVOLVED IN DEVOWELIZED THAN VOWELIZED READING COMPREHENSION ?

Summary of the aims

According to the presence and absence of vowels, Arabic script is divided into transparent or deep script. The variation between the two forms of Arabic script might have an influence on reading performance and working memory. Previous studies suggested vowels were found to facilitate both word reading accuracy/fluency and enhance reading comprehension (e.g., Abu Rabai, 2001). Within the same context, Al Menaye (2009) suggested that processing the two form of Arabic script seemed to require different skills. He continued to argue that vowelized text seemed to depend heavily on phonological processing skills and require less complex skills; in particular, working memory. In contrast, processing devowelized text may require a combination of phonological processing skills and working memory. The current study would investigate the influence of vowels within the working memory/reading comprehension relationship.

The findings

The data were analysed in the following Tables. In Table 9.1, descriptive analysis was presented. Table 9.2 presented the t-test value of comprehension measures (vowelized and devowelized). Then, correlations between measures were presented in Table 9.3. Finally, regression analyses were presented in Tables 9.4 and 9.5.

Table 9.1 Descriptive statistics: means and standard deviations with minimum and maximum scores

Variables	Mean	St. Deviation	Minimum	Maximum
Vowelized reading comprehension	23.34	4.79	11.00	30.00
Devowelized reading comprehension	21,18	6.09	8.00	30.00
Vocabulary	28.48	5.33	15.00	37.00
Word reading fluency	.60	.30	.16	1.69
Phoneme deletion	22.61	4.37	13.00	29.00
Rapid naming	21.10	6.48	13.00	40.00
Listening span	7.30	1.54	5.00	11.00

Table 9.2 Mean scores, standard deviation and the t-test valued of comprehension measures T-test vowelized and non -vowelized reading comprehension

Variables	mean	St. Dev	t-test	sig
Vowelized reading comprehension Devowelized reading comprehension	2.16	3.89	3.28	p <.001

Table 9.3 Correlations between the comprehension measures and the other measures used in the study

	Vowelized reading comprehension	Devowelized reading comprehension	Vocabulary	Word reading fluency	Phoneme deletion	Rapid naming	Listening span
Vowelized reading comprehension							
Devowelized reading Comprehension	**.770**						
Vocabulary	**.660**	**.631**					
Word reading fluency	**.530**	**.591**	**.472**				
Phoneme deletion	**.499**	**.521**	**.403**	.325			
Rapid naming	-.163	-.216	-.001	-.226	-.168		
Listening span	**.503**	**.556**	.346	**.430**	.280	**-.365**	

Note: Values in bold are significant at .01 level.

Note: The underlined correlations were significant at .05 level.

Table 9.4 Regression analysis to investigate working memory variance in vowelized reading comprehension

	Variables	**R^2**	**R^2change**	**Sig R^2 change**	**Final Beta**
I					
	Working memory	. 309	.309	F(1,47) = 21.061, p <.001	
II					
1	Vocabulary	.436	.436	F(1,47) = 36.344, p <.001	Vocabulary =.419
2	Word reading fluency	.497	.061	F(1,46) = 5.614, p <.001	Word reading fluency =.166
3	Phoneme deletion & Rapid naming	.549	.052	F(2,44) = 1.892, p = 163	phoneme deletion =.223
4	Listening span	.584	.035	F(1,43) = 3.633, p =.053	Listening span =.264

Table 9.5 Regression analysis to investigate working memory variance in devowelized reading comprehension

	Variables	**R^2**	**R^2change**	**Sig R^2 change**	**Final Beta**
1					
	Working memory	. 253	.253	F(1,47) = 15.903 p <.001	
II					
1	Vocabulary	.398	.398	F(1,47) = 31.080, p <.001	Vocabulary =.334
2	Word reading fluency	.508	.110	F(1,46) = 10.322, p <.001	Word reading fluency =.238
3	Phoneme deletion & Rapid naming	.576	.068	F(2,44) =3.507, p =.039	Phoneme deletion =.231
4	Working memory	.624	.048	F(1,43) = 5.544, p =.023	Listening span =.225

As shown in Table 9.1, children's performance in vowelized reading comprehension was better (M= 23.34) than their performance in devowelized reading comprehension (M=21.18). T-test was used to test the significance of the mean differences of vowels and devowelized reading comprehension. The results revealed that the mean differences of the two forms of reading comprehension measures were significant *t* (48) =3.88, p = .001 (See Table 9.2)

Pearson correlation coefficients were calculated to determine the relationship between comprehension measures and the other measures in the study. Correlations between comprehension measures and other measures used in this study are shown in Table 9.3. As shown in Table 9.3, the two forms of comprehension measures (vowelized and devowelized) were correlated with each other, and they were correlated with all measures used in the study except the rapid naming measure. As for working memory measure-listening span, the results showed that it was correlated with all measures used in the study (see Table, 9.3).

To investigate whether working memory contribution was varied according to the form of reading comprehension text script (vowelized & devowelized script), a pair of hierarchical regression analyses was conducted for each form of comprehension measures (vowelized & devowelized), see Table 9.4 & 9.5. In each regression equation, reading comprehension measure for each form (vowelized & devowelized) was the dependent variable in the analyses. Vocabulary measure was entered, followed by word reading fluency. Then both phoneme deletion and rapid naming measures were entered. Finally, listening span was entered. The final significant beta column presents the beta values for the final model (i.e., after all variables have been entered). Therefore, it can be interpreted as the association between the variable and the comprehension measure after controlling for all other variables in the final model.

The regression results in Table 9.4 showed that working memory explained 30% of the unique variance in vowelized reading comprehension in the first analysis (I). This level of prediction was reduced to 3% in the second analysis when vocabulary, word reading fluency and phonological processing measures were entered and to significance in the second analysis (II).The results of the second analysis showed that vocabulary accounted for 43% of the unique variance in vowelized comprehension measure; with word reading fluency adding a further 6% of the variability. The phonological processing measures (phoneme deletion and rapid naming) accounted for 5%. The final beta scores showed that measures of word reading fluency, phoneme deletion skills, vocabulary and listening span were significant predictors to vowelized reading comprehension.

As shown in Table 9.5 verbal working memory measure explained 25% of the unique variance in devowelized reading comprehension in the first analysis (I). This level of prediction was reduced to 4% when vocabulary, word reading fluency and phonological processing measures were entered and to significance in the second analysis (II). The results of the second analysis (II) showed that vocabulary accounted for 39% with word reading fluency adding a further 11% of the variability in devowelized comprehension. The phonological processing measures (phoneme deletion and rapid naming) accounted for 6%. The final beta scores showed that measures of word reading fluency, phoneme deletion skills and vocabulary measures, and listening span were significant predictors to devowelized reading comprehension.

Summary of the findings

Data derived from study 3 showed that children's performance on reading vowelized text was better than their reading devowelized text. The results of study 3 were consistent with the previous results reported in this thesis on showing that measures of vocabulary, word reading fluency, phonological awareness and working memory (listening span) were significant predictors of reading comprehension regardless of the form of the Arabic script (vowelized or devowelized).

Conclusion

Overall the results of the three empirical studies confirmed the relationship between working comprehension measures in Arabic and English. Furthermore, the results suggested that the relationship was through verbal working memory measures. However, the results showed that the role of these verbal working measures in Arabic and English differed. The results also showed evidence of interaction between verbal working memory measures and children's language competence indicating that children's performances on L1WM measures were better than their performance on L2 WM in studies 1 and 2. The results also showed cross language transfer effect of L1 working memory measures into L2 comprehension measures. It is well known that language skills are rooted and developed in children's home environment (Bonci et al., 2010; Sénéchal, 2006).Thus, home literacy activities and parents' beliefs and attitudes have been found to influence literacy acquisition. Furthermore, learning the Qur'an is a unique home literacy practices restricted to Muslims and might have influence on children's literacy development. Furthermore, regular memorizing and rehearsing verbal material that involved in learning the Qur'an process could have an influence on children's memory performance. Thus, the fourth study investigated the influence of home literacy activities on children's performance on literacy, vocabulary and working memory measures. It also investigated how parents' beliefs and attitudes about literacy could influence the effectiveness of home literacy activities and children's attainment in literacy.

Chapter 7

FINDINGS FROM STUDY NO 4: THE INFLUENCE OF HOME LITERACY EXPERIENCE ON LITERACY SKILLS AND WORKING MEMORY PERFORMANCE.

Summary of the aims

The results of the reported previous empirical studies revealed that there was interaction between verbal working memory performance and the level of language proficiency. Furthermore, the results showed cross language transfer between L1 working memory (listening span) and L2 reading comprehension. However, language skills such as vocabulary, phonological awareness and comprehension skills have been found to be rooted and developed in children's home environments (Bonci et al., 2010; Sénéchal, 2006). Accordingly, one might have presumed that home literacy activities might have an impact on working memory performance; since the data derived from studies 1 and 2 in the current work were consistent with previous studies in arguing for interaction between verbal working memory and the competence level of language skills (Service et al., 2002; Van den Noort et al., 2006; Walter, 2004).

Therefore, the intention of this study would be to explore home literacy practices in relation to reading comprehension, vocabulary, word reading and working memory in 99 Arabic children (aged 11) and the influence of the children's parents' beliefs and attitudes towards literacy on literacy skills performance. To achieve this, children's performance on measures of literacy skills and working memory measures were compared with parents' responses to a questionnaire (See Appendix V) about home literacy activities and with data from personal interviews with children's parents to explore the influence of parents' beliefs and views towards literacy on children's attainment on literacy and vocabulary tasks. The methodology has been described in chapter 6 (p.99).

The findings

The questionnaire findings

The data from the questionnaires were analysed in the following Tables. Table 10.1, presents the number of valid and missing responses to each question in the questionnaire. In Table 10.2, descriptive analysis was presented. Table 10.3, presented the t-test in which the value of the mean of the parents' responses to each question in the questionnaire was compared with the mean of their children's scores on tasks of reading comprehension, vocabulary, word reading and working memory.

Table 10.1 Valid & missing responses to each question in the questionnaire

Questionnaire Questions	Number of responses	Valid	Missing
1. Is children's home environment rich in literacy sources?	99	71	28
2. How often are you involved in reading with or your child?	99	71	28
3. How often does your child read by himself for enjoyment not for academic purpose?	99	68	31
4. When does your child start reciting and memorizing the Qur'an?	99	65	34
5. How often are you involved in teaching practices with your child such as reading skill, the Qur'an and helping him in doing homework?	99	71	28

As shown in Table 10.1, the number of valid responses to questions 1, 2, and 5 are 71 with 28 responses missing. The number of valid responses to questions 3 and 4 were

68 and 65 respectively. The missing responses to these questions were 31 and 34 respectively.

All these valid responses to the questions were coded into two categories to compare the means of parents' responses to each question with their children's performances on measures of literacy, vocabulary and working memory measures. Code 1 represents poor home literacy environment. Code 2 represents poor rich literacy environment. The rational for coding parents' responses is to explore the potential influences of child's context and cultural activities on literacy development.

Table 10.2 Mean frequencies and valid % for parents' responses to the home literacy questions

Questionnaire Questions	Code Answers	Frequency	Valid present
Literacy resources Is children's home environment rich in literacy sources	Poor 1 Rich 2	15 56	21.8 % 78.8 %
Joint reading How often are you involved in reading with or your child?	Rarely 1 Usually 2	11 60	15.5% 84.5%
Child self-reading How often does your child read by himself for enjoyment not for academic purpose?	Rarely 1 Usually 2	32 36	47.1% 52.9%
Religious literacy(the Qur'an literacy experience) When does your child start reciting and memorizing the Qur'an?	At age six 1 Younger than six 2	23 42	35.4% 64.6%
Direct teaching How often are you involved in teaching practices with your child such as reading skill, the Qur'an and helping him in doing homework?	Rarely 1 Often 2	14 57	19.7% 80.3%

As shown in Table 10.2, 78% of the parents felt that their homes are rich in literacy materials (e.g., books, stories, magazines, educational CDs), with 84% of parents reporting that they read to their child at least twice per week. The results showed that

52% of the parents reported that their children were interested in reading i.e. read by them for enjoyment. Regarding religious literacy, mainly the Qur'an, the parents reported that 64% of children started memorizing and reciting the Qur'an before schooling. The results revealed that 80% of the questionnaire responses indicated that children's parents were involved in direct teaching and helping their children in school homework.

In order to investigate the effect of home environment and family literacy practices on the performance of literacy skills and working memory, a series of independent t-tests were conducted (see Table, 10.3).

Table 10.3 t-test values of parents' responses on the questionnaire and their children's score on literacy and working memory

	Reading comprehension	Vocabulary	Word reading	Forward digit span	Non-word repetition	Backward digit span	Listening span
Literacy resources	t (69) = -5.28, **p= .001**	t (69) =-7.81, **p =.043**	T(69)=-3.98 , **p=.001**	t(69)= -1.766, p=.082	t(69)=- 0.939, p=.351	t(69)= - 0.181, p=.981	t(69)= - 0.896, p=.292
Joint reading	(t (69) =-2.649, **p= .001**	t (69) =-3.162, **p=.001**	t(69) =-0.427, p=.327	t (63) = -.803, p =.425	t(69) =-0.318, p=.715	t(69) =-1.421, p=.164	t(69) =- 0.110, p=.850
Child self-reading	(t (66) =-2.598, **p=.012**	t (66)= -2.196 **p=.032**	t(66) =-2.387, **p=.020**	t(66) =-0.772, p=.443	t(66) =-1.740, p=.087	t(66) =-0.121, p=.904	t(66) =-0.360, p=.720
Reciting the Qur'an	(t (63) =-1.949, **p=.057**	t (63) =-2.404, **p =.019**	t (63) =-1.098, **p=.031**	t (63) =-2.076 **p=.041**	t (63) =-0.010 p =.992	t (63) =-0.264, p =.793	t (63) = -0.588, p =.559
Teaching & helping with homework	T (69) = -2.978, **p=.004**	t (69) =-2.519, **p=.001**	t (60) =-.2.733, **p=.008**	t (69) =-.992, p=.184	t (69) =-1.358, p=.179	t (69) =-0.264, p=.792	t (69) = -1.170, p=.246

Significant *P* value at level .05 was in bold.

As shown in Table 10.3, there were significant differences between reading comprehension (p = .001), vocabulary (p =.043) and word reading (p = .001) between the children who lived in home richer of literacy resources and those who lived in a home with poorer literacy resources. There were also significant differences between comprehension (p = .001) and vocabulary means (p = .001) of the children whose parents were more regularly involved with them in literacy and language activities than those who were not. Moreover, the results showed that there were significant differences in reading comprehension (p =.012), vocabulary (p =.032) and word reading scores (p =.020) between children who regularly read for non-academic purpose than those who did not. As for the Qur'an learning experience, the data showed that children who were exposed to reciting and memorizing the Holy Qur'an at an earlier age before starting school were likely to perform better on reading comprehension (p =.057), vocabulary (p =.019), word reading (p =.031) and forward digit span (p =.041) than those who were exposed to it at school age (age 6). Finally, the results revealed clear differences in reading comprehension (p =.004), vocabulary (p = .001) and word reading (p = .008) between children whose parents regularly taught reading and helped them with homework than those whose parents did not. However, with respect to the influence of home literacy activities on working memory, the results showed that home literacy practices did not have significant influence on children's working memory performance. The only exception was the significant relationship between the learning Qur'an activity and forward digit span**.**

Summary of the questionnaire findings

The results of the parent's self-report questionnaire demonstrated that children who lived in a richer home of literacy resources and whose parents were engaged with them in literacy and language related activities (such as joint book reading, learning the Qur'an and teaching and helping children with homework) seemed to significantly outperform those who did not in measures of word reading, vocabulary and reading comprehension. Furthermore, the results suggested that the experience of learning the Qur'an was related to the children's ability to recall digits in sequence (i.e., forward digit span). However, other factors, such as parents' views and attitudes towards literacy and the style of parent-child interaction during reading, may determine the efficacy of home literacy activities. Therefore, there was a need for a way to enable personal contact

between the researcher and children's parents. The semi-structured interviews provided that personal contact to enable the researcher to explore how parents' beliefs towards literacy may shape their attitudes and views towards literacy, the quality of literacy material in children's homes, and the parents' styles during reading to or with their children.

Four adults (two mothers and two fathers) were recruited for the interviews. One of the mothers refused to be interviewed by the researcher. That mother was coded as number (1). Accordingly, a Kuwaiti female interviewer, trained by the researcher, was hired to interview her. Again, the second mother refused to be interviewed, and her husband volunteered to be interviewed on behalf of his wife. That father was coded as number (4). Appendix P.2 provides the interview schedule used to guide the researcher in the interviews. The procedures for conducting interviews were discussed in chapter 6

The findings from the personal interviews

The Braun and Clarke thematic analysis method (2006, cited in Howitt & Cramer, 2008) was adopted for analysing the data from the interviews. First the data from the interviews were transcribed in full from the recordings by using direct literal (secretarial). Then the text was read and re-read to be coded. Coding is the process by which lines of data are given a short description to identify the nature of their content. The structures of initial coding were driven by emerging home literacy theories. A thematic analysis based on emerging home literacy theories provided guidelines for analysing and interpreting the textual material. After that, initial codings were revised in attempt to find themes and these themes again were revised by testing the themes against the original data again to refine them. Finally early home literacy theories were drawn upon to aid interpretation of the themes. Four major themes emerged and were analysed from the interviews with the four adults' (parents of the four children).

- Literacy resources (home environment)

All four parents stated that they were keen to provide their children with literacy materials that encouraged them to read. However, the interview data indicated that the quantity and the quality of literacy materials used in the homes differed. For example, the parents of the skilled readers stated that they had many books that both suited and attracted their children. In contrast, parents of less skilled readers reported that, despite

their houses being full of literacy materials, these literacy materials were not children's stories or books with reading and writing skills were poor.

> *Mother of skilled reader (MSC)*
> There are many stories with illustrated pictures…..educational books with CDs, a whiteboard for teaching how to write letters and words.
>
> *Father of skilled child (FSC)*
> There are many books and short stories with pictures …Books for children.
>
> *Mother of less skilled child (MLC)*
> Few magazines….. There are little books …..But not children's books that teach reading and writing, there are a lot of video games…
>
> *Father of less skilled child (FLC)*
> There are many books. But, not for children …….they are references ….. Religious books.

Most parents reported that they were keen to go to bookstores to buy new books. However, the frequency of going to bookstores and the degree of children's participation in choosing these books varied among parents. The information reported from the interviews showed that the parents of skilled children went more regularly to bookstores than the parents of less skilled children. Furthermore, the parents of skilled children were keen to involve their children in choosing their books. They encouraged and helped their children to choose the books that matched their interests and their grade level, and enriched their literacy skills. Alternately, the parents of the less skilled children were likely to be less enthusiastic than the parents of skilled children on involving and encouraging their children to choose their books.

> *MSC*
> We go to the bookstores twice a month…. They (children) choose their books,
>
> *FSC*
> Every week we go….I always suggest some books for reading .. … however, they are free to choose the books they like. Additionally, I bought them short stories with pictures-those books that have few words and a lot of pictures to read to them when they are young.
>
> *MLC*
> I rarely go to bookstore … I do not remember my last visit… But, I bought him books … few books… He doesn't like going to the bookstore.
>
> *FLC*
> Not often…I always buy religious books…Advanced books. However, not suitable for him. He has his computer games, not interested in reading.

- Shared book reading

Despite the fact that 84% of parents indicated in the questionnaire, which was conducted prior to the interviews (See Table 10.2.Q 2) that they were involved in reading to or with their children, data from the interviews reported that parents used different styles of reading during reading sessions. It seemed that parents of skilled children used a style that may encourage discussion, prediction and joining the story to the real world of the child. On the other hand, parents of less skilled children used a style that seemed to stick to the text read and they were not likely to extend the reading by other strategies that encouraged interactive reading.

> *MSC*
> While reading to my children, all were totally attracted and involved in the story, even sometimes they cried or were scared according to the event of the story. You know… I had an expressive way in reading the story. I changed my tone, my facial expression, pauses and son.
>
> *FSC*
> I was cautious on making him listen attentively before asking any questions. I paused after each part of the story and asked him about this part… I encouraged him to ask me questions during reading the story especially the word meaning.
>
> *MLC*
> I read to him but few. He likes listening to stories more… When I read to him … he asked about the meaning of words… I told him the meaning directly…
>
> *FLC*
> We did not read story to our children. We focused on homework.

- Teaching the Qur'an

The results of the questionnaire indicated that the parents' teaching of the Qur'an was related to children's scores on word reading, reading comprehension and vocabulary measure. The information reported from the interviews revealed that all parents were willing to help their children in developing their reading skills through teaching them the Qur'an. The way that parents adopted when reading the Qur'an is similar to shared book reading and mnemonic strategies. Parents narrated the short stories in the Qur'an. Furthermore, the data revealed that parents were careful to train their children to recite the Qur'an correctly according to its reading rules. However, parents of less skilled children felt they were unqualified, less confident to teach their children the Qur'an. Thus, they hired a qualified person such as a private Qur'an tutor to do the job for them. However, they are not likely to explore the meaning of the stories in the same sort of

ways as the parents. They are likely to focus on reciting and memorizing the verses perfectly.

MSC
As for the Qur'an, it is the key and basic for everything… You know the Qur'an is a masterpiece of literary and scientific book. It contains metaphors… The Qur'an language and its tone differ according to the story it narrate.

FSL
I always read short verses to him and make him read to me especially in the daily prayers and bed time. You know the Qur'an fosters human memory.

MLC
… The Qur'an is very important in our life. … For our language, for memory. I teach him orally the very short story…. Encourage him to memorize verses … He learns the Qur'an at school… I think it is enough.

FLC
The Qur'an is important, but you know we are busy nowadays … Additionally, the language of the Qur'an… You know (pause). Not anyone can know it or read correctly…

- The Diwaniya

Diwaniya emerged as a potential literacy activity that could play a role in developing children oral language skills. Diwaniya is a social activity restricted to Kuwaiti society. Diwaniya is a gathering place where members of families and friends meet every week and discuss different issues. The data reported from the interviews showed that the parents of skilled children accompanied their children when they went to Diwaniya. In Diwaniya children listen to different topics including old stories and social and political affairs that in turn may enrich children's vocabulary knowledge. However, children are not allowed to contribute in the discussion until they are permitted by the adults. In contrast, parents of less skilled children seemed not to be interested enough in attending Diwaniya.

MSC
We have Diwaniya in our house. His father is training him how to serve the visitors. Of course, he sits and listens to the talks that happen. But he is not allowed to participate until he is permitted to talk…

FSC
Despite I sometimes take him (the child) with me when I go to Diwaniya… He is listening to the dialogues that occurred… later; he asked me what he heard in the Diwaniya …

MLC
You know, life is different… We have not time to attend Diwaniya …His father is not interested in accompanying his children with Diwaniya …

FLC
I rarely go to Diwaniya. I am only attending family Diwaniya on occasions. Children are not interested in attending Diwaniya …

- Parents' attitudes and views towards literacy

The differences that were found in children's homes in terms of home literacy environment and parents' literacy activities may be a product of their families' beliefs and attitudes towards literacy. For example, the parents of the skilled children seemed to be enthusiastic about reading to or with their children; whereas the parents of the less skilled children were likely to be less enthusiastic about reading with or to their children.

MSC
I bought (child) books with reading activities. stories ….Books trained him writing through pictures….. Drawing. … You know… my house was like a school….

FSC
I was fond of reading to him or listening to stories of his own. Yes I am care about the print while reading…… I said to him see this word … even sometimes I caught his fingers and put it on words while reading to him.

MLC
You know, I do not like reading, even when I was student.... I was not a good student. You know …. I quickly got bored.

FLC
I am old and his mother is old too. This is our youngest child. We do not know teaching. I hired many teachers to teach him. But… you see …… (Pause)

Furthermore, the data revealed that the less enthusiastic attitude might be an outcome of previous negative experience or parents feeling of inefficiency to do that job (shared book reading or helping them in their homework)

MLC
I do not like reading. Even when I was young I do not like reading aloud … you know. ….. I don't know how…. (Pause)…..

FLC
We don't know ……. …… you see ……(pause)… I was uncertain how to read to him ….. Teachers are professional.

- Children's interest in literacy

Children's interest in literacy is linked to their family's beliefs and attitudes towards literacy. The level of children's interest is a good indicator of the degree to which they react positively towards home literacy practices and vice versa. Skilled children were found to be interested in reading and had the belief that reading was a channel for enjoyment. Alternately, less skilled children seemed to find reading a boring activity and therefore, they prefer computer games to reading.

> *MSC*
> They gathered and sat on my bed room waiting me to tell them a story.. … the day I didn't read to them because of urgent circumstances ,I can't tell you how they felt …… felt sad.
>
> *FSC*
> Even when I came home late, he never slept and waited me to read a story to him
>
> *MLC*
> ….. He could not stay still for a while to teach him…… therefore, I hired a teacher (a friend of mine) to teach him. .. However, he did not like her….
>
> *FLC*
> I rarely saw him reading a book by himself…. Or bring me a book to read……he was interested in computer games…

- Parent- teacher communication

Parents' involvement in teaching their children did not mean that they dispensed with the school help. However, all parents in the interviews reported that they regularly visited school (primarily-intermediate school) to communicate with teacher and sought after their help to know the best ways to improve their children scores in literacy skills.

> *MSC*
> I always communicate with teachers in the weekly meeting …. every Monday ……. To stand on the level of my child on different school subjects …how he is in class (behaviour). Sometimes I ask teacher how I teach …this….. (Skill)
>
> *FSC*
> There should be cooperation between school and home ….this good for children. Sometimes I was uncertain how to teach this subject….. Teachers are professional ….so I asked them
>
> *MLC*
> School always communicates with me. I go and listened to teacher's remarks and advices on how to improve my children level in reading and writing. Mostly I did not understand their words or even how to ……. So I rarely go their unless they called me.

FLC
Yes... I went ….. To ask about my son (academic level). Frankly teachers were helpful. I feel I …… (Her facial expression indicated that he was unconfident to do the job (Pause)

Summary of the personal interviews findings

The results of the personal interviews suggested that parents' beliefs and attitudes may determine the effectiveness of home literacy activities and the child's attitude to learning to read. The results obtained from the parental interviews revealed that there was a difference between the parents of skilled and less skilled readers in terms of their beliefs and attitudes towards literacy. This discrepancy was manifested on the quality and quantity of the literacy resources provided to children. The discrepancy was also clear in the reported interaction between parents and children during literacy activities explored in the current work.

For elaboration, the results showed that the father of the less skilled reader viewed literacy as the job of school not the home. That belief seemed to have a profound influence on the quality of literacy materials in the home. That was clear when the father reported that the books included in the home library were not for children. Furthermore, he revealed that he rarely became involved with his child in literacy activates. Similarly, the mother of the less-skilled reader viewed reading as a boring activity that she did not like. That belief seemed to transfer to her child. She stated that her child did not like reading books and he usually tore the books he read. This mother's attitude towards literacy may be reflected in the quality and the quantity of literacy resources in the home, as well as the frequency of literacy activities conducted. The results showed that she was rarely involved with her child in any literacy activities, such as reading books or helping with homework - and even when she did engage with her child in reading, it was for a relatively short time. Furthermore, her views of reading as a boring activity might profoundly influence the style of reading. For example, she stated that she only explained difficult words that children ask about directly. This can be contrasted with the parents of the skilled children who viewed reading as a channel for enjoyment and a tool of gathering the family together in a warm emotional atmosphere. Accordingly, this positive attitude seemed to enhance their children's interests in reading and their academic success; and may be reflected in the parents' keenness to provide their

children with literacy materials that matched their grade level and their interests. Such parents accompanied their children to the book store, and encouraged their children to choose the book they liked. Furthermore, these parents' beliefs and attitudes towards literacy appeared to have a positive impact on their reading style during reading stories with or to children. The data showed that they did not restrict themselves to the text but extended the text by asking their children questions and initiating discussion, encouraging them to deduct, predict what was going to happen in the story. Parents of skilled readers again reported they tried to relate what happened in the story to the real world.

Summary of the findings

The results from the questionnaire and parents' interviews showed that home literacy activities were likely to have an influence on children literacy acquisition. However, the efficacy of these home literacy activities seemed to be influenced by parents' beliefs and attitudes towards literacy. The results suggested that parent's beliefs and attitudes towards literacy seemed to affect both the quantity and the quality of home literacy activities, and the strategies that parents used during reading and hence, their children's interest in reading.

Conclusion

Overall the results from the four studies in this thesis present both theoretical and practical implications for measuring literacy in general and reading comprehension in particular. These implications are discussed in the final chapter.

Chapter 8

GENERAL DISCUSSION

Overview of results

Study one found that word reading skills and spelling were good predictors of reading comprehension measures in L1 Arabic and L2 English. The results also showed cross-language correlations between Arabic and English literacy measures. Similarly, cross-language correlations were found between measures that assess the same memory construct: for example, correlations were found between forward digit span, non-word repetition and backward digit span in Arabic with their versions in English.

There was also evidence of relationships between working memory and measures of literacy. In Arabic, the results showed that forward digit span was correlated with measures of reading comprehension, word reading and spelling, whereas non-word repetition was related to non-word reading. Backward digit span was poorly correlated with all Arabic literacy measures used in the study. In English, the results showed that forward digit span and non-word repetition were correlated with reading comprehension, word reading and spelling. Backward digit span was correlated with reading comprehension and word reading in English. However, after controlling for the influences of single word reading and word spelling measures, the results failed to find an overall independent predictive role for the working memory measures in either L1 or L2 sentence reading comprehension; although the final beta scores for Arabic forward digit span and Arabic backward digit span were significant for the comprehension in Arabic and in English respectively.

Study two found that word reading fluency, vocabulary and phonological awareness were significant predictors of reading comprehension in Arabic and English. The results also showed correlations between Arabic and English literacy measures. As for the working memory measures, correlations were found between forward digit span and non-word repetition measures; however backward digit span and listening span were poorly correlated with each other within languages. Cross-language correlations were

found between working memory measures that assess the same construct: i.e., the Arabic version of forward digit span, non-word repetition, backward digit span and listening span were correlated with their English version.

The findings of study two were consistent with study one in showing that working memory was not a significant predictor of sentence comprehension measures in Arabic and English after controlling for word reading skills and vocabulary. In contrast, the data suggested that working memory was an independent predictor of text reading comprehension in both Arabic and English. The results indicated that listening span was a significant independent predictor of text reading comprehension in Arabic, whereas backward digit span was not. Additionally, both listening span and backward digit measures in Arabic were significant independent predictors of text reading comprehension in English. The results also suggested that for children with worse than average L2 vocabulary (an indicator of L2 language proficiency), L2 reading comprehension was more related to L1 listening span than in it was to L2 listening span. In contrast, for those with good L2 vocabulary, L2 reading comprehension was more related to L2 listening span than in was to L1 listening span.

Study 3 findings were consistent with previous results reported in this thesis in showing that word reading fluency, phonological awareness, vocabulary and listening span were significant predictors of Arabic reading comprehension. Furthermore, the data showed that children's Arabic reading comprehension scores were on average better when reading vowelized text than when reading non-vowelized text. As for the role of working memory, the results indicated that, regardless the form of the Arabic script (vowelized & non-vowelized), listening span was a significant predictor of reading comprehension after controlling for the influence of measures such as word reading fluency, vocabulary, phonological awareness, and rapid naming.

Study 4 questionnaire findings indicated that children who lived in homes rich in literacy materials and whose parents were engaged with them in literacy and language related activities (such as joint book reading, learning the Qur'an and teaching and helping children with homework) outperformed those who were less frequently engaged in these activities in measures of word reading, vocabulary and reading comprehension. Furthermore, the results suggested that the experience of learning the Qur'an was related to the children's ability to recall digits in sequence (i.e., forward digit span).

Additionally, the results reported from personal interviews of parents revealed differences between parents of children who were classed as less skilled readers and parents of children who were better readers. These differences were primary in their interests and their keenness to provide children with literacy resources that match their children's grade levels and interests, in their frequency and their styles of reading with or to their children, and their views and attitudes about and toward literacy. Parents of less skilled readers were inclined to report less interest in the quality and quantity of the literacy resources available to children at home. In contrast, parents of skilled readers revealed that they were interested in encouraging their children to choose the literacy materials that match their levels and their interests. Furthermore, the results showed that parents of less skilled readers focused only on the text when reading with their children, whereas parents of skilled readers encouraged discussion during reading and connected the material with real life.

Theoretical interpretations and practical implications of the research

Findings from the studies undertaken as part of this PhD work suggested that word reading in Arabic was related to similar factors, such as decoding and phonological awareness measures, that have been found to be related to English word reading levels, suggesting that English models of basic word reading may be applicable to Arabic (Al Menaye, 2009; Elbeheri & Everatt, 2007). At the text level, the data suggested that single word reading (accuracy & fluency), vocabulary and spelling were common predictors of reading comprehension in Arabic and English. Again, these results suggest commonalities in reading comprehension development in both Arabic and English. These commonalities in underlying skills predictive of reading development were further confirmed by the cross-language influences observed across the studies. Both study one and two showed that literacy, decoding and phonological measures were correlated across the two languages. These cross-language correlations are also consistent with the view that language skills in the first language may support second language acquisition, at least in the early stages of learning a second language (Cummins, 2000).

With respect to the involvement of working memory in reading comprehension, the results were in agreement with previous findings on suggesting that working memory

plays an important role in reading comprehension in Arabic and English (e.g., Seigneuric et al., 2000). However, the results across the studies suggested that the type of working memory contribution to Arabic and English reading comprehension may be determined by the demands of the reading task used to assess comprehension. Working memory was not a significant predictor of sentence reading comprehension measures once basic literacy skills and vocabulary were controlled, whereas it was a reliable predictor of text reading comprehension measures. One possible explanation is that comprehension at the sentence level may be over determined by simple word reading skills, and any relationship between working memory measures and reading comprehension would be mediated by these word reading skills. Thus, relationships between working memory and reading comprehension at the sentence level disappear after controlling word-level reading skills. These sentence-level reading comprehension tasks can be reasonably answered from basic word knowledge skills. So higher-level, more complex cognitive skills, such as those associated with working memory, might be unnecessary for successful completion of such sentence reading tasks (Francis et al., 2006). In contrast, reading comprehension at the text level may be more complex and require higher-level comprehension skills (such as making inferences or predictions about text or monitoring text consistency) in addition to word-level skills. Accordingly, complex cognitive processes, such as those related to working memory, are likely to be called upon. Hence, findings of the current work suggested that working memory may function differently according to the demands of the task. (Andreessen & Braten, 2010).

The results of study 3 suggested that working memory was significantly correlated with Arabic reading comprehension regardless of the form of script (vowelized versus non-vowelized) used. This was despite non-vowelized script showing lower scores on comprehension measures compared to vowelized scripts, which may be indicative of increased complexity of reading. However, the difference in complexity between vowelized and non-vowelized scripts is focused at the word level: in vowelized script, the relationship between letters and sounds may be more apparent. Therefore, any increase in complexity of reading with non-vowelized scripts may not influence the association between working memory processes and reading comprehension at the text inference, prediction or monitoring level of processing.

However, the devowelization results of current work were somewhat inconsistent with those of Al Menaye (2009). Al Menaye found that listening span was poorly correlated with young children's vowelized text reading comprehension but was related to non-vowelized reading comprehension. A possible explanation of this discrepancy between Al Menaye (2009) and the current work may be due to the differences in grades tested. By grade six (as tested in the current research); children may be using their working memory automatically whenever they see a text. Younger children, though, may use their working memory only when needed. This explanation needs to be explored in future research; for example, by contrasting groups of children between grades 3 and 6 on measures of reading comprehension (vowelized & non-vowelized) and working memory, as well as other measures, such as vocabulary, word reading and phonological awareness, etc.

With regard to the nature of the relationship between working memory and comprehension measures in L1 and L2, the results lend further support to the domain specific perspective of working memory. That perspective argued that the contribution of working memory to reading comprehension may be dependent on the task modality. That is, verbal working memory measures are better at distinguishing between poor and good comprehension than non-verbal (visuo-spatial) working memory measures (e.g., Cain et al., 2004; Seigneuric et al., 2000). The results of the current work showed that working memory tasks that require both processing and storage of linguistic information (backward digit span and listening span in English and listening span in Arabic) were significant predictors of L1 and L2 reading comprehension measures, whereas the visuo-spatial task (block recall) did not reach significance. Daneman and Tardif (1987) justified the significant association between verbal working memory measures and reading comprehension by suggesting that both tasks share some common processes. That is, they are drawing on the processes of the verbal domain. Daneman and Tardific continued to argue that the more processes shared by the working memory tasks and reading comprehension, the larger the correlation would be.

Despite this, the results suggested that L1 and L2 both need to draw on verbal working memory resources, however the demands that L1 and L2 comprehension processing make on the working memory resources may differ. The results suggested that the role that verbal working memory measures played in reading comprehension may differ for

the Arabic and English texts. For English, both backward digit span and listening span were significant predictors of comprehension; whereas only the listening span measure was a significant predictor of comprehension measures in Arabic. In this sense, the results suggested that comprehension processing in L2 for this group of children might impose heavy demands on working memory resources. For elaboration, the L2 learner is likely to be less proficient on comprehension skills in L2 in contrast to L1. That is because L2 learners are likely to be less fluent and his or her decoding skills are likely to be less automatic than in his or her first language. In addition, differences between the orthographies in L1 and L2 will mean that the learner is less familiar with the orthography in L2. Furthermore, L2 learners are likely to have limited vocabulary knowledge in contrast to their first language. That comparatively limited proficiency of L2 comprehension skills, compared to the acquired optimal level of L1 skills might suggest that L2 comprehension processing is effortful processing; and presumably places heavy demands on working memory resources especially the central executive (Wen, 2007). Wen justified his argument by stating that second language acquisition is characterized by controlled processing. Controlled processing is a process that requires intentional attention. Therefore, it is effortful process and indeed relies more on working memory. Consequently, it could be suggested working memory may play a greater role in second language learning than in first language. Another possible explanation of the different role that working memory plays in Arabic and in English may be the impact of the translation process (mental reprocessing) that will be discussed later in this section.

Unlike L2 comprehension, L1 comprehension processing in Arabic children was only predicted by listening span measure. Backward digit span was not predictive of variability in Arabic reading comprehension across the studies, whereas listening span was. A plausible explanation of the distinctive role that verbal working memory measures played in Arabic is that backward digit span and listening span may assess different elements of working memory skills. Those elements involved in processing random numbers in backward digit span may not be the same as those involved in comprehension process in Arabic; whereas those involved in listening span may be more linked to comprehension processes. The listening span and comprehension association in Arabic may be clarified by discussing the reading process in Arabic. During text reading, particularly when that text is devowelized, the reader of Arabic may have to process a whole sentence in order to decide the correct meaning and the correct

pronunciation of a word or words (Al Rashidi, 2010). In order to achieve this, incoming information must be stored while processing other information for reading comprehension to be achieved in Arabic. These processes seem more consistent with those involved the listening span task. However, there are alternative explanations. For example, the relationship could be simply due to the common need within the two measures to understand linguistic materials in order to complete the tasks. Accordingly, the relationship may be due to a third unidentified factor underlying both tasks, rather than some fundamental aspect of working memory.

Overall, however, such findings in the current work were consistent with the view that the central executive may not be a unitary system but rather that it can be separated into different functions (Baddeley, 1996; Miyake et al., 2000). Indeed, the results in study 2 showed that the two measures of verbal working memory, backward digit span and listening span, were poorly correlated in Arabic and English. Similarly, Miyake et al. (2000) has argued that, although different functions of the central executive are moderately correlated with one another, these functions contribute differently to the performance on complex central executive tasks. Furthermore, Oberauer et al. (2003) has suggested that despite the two measures sharing the simultaneous storage and processing function of working memory's central executive, other complex functions of the central executive, such as coordination and supervision, may be more involved in listening span than backward digit span measure. For that reason, Daneman and Carpenter (1980) have described backward digit span as a measure of simple manipulation, whereas listening span may involve more than one operation in order to comprehend the linguistic information that it processes.

Furthermore, the results may argue for cross language relationships between L1 working memory and reading comprehension in an L2. In studies 1 and 2 verbal working memory measures of backward digit span and listening span in Arabic were associated with L2 English reading comprehension measures. Furthermore, the correlation between L1 listening span and L2 text comprehension of a group of children who were below average in L2 vocabulary was higher than for a group of children who were above average in L2 vocabulary. Such results could be due to the effects of bilingualism on cognitive skills identified in the literature (Bialystok, 2011). Sundermen and Kroll (2006) clarified this effect by stating that the two languages are activated at the same

time and interact in response to incoming information even when the task is presented in one language. Thus, the L2 reader, especially those at lower competency levels, is likely to shift back and forth between the two languages in order to select lexical representations from his native language that are relevant to the task at hand, and remove those lexical representations which are irrelevant. The argument here is that L2 learners tend to perform this mental reprocessing (translation process) as a cognitive strategy to compensate for lower levels of L2 proficiency (Kern, 1994). This mental reprocessing is consistent with the association of Arabic working memory measures with comprehension measures in English across the studies; and the differences in this relationship dependent on the child's level of language proficiency.

The development of native oral language skills, such as vocabulary, word reading and comprehension skills, were found to be influenced by home literacy activities. The results of the questionnaire in study 4 were in accordance with previous studies (e.g., Bonci et al., 2010; Wolf, 2008) in showing that the number of literacy resources available in children's homes, the frequency of parents involvement in joint book reading and with homework, and the frequency of child self-reading, has a positive influence on word reading skills, vocabulary and reading comprehension performance. However, the results of the present study also suggested that learning the Qur'an before school entry may have a positive impact on single word reading, vocabulary and reading comprehension. During learning the Qur'an, the child has to recite verses correctly to his parents or the sheikh (the teacher of the Qur'an). Furthermore, the child is regularly listening to the rhyming sounds found in the Qur'an verses. Listening to these rhyming sounds may help children differentiate sounds; and this knowledge of rhyming units may help children to read and spell new words via analogy to known words (Goswami, 1994). The Qur'an might also prompt comprehension skills through the use of imagery. The use of imagery in the phrases and sentences of the Qur'an may make them cognitively demanding. Consider this example of simile which the Qur'an affirms the impossibility of the disbelievers' entry into paradise with these words: "Nor will they enter the Garden until a thick rope can pass through the eye of a needle." In order to understand this simile, the reader has to compare the thick rope to the tiny hole of the needle and infer how it is impossible to pass this thick rope through this tiny hole. Such similes may aid the child in performing comparative processing and in practicing analogical skills (Wolf, 2008). These processes may foster comprehension by requiring

the child to use skills of inference (i.e., plausible deductions based on the information given and their general knowledge), which are strongly related to comprehension (Kintsch & Rawson, 2005). Furthermore, during reciting or reading the Qur'an, children are exposed to the classical Arabic language which includes vocabulary that children are rarely exposed to in their daily conservations with their families or peers but which is used in Modern Standard Arabic in written text. Children, in this sense are likely to ask the adults (parents, teacher or sheikh) about the meaning of these words. Consequently, it might be expected that children who are frequently exposed to the Qur'an prior to school have more vocabulary knowledge for use in supporting the understanding of written texts than do those who lack this experience. Clearly, further research is necessary to contrast these differing explanations.

Regarding the influence of home environment on working memory performance, the findings of the current work were consistent with previous studies in suggesting that working memory may be unaffected by environmental influences (Gathercole & Alloway, 2004). The association between Qur'an learning experiences and forward digit span measure could be due to a chance effect. However, alternative possible explanations for the relationship between such home literacy activity and digit span include the existence of a third variable that is associated with both. Further work is needed to investigate the relationship between the Qur'an and forward digit span (a measure related to working memory processes).

Finally, the results of the personal interviews supported a further point that Weigel et al. (2006) presented. This was the idea that parents' beliefs and attitudes about literacy are likely to provide the starting point for all the literacy experiences that parents have with their children. The results here showed that parental beliefs about learning might affect children's views about literacy (Bonci et al., 2010; Williams et al., 2003) and the quality of literacy material that parents provide their children with (Bus, 2001; Sénéchal & LeFevre, 2002). Parents' beliefs and attitudes about literacy might also determine the literacy prompting behaviours (styles) (Wasik & Herrmann, 2004). To elaborate, the results of the interviews were consistent with previous findings on suggesting parental attitudes towards literacy may influence children's achievement (Brown, 2008; Bus, 2001; Sénéchal & LeFevre, 2002). The results showed that children who had higher achievement scores in literacy and vocabulary tasks were more likely to have parents

who had positive view of literacy and vice versa. That is, the results showed that parents of skilled children viewed reading as a channel for enjoyment and a tool of gathering the family together in a warm emotional atmosphere. Accordingly, this positive attitude seemed to transfer to their children. That influence was evident on children's eagerness to read to or with their parents. In contrast, the results showed that parents of children who had lower achievements scores were likely to view reading as a boring activity or the job of the school. That view seemed to be profoundly transferred to the children. For example, the mother of the lower achieving child reported that her child did not like reading books and he usually tore the books he read.

Furthermore, the results suggested that parental attitudes and beliefs about literacy might influence the literacy environment that parents provide for their children such as literacy materials available in the home. The results obtained from the parental interviews revealed that there was a difference between parents of skilled and less skilled readers in terms of the quality and quantity of the literacy resources provided to children, though these parents were of similar economic status. That is clear when the parents of lower achievement children reported that the books included in the home library were not for children. On the other hand, the results argued that parents of higher achievement children were likely to provide their children with literacy materials that matched their grade level and their interest. Such parents accompanied their children to the book store, and encouraged their children to choose a book they liked.

Finally, the results suggested that parents' beliefs and attitudes might affect parental behaviours during reading with their children. However, the results suggested that there is discrepancy in the quality of parental interaction with their children during reading stories with or to children. That discrepancy might play a role in the children's performance in word reading, reading comprehension and vocabulary tasks.

The data showed that parents of skilled readers did not restrict themselves to the text but extended the text by asking their children questions and initiating discussion, encouraging them to deduct and predict what was going to happen in the story. This type of reading style was found to enhance higher skills of reading comprehension (De Temple, 2001). In contrast, parents of children who had lower scores were likely to speak (interact) to their children ineffectively during reading stories (i.e., not initiating

discussion or using a question asking technique) or might not give their children adequate opportunities to increase their comprehension skills.

Furthermore, parental confidence in terms of their interaction with their children might make them reluctant to read to or with their children. Data gathered from the interviews revealed that children of less skilled parents seemed to feel less confident to do reading to or with their children. They stated that they did not know how to help their child in reading. Even though, the class teacher told them about the ways to elevate their children's reading process, they reported that they did not understand the teacher's suggestions. It is acknowledged by the parents of less skilled children that the main responsibility of being a good reader mostly depends upon formal learning in schools. Therefore, this type of interaction might hinder the development of literacy skills and vocabulary of this group of children.

Practical implications of the research

The previous sub-section focussed on more theoretical or research-related perspectives related to the current studies. Below, the discussion moves to potential future practical implications of this work. This focuses on issues related to teaching practice, families and education, assessment and intervention.

Teaching practices

The results highlighted the role of word decoding (fluency & accuracy) for reading comprehension in L1 and L2. Therefore, teachers should pay more attention to teaching decoding, as it is one of the important components of reading comprehension (Gough & Tunmer, 1986; Joshi & Aaron, 2000). This could be done by teaching decoding skills explicitly and systematically. Explicitly means that the letter sound relationships are taught in isolation, the letters blended into whole words and practised in decodable text. Systematically means that the teacher should initially introduce the most common sounds of a new letter, letter sounds that are easier to blend, progress from simple to complex and separate confusing letters and sounds. Furthermore, teachers could promote decoding by helping children to recognize pattern in words instead of by rule memorization.

Reid (2011a) suggested some activities that proved effective on students' word reading skills. These activities include: (1) rhyming activities and rhyming games; (2) games involving blending and segmenting phonemes and word games such Scrabble; (3) practice at identifying initial and final sounds and (4) practice at blending longer words. These suggested activities are supported by previous evidence (e.g., Torgesen, 2005). These findings found improvement of children's word reading skills when they were exposed to early phonological training, accompanied with suitable linkage to early orthography and literacy experience.

With regard to word reading fluency, repeating reading is considered a useful technique for promoting reading fluency in different grades (National Reading Panel, 2000). Reid and Green (2007) suggested some ideas to increase reading fluency. For example, the teacher may choose a passage that is at a level below the students' ability. Before asking students to read, the teacher should present any words or phrases the students may struggle with. The teacher should then write these words or phrases out separately on cards for students to read. In this sense, when students come across these words or phrases, they won't be new to them, and they are likely to read the text faster. Green and Reid (2007) proposed another strategy for promoting reading fluency. They suggested that the teacher should ask students to read a text at their own speed. Children then read the text again and underline all the key words on the text. Children read these words several times. The teacher can turn reading into a fun game by giving children less time than they need to read the text. By turning this into a fun game, the teacher is likely to reduce any anxiety and make reading challenging for everyone in the class (Green & Reid, 2007).

Vocabulary is critical to reading comprehension and to word reading fluency. Vocabulary can be developed through explicit and implicit teaching and through training children to use effective learning strategies. Pre-teaching the key vocabularies of text is one of the effective explicit teaching techniques that can be used in the classroom context. But these key vocabularies should be given in context not given as separate words. Repeated exposure to words through providing children with many opportunities to use a new word in its written and spoken form in different contexts as possible can enhance children's understanding of it (Reid & Green (2007). For example the word light describes weights in science; whereas it describes weather as in light shower (in

geography). Reid and Green (2007) continued to argue that consolidating vocabulary in this sense could provide children with overlearning experience that may help to reinforce new learning. They further suggest that word mapping could be a useful strategy for supporting children's vocabulary development.

However, much of the vocabulary one knows is acquired incidentally when engaging in talking or reading. Thus, parents and teachers should also make use of talking to their children in different situations (at meal time, in Diwaniya, in classrooms) by increasing the amount of talk that incorporates language and literacy skills into everyday activities with their children. This could be done through using words for more than directions; asking children open ended questions, and verbally exploring ideas and possibilities. This might support the development of oral language skills especially at pre-school years (Dickson & Tabors, 2001).

Additionally, paired reading can be a useful tool for developing oral language, vocabulary and enhancing comprehension skills. Mortimore et al. (2013) provide evidence of its impact on children with English as an additional language in the UK. Reid (2011 a, b) described paired reading as multisensory technique, as the child learns through more than one sense. During paired reading, the child looks, makes a feel of the book and tracks what is read to *him or her* (visual, tactile, kinetic auditory). The child also reads aloud from the book and talks in the discussion aroused about the story. Squires and Mackeown (2006) suggested some useful strategies could be adopted during paired reading. For example, the teacher can create a context cue for the story and cue-in the reader. This could be done by asking the child what he or she thinks the story is about; through looking at the title; or through looking at the illustrative pictures that may be in the book. In this sense, the adult (teachers or parents) trains children on making use of the clues in the text. Many researchers (Reid, 2007, 2011a, b; Squires & Mackeown, 2006; Wearmouth & Berryman, 2011) have stated strategies that could be followed during paired reading activities. Firstly, during paired reading, the adult (teacher or parents) and the child should read aloud at the same time, and the adult should lessen his or her speed to match that of the child. Secondly, they should take turns. That is, sometimes the adult takes the lead and sometimes the child takes the lead. Thirdly, adopting the Pause Prompt Praise technique can be adopted while reading. For elaboration, if the child is stuck at a word, the adult should not worry. Simply pause and

give the child 4 or 5 seconds to work it out by himself or herself. Then, the adult should say (prompt) the word and continue reading. Fourthly, the adult could make mental note of words that were difficult and use these (another time) for word building. Fifthly, stimulating discussion about the book can help the child obtain meanings from the text and promote comprehension skills. These techniques are found to have a positive influence on children's word recognition, reading fluency, and comprehension skills (Brook, 2002; National Reading Panel, 2000; Wolf, 2008). Therefore, teachers should encourage children to read for pleasure not for purely academic purpose.

Furthermore, parents should encourage children to read to them. This may be supplemented by having books in the child's room and by helping their child finding books to read (Dickson & Tabors, 2001). Moreover, parents should show positive attitudes towards learning and school to make literacy fun and interactive for children. This can be done through adopting emotionally-centred and relationship-based strategies, such as hugging or sitting the child on the parent's knees during shared reading. That is, parents should view reading stories as a time for warmth and affection with their children (Wolf, 2008).

The results also suggest that teachers should consider limitations in working memory, particularly given that many researchers (e.g., Gathercole & Pickering, 2001; Swanson, 2006) have found that differences between skilled and less skilled readers on cognitive measures are related to limitations in working memory. Many researchers (e.g., Gathercole & Alloway, 2008; Mortimore, 2008; Reid, 2007) suggested memory strategies that the teacher can adopt in the classroom to minimise overloading learners' working memory. These memory strategies have been used in memory intervention programmes, and have been shown to improve working memory functions in individuals with learning difficulties, potentially leading to enhanced learning skills and increased chances of educational success (Hulme & Mackenzie, 1992; Melby-Lervag, & Hulme, 2011). Some of these memory strategies are discussed below.

Establishing understanding by reconstructing information or simplifying a complex activity by breaking it into simple steps is one strategy. For example, a teacher could break texts down into manageable meaningful chunks. That strategy may help understanding and reduce the amount of information the child has to remember (Mortimore, 2008). Repeating information is another strategy. The teacher should repeat

important information and encourage children to request repetition when necessary. However, the teacher should use different means to repeat the same information, such as memory cards, visual headings, summaries, notes and discussion. These different ways may help in consolidating and mastering information (Reid, 2007). Gathercole and Alloway (2008) suggested that praising those children who ask for repetition, increases the likelihood of children asking the teacher to repeat information in school. Rehearsing material could be a useful way to support the learning of children who have low working memory capacity.

Linking new information to either a student's experience or prior knowledge can make learning meaningful and aid understanding with the result that information is likely to be more easily remembered (Mortimore, 2008). Mortimore explained clearly by giving examples, how to link information to a student's real life. For example, in English literature, a teacher can ask students this question: what does this character remind you of? As for linking new learning information with past knowledge, it can be done by making a list about everything a learner can remember about the topic, and then adding in the new information. Linking can also be done by asking questions like: is there anything familiar in this the new information? What is it and why? (Reid, 2007). Furthermore, planned learning by organizing time, ideas, notes and thoughts are key to effective learning, and may reduce the load on working memory resources and positively influence working memory performance. This could be achieved through training children in using mind maps, highlighting and summarising ideas (Reid, 2007, 2011a; Mortimore, 2008).

Adopting multisensory methods in teaching could help children's memory. Learning is more effective when the learner uses all his or her senses when he or she learns (Reid, 2007; Mortimore, 2008). Some research suggests that individuals have processing preferences (Mortimore, 2008). For example, some learners may find visual processing more comfortable than verbal processing. Therefore using visual graphic symbols can strengthen the memory traces. Mnemonics could also be an effective strategy that enhances children's memory performance (Reid & Green, 2007).

Parents and school partnership

Since children's parents were found to play a role in the acquisition of literacy skills,

The establishment of communication between teacher and parents should benefit both school and family (e.g., Reid, 2011b; Wearmouth & Berryman, 2011). Although meetings between teachers and parents are held regularly in Kuwait, these are only for discussing children's academic achievement and rate of progress. However, a further role for such meetings could be to discuss the home literacy context of the child. This could be done by providing parents, especially those of less skilled readers, with specific techniques that enable them to implement home literacy activities in an effective way (Sénéchal, 2006). Workshops and training courses for parents may be offered to show parents how to implement the activities in a way that enhances their children's reading and writing skills, or that provide parents with specific suggestions on how to assist their children at home when reading and writing (Goldenberg & Arzubiaga, 1994; Wilks & Clarke,1988). The present research suggests that it might be useful to train parents on strategies that support their children's literacy skills such as those discussed on the teaching practice section. That means, it is important for the school to work with the family as much as possible, as they can be a source of support for the school and vice versa (Reid, 2007).

However, much research suggests that certain parents are really hard to reach and these are often the parents who would benefit most from this kind of support (Mittler, 2002). Thus, teachers should use different ways (including more informal approaches) to encourage parents to communicate with the school, and to keep parents informed about the curriculum. This could be done through informal evening meetings between parents and teachers. At these meetings, teachers can discuss different issues regarding the home literacy environment; literacy and language practices and how to implement them effectively. The teacher could then see how best to support both parents and their children. Establishing a specific school site on the web could be an effective way of communication between teacher, parents and children. Teachers can then upload useful items such as brochures, videos and workshops that may empower parental support towards their children. Also through this site teachers could informally communicate and answer parent enquires in a less public way than at a meeting. A daily notebook with comments from both home and school could be a useful way of communicating between family and school. Through this daily notebook, parents and teachers could record information about the child progress and achievement. Although in common use in the United Kingdom, this is not common practice in Kuwait. In addition, providing

parents with information about working memory deficits, again potentially through workshops, may help parents recognise signs of working memory failure, such as forgetting to complete daily tasks or slowness in recalling information that he or she knows. Parents can also be encouraged to help their children compensate at home for their memory issues by practical strategies such as notice boards or clear calendars with events (Mortimore, 2008).

Early identification of working memory strengths and weaknesses can make a big difference (Alloway & Alloway, 2010) as children can be admitted to intervention programmes. However, through these workshops, parents can learn how to carry out memory games and word searches and puzzles. These games have been found to be good for developing memory and vocabulary in an enjoyable way (Reid, 2011b). Parents can also make use of memory strategies that are regularly used in the Qur'an learning experience while helping their children in literacy and language activities such as training children to organize the information. Reciting and repeating information as they experience during Qur'an learning are suggested strategies that can reinforce and help the children to learn information.

The previous section talks about strategies that both parents and teacher can use to support children in acquiring literacy and language skills. It also provides some ways of bringing teachers and parents into a better working relationship which could benefit all teachers, parents and children. However, there are some difficulties that might hamper these suggestions. For example, many parents are worried about going to school because they are still carrying the history of their own experiences of teachers and schooling. Furthermore, not all parents will welcome such ways of reaching them and will take evasive action accordingly (Wearmouth & Berryman, 2011). Teachers' attitudes to altering classroom practice could be another challenge that hampers the suggested strategies (Mittler, 2002). Therefore there is a need for training teachers to use the proposed strategies in the classroom setting, and to look beyond the child to the family in which the child is living. That is, teachers should attend training courses on the needs of families and how they can work together and also on useful techniques that may help children in the class, mainly those children who are at risk of reading difficulties. To sum up there is a need to consider the whole context of the child within the learning

process. That consideration should include the social and environmental factors as well as cognitive factors (Reid, 2007).

Assessment and intervention practices

The current work focused on the relationship between working memory and reading comprehension with the goal of better understanding the nature of working memory and how working memory contributes to reading comprehension, particularly with Arabic children who are learning English as a second language. The focus on reading comprehension and underlying factors that influence the development of this skill within this context should inform our understanding of the literacy development of children who are learning to be competent in two languages. Consequently, the prediction of literacy problems, potential diagnosis of difficulties and development of remedial programmes should be possible. The results suggesting that listening span may be a useful tool for predicting reading comprehension levels, in addition to single word reading and vocabulary, argue for its consideration in assessment batteries for populations of Arabic and Arabic-English children. Furthermore, the results suggesting that background information on literacy and language practices at home may inform our understanding of the learning context of the child, and potentially lead to a deeper understanding of their reading problems, argues for parental interviews to form an integral part of assessment procedures. This deeper understanding may also help in targeting remedial programmes.

Overall, the current work argues for a consideration of the diagnostic tools used in Kuwaiti governmental schools. The current measures of reading comprehension, vocabulary knowledge, grammar and composition are used as a group screening tool. To support individuals identified as failing to develop at average rates, individual assessments should be introduced. These should include other quantitative tools, such as measures of word-reading accuracy and fluency, non-word reading accuracy and fluency, and verbal working memory. In addition, qualitative tools (focusing on parental questionnaires/interviews) should be developed to provide a complete picture about the potential variables that might be hindering a child's literacy acquisition.

Assessment is not useful unless accompanied by appropriate intervention or changes in teaching. The focus on the present research on the influence of working memory on

learning to read argues for its consideration in intervention/teaching methods. Despite the great deal of uncertainty about the efficacy of working memory intervention programs, because of their modest and limited specific improvement (Melby-Lervag & Hulme, 2012), this does not necessarily mean that they would be entirely unhelpful (Holmes & Gathercole, 2013). Working memory intervention programs could be described as a co-ordinated set of approaches and strategies (Gathercole & Alloway, 2008). For example, Vance (2008) stated that current working memory intervention programmes work on three strands: developing phonological skills to support phonological loop function, developing strategies to support recall and adapting the way in which material to be learned or remembered is taught. The results of the current work potentially provide some evidence for the first approach, as they showed associations between verbal working memory performance, reading and language competence. Efficient phonological skills are presumed to enhance both verbal short term and verbal working memory performance (Dehn, 2008). Hitch (1990) clarified how phonological awareness skills underpin short term memory performance. He stated that speech input is phonologically decoded and encoded directly into the verbal short term memory store. Thus any deficiency on phonological awareness skills may not only disturb the function of phonological short term memory but also the function of verbal working memory.

The second element related to working memory intervention programmes focuses on strategy use. Despite the results of the present research failing to find a significant relationship between working memory and learning the Qur'an, the memory strategies involved in the process of learning the Qur'an could be helpful. One of these memory strategies is rehearsal. Many researchers (Gathercole & Alloway, 2008; Reid, 2011a; Reid & Green, 2007) have argued that rehearsing verbal items is a successful strategy for maintaining information in short term memory. Gathercole and Alloway (2008) argued that rehearsing may improve short term memory performance; and better performance of short term memory may lead to better working memory performance. However, there are other memory strategies involved in the process of learning the Qur'an, such as mnemonic techniques related to Ghnona (chanting), chunking & tonal variations. Such mnemonic techniques are found to be effective in increasing the amount of information that can be retained in a task (Gathercole & Alloway, 2008; Reid, 2011a; Reid & Green, 2007).

The final element of working memory intervention programmes focuses on the adaptation of the materials that are to be learned or remembered in order to reduce memory demands in the task. Gathercole & Alloway (2008) suggested that one of the strategies related to this idea might be to restructure complex tasks by breaking them down into simple steps, which may be consistent with strategies used during the learning of the Qur'an. The tutor of the Qur'an always breaks chapters (Sura) into parts (Hezib), with these parts then broken down further into verses. Children start learning separate verses, then combining these verses into the larger parts (Hezib), and so on until the whole chapter is memorized. Hence, there may be a further way in which the learning of the Qur'an and working memory skills are related.

Clearly, the way in which these strategies are taught to children needs to be carefully considered, but the present work argues for one potential way in which they can form a normal activity in everyday life within the Arab world. Also, generalization across learning contexts and materials needs to be shown for the effects to influence current thinking about working memory capacity. However, further research in this area may be worthwhile, particularly within a learning context such as Kuwait.

Limitations

There are a number of limitations in the current research that need to be considered for a full understanding of the conclusions derived from the work and for future studies in this area. The first limitation is the relatively small samples used in the different studies. This makes it difficult to generalise the present findings to mainstream government school populations. The current findings may be specific to the particular selection and age-group investigated. All the studies were conducted with children from grade 6 (age 11) of Kuwaiti schools and, therefore, the results may not be applicable to different ages. For example, the working memory capacity of an average 4-year old child was presumed to be around one–half or one-third of the working memory capacity of an adult (Gathercole & Alloway, 2008).

Similarly, the results need to be considered carefully in terms of their information about literacy development. Young Arabic children at age 6 may be reading at the single word level whereas literacy skills for adults are more complex and cover a wider range of skills and materials. Therefore, the relationship between working memory and literacy

found in the present work may change with age. Findings were also primarily relevant to Arabic-English bilingual children and, therefore, may not be applicable to Arabic (or English) monolingual/bilingual learners.

A further limitation is that assessments of older children and interviews of the parents of these older children about early literacy experiences may not show clearly how these literacy experiences may have influenced literacy acquisition.

The conducting of interviews with females (mothers) by a male researcher in not an easy task in Kuwait. Kuwaiti society is conservative and follows a segregated educational system (i.e., there are separate schools for boys and for girls). This segregation of males and females often extends to other parts of life and can lead to a certain level of reticence between men and women. Thus, mothers may not feel able to freely discuss behaviours, home environment experiences and their beliefs and attitudes about literacy with a male researcher. Replication of the interview-based part of the research with a female interviewer may produce different or more elaborate results. However, the area from which all children and parents come is a newly constructed area, and their inhabitants come from different parts of Kuwait. The small size of the interviews and the background of children of students/parents in this work make it difficult to generalise the present findings to all Kuwaiti schools.

Future research

Clearly, more work on the role of working memory in Arabic and in English is needed, particularly related to variations in reading skills. Despite the results showing that listening span was related to reading comprehension, this relationship might be due to the common need within the two measures to comprehend linguistic materials. Future research, therefore, might include measures such as counting span and listening comprehension in addition to the measures used in the current work. Counting span is a verbal working memory measure that requires the retention of answers to calculations whilst performing further calculations. In this sense, this measure may load on working memory in the same way as the listening span task. However, it does not rely on the ability to comprehend language content as in the case of the listening span measure. Therefore, if the relationships identified in the current work on Arabic remain, then they are unlikely to be simply due to linguistic understanding and are more likely due to

underlying working memory processes. In addition, the inclusion of a listening comprehension measure would allow the study to formally assess any influence of the common sentence comprehension process on working memory and reading measures. This level of control of the underlying skills would go beyond the use of vocabulary as a linguistic control variable in the present research. For example, listening comprehension would assess the ability to make inferences to support the formation of a comprehension model (schema) whereas vocabulary assesses word knowledge stored in long term memory. Controlling such skills should help specify the influence of verbal working memory on reading comprehension.

The results of the current work indicate that those elements of the central executive involved in backward digit span seem less likely to be common to reading comprehension than factors underlying listening span. Hence, there is a need to incorporate a range of measures related to the functioning of the central executive to assess each element individually, and then explore how each element contributes to variability in reading comprehension. For example, a study could include tasks that assess shifting, such as the Wisconsin Sorting Card Test, and tasks that assess inhibition, such in the Tower of Hanoi (see discussions in Miyake et al., 2000). Such future research should help identify relationships between different aspects of the working memory central executive and reading comprehension in Arabic.

The current work also argued for cross-language relationships between L1 verbal working memory and L2 reading comprehension. Future research investigating interactions between language competence levels and working memory is needed. This could be done by recruiting a large sample of participants and by splitting this sample into different groups based on L2 vocabulary levels. Relationships between L1 and L2 verbal working memory measures and reading comprehension at each level of vocabulary could then be considered across the two languages included in the research. This would provide further evidence for the proposal that as L2 competence increases there is less use of L1 underlying working memory skills in L2 learnt skills (such as reading). The use of a range of working memory measures (as used in this thesis research and proposed in the previous two paragraphs) in this study should help identify the specific area of these cross-language effects: e.g., are they at the level of simple retention (as in digit span or non-word repetition) or at the more complex levels of

retention and manipulation (as in listening span or counting span) or are they focused on other aspects of executive functioning, such as shifting or inhibition.

The association found between the learning of the Qur'an and literacy is also worthy of further investigation. Future research might recruit children from the same grade but divide them into subgroups according to their Qur'an knowledge: a Qur'an knowledge test could be developed to achieve this goal. These groups could then be compared in terms of their performance on measures of reading comprehension; and potentially on measures that might lead to the relationship between the learning of the Qur'an and literacy, such as rhyming, vocabulary and imagery – though other measures might also be included to determine potential mediator factors.

As discussed in the previous (limitations) sub-section of this chapter, research conducted on a group of children at a certain point of time (age 11 in this case) is limited in its ability to inform the field about the development of working memory skills and reading comprehension – it can only consider this development in relation to similar studies performed on different age cohorts. For further data on this aspect of the potential relationship between working memory and reading comprehension, a longitudinal study, following Arabic children's development of reading comprehension and working memory say from grade two/three through to grade six/seven, would be useful. This would identify whether reading comprehension and working memory show similar rates of development; or whether the trajectory of development differs, which would argue against a major link between the processes underlying the two. Arabic literacy development would be particularly interesting here as devowelized text typically occurs in this period across the Arab world (in Kuwait, where the present research was performed, grade four children would be expected to be reading non-vowelized text). Hence, around grade three to four, there may be a change in the relationship between reading and working memory as the child is required to use text inference processes to support the decoding of homographs. Such inferences may be supported by the aspects of working memory that retain information while processing. Given that a relationship between working memory and reading is found around this grade level in Arabic, then the association between the two could be more clearly specified.

Conclusions

Overall, the current data was consistent with previous findings arguing for a relationship between reading and working memory processes – and also was consistent with previous research. These become apparent in the English and Arabic language measures. The present data extends these findings by suggesting that such relationships can be cross-language – at least within Arabic-English literacy learning children. This data also argues for some level of interdependency between working memory and language competence in a second language context. The results also confirm the need to consider the basis of the working memory model, in particular whether the central executive needs to be divided into different processes or systems, and the reasons for different measures of working memory showing poor correlations (in the present case, listening span and reverse digit span). These conclusions suggest that working memory measures need to be developed carefully in order to be effective for Arabic language and literacy contexts. Finally, the data confirm the importance of home literacy environment as a potentially important variable that may support the development of literacy skills. Such findings have both theoretical and practical importance, particularly for work in Arabic reading and writing assessment and teaching; though further work is necessary to determine the efficacy of assessment and intervention methods that target working memory processes.

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APPENDICES

FOR

CONSENTS

&

MEASURES DEVELOPED FOR THE WORK

Appendix A .1

Consent Form Parents

I have given a full explanation of this project and have been given and have been given an opportunity to ask questions.

I understand what will be required of me if I agree to take part in this project.

I understand that my participation is voluntary and that I may withdraw at any stage without penalty.

I understand that any information or opinions I provide will be kept confidential to the researcher and that any published or reported results will not identify me.

I understand that I will receive a report on the findings of this study. I have provided my email details below for this.

I understand that if I require further information or any complaints I can contact the researcher, [HossamElsayyad]. If I have any complaints,

By signing below, I agree to participate in this research project.

Name: _____

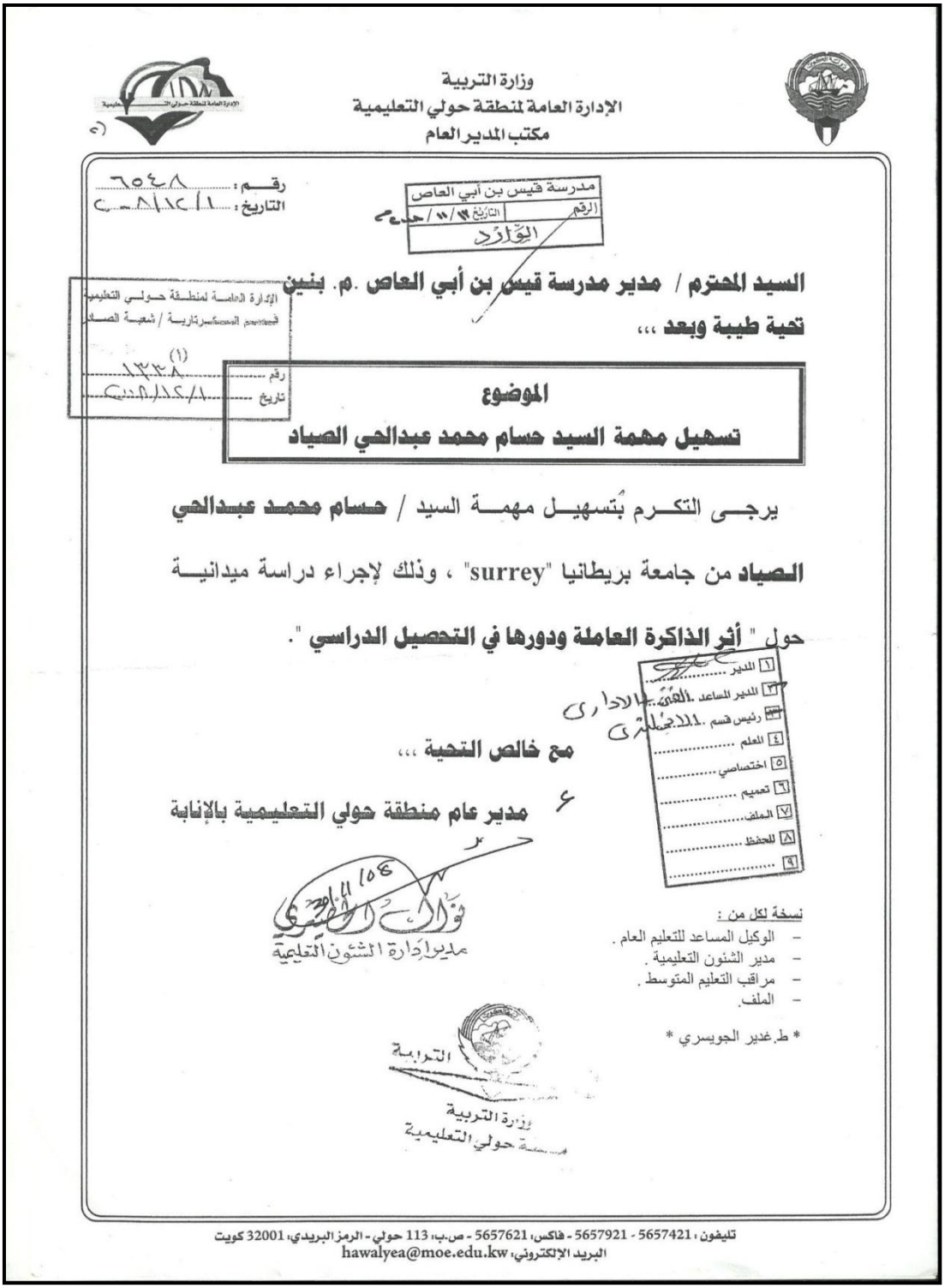
Date: _____

Signature: _____

Email address: _____

Please return this completed consent form to [Mr Khalid Seleem] in the envelope provided by [15/12/2010].

Appendix A .2



وزارة التربية
الإدارة العامة لمنطقة حولي التعليمية
مكتب المدير العام

رقم : ٦٥٤٨
التاريخ : ٢٠١١/١٠/١٠

مدرسة قيس بن أبي العاص
الرقم
التاريخ ١٣/١٠/٢٠١١
الوارد

السيد المحترم / مدير مدرسة قيس بن أبي العاص .م. بنين

تحية طيبة وبعد ،،،

الإدارة العامة لمنطقة حولي التعليمية
قطاع الشئون المدرسية / شعبة الصفوف
رقم (١) ١٣٢٨
تاريخ ٢٠١١/١٠/١٠

الموضوع

تسهيل مهمة السيد حسام محمد عبدالحي الصياد

يرجى التكرم بتسهيل مهمة السيد / **حسام محمد عبدالحي الصياد** من جامعة بريطانيا "surrey" ، وذلك لإجراء دراسة ميدانية حول " **أثر الذاكرة العاملة ودورها في التحصيل الدراسي** ".

مع خالص التحية ،،،

مدير عام منطقة حولي التعليمية بالإنابة

مدير إدارة الشئون التعليمية

١ المدير
٢ المدير المساعد
٣ رئيس قسم
٤ المعلم
٥ اختصاصي
٦ تعميم
٧ الملف
٨ للحفظ
٩

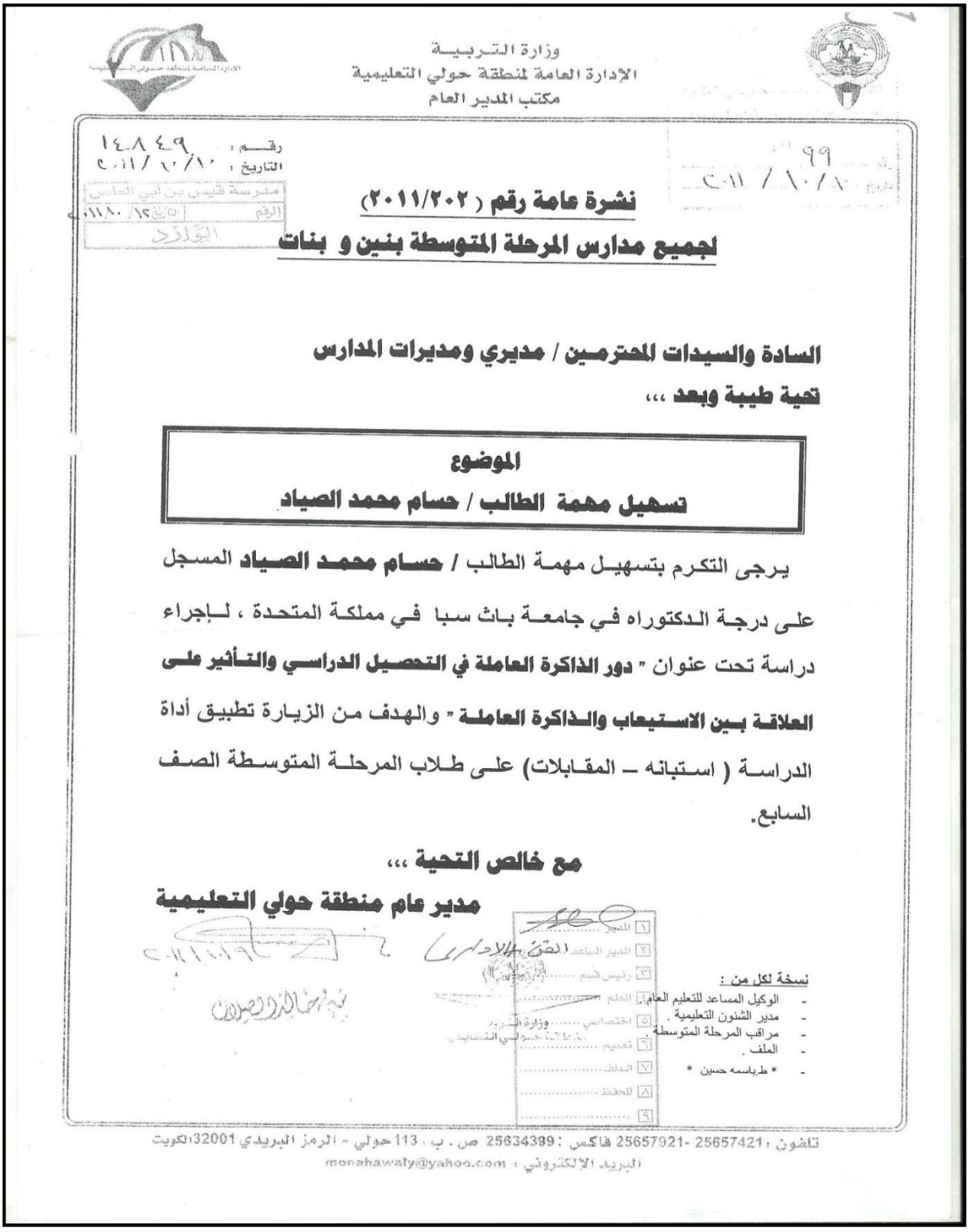
نسخة لكل من :
- الوكيل المساعد للتعليم العام .
- مدير الشئون التعليمية .
- مراقب التعليم المتوسط .
- الملف .

* ط.غدير الجويسري *

وزارة التربية
منطقة حولي التعليمية

تليفون : 5657421 - 5657921 - فاكس: 5657621 - ص.ب: 113 حولي - الرمز البريدي: 32001 كويت
البريد الإلكتروني: hawalyea@moe.edu.kw

Appendix A .3



وزارة التربية
الإدارة العامة لمنطقة حولي التعليمية
مكتب المدير العام

رقم : ١٤٨٤٩
التاريخ : ٢٠١١/١٠/١٠

مدرسة فهيد بن أبي العاص
الرقم ... التاريخ ٢٠١١/١٠/٨
الوارد

٩٩
٢٠١١/١٠/٨

نشرة عامة رقم (٢٠١١/٢٠٢)

لجميع مدارس المرحلة المتوسطة بنين و بنات

السادة والسيدات المحترمين / مديري ومديرات المدارس

تحية طيبة وبعد ،،،

الموضوع

تسهيل مهمة الطالب / حسام محمد الصياد

يرجى التكرم بتسهيل مهمة الطالب / **حسام محمد الصياد** المسجل على درجة الدكتوراه في جامعة باث سبا في مملكة المتحدة ، لإجراء دراسة تحت عنوان " **دور الذاكرة العاملة في التحصيل الدراسي والتأثير على العلاقة بين الاستيعاب والذاكرة العاملة** " والهدف من الزيارة تطبيق أداة الدراسة (استبانه – المقابلات) على طلاب المرحلة المتوسطة الصف السابع.

مع خالص التحية ،،،

مدير عام منطقة حولي التعليمية

٢٠١١/١٠/٩

نسخة لكل من :
- الوكيل المساعد للتعليم العام.
- مدير الشئون التعليمية .
- مراقب المرحلة المتوسطة
- الملف .
- * ط.باسمه حسين *

١ للنشر
٢ المدير المساعد
٣ رئيس قسم
٤ المعلم
٥ اختصاصي
٦ تعميم
٧ الملف
٨ للحفظ
٩

تلفون : 25657421 -25657921 فاكس : 25634399 ص . ب : 113 حولي - الرمز البريدي 32001 الكويت
البريد الالكتروني : monahawaly@yahoo.com

Appendix. B

Forward digit span test (Arabic form)

إجراءات الاختبار:
يقرأ الفاحص الأرقام بمعدل رقم لكل ثانية، وينتظر قليلاً بعد كل محاولة. يجب على المفحوص الانتظار حتى ينتهي الفاحص من كل محاولة قبل أن ينطق بالأرقام نطقاً تسلسلياً.

التمرين على الاختبار:
تأكد من أن المفحوص يسمعك جيداً ويعرف المطلوب إليه.درِّبالمفحوص على الاختبار أولاً 'ثلاث محاولات'.

الاختبار وحساب درجات الإختبار:
ابدأ الاختبار بعد الانتهاء من التمرينات. لا تقل إذا كانت إجابة المفحوص خطأ أم صواب. سجّل عدد الوحدات الصحيحة ضع سطرا يفصل .في ورقة تسجيل الدرجات. أوقف الاختبار إذا ارتكب المفحوص خطأين متتالين في تذكر الأرقام الأرقام التي أعادها الطالب بنجاح عن بقية الأرقام.

الأرقام المستخدمة للتدريب هي:	2	8			الإجابة الصحيحة للطالب هي	2	8	
	3	6			الإجابة الصحيحة للطالب هي	3	6	
		1	9	4	الإجابة الصحيحة للطالب هي	1	9	4

								صح (/) أو خطأ (x)
1	8							
3	5							
0	1	8						
5	8	6						
2	6	4	9					
7	4	2	5					
0	7	2	3	8				
9	6	1	8	5				
8	4	3	7	5	0			
7	9	2	8	4	6			
2	5	1	7	4	3	9		
3	8	4	7	6	5	1		

Appendix C . 1

Non- word repetition test(Arabic Form)

	قائمة الكلمات
1	بصع
2	غشد
3	جمط
4	مزكش
5	واجق
6	فلحط
7	أطلش
8	ماقظ
9	أقزح
10	مضارش
11	مخفوط
12	انهقط
13	مهكشب
14	دمحفرن
15	استظخش
16	نواغيس
17	تضابكن
18	مواكيخ
19	استحفاط
20	تهاوكن
21	يتوخنان
22	يتهافرن
23	يستشكبان
24	انبهاطات
25	يستضفخان

Appendix C .2

Non-word repetition test (English form)

Pim	Jint
Tam	Blim
Swad	Gruss
Chove	Skoosh
Tropment	Plention
Prejend	Miction
Fitosal	Sabotack
Mispreture	Rebably
Ambrahili	Prebalture
Catashin	Mysluwoon
Polonelist	Delikeraties
Sholuteka	Zalotipik
Kariphanik	

Appendix D

Backward digit span test (Arabic form)

إجراءات الاختبار:

يقرأ الفاحص الأرقام بمعدل رقم لكل ثانية على أن يقرأ الأرقام رقما رقما، وينتظر قليلاً بعد كل محاولة. يجب على المفحوص الانتظار حتى ينتهي الفاحص من كل محاولة قبل أن ينطق بالأرقام نطقاً عكسياً.

التمرين على الاختبار:

تأكد من أن المفحوص يسمعك جيداً ويعرف المطلوب إليه. درِّب المفحوص على الاختبار أولاً 'ثلاث محاولات'.

الاختبار:

ابدأ الاختبار بعد الانتهاء من التمرينات. لا تقل إذا كانت إجابة المفحوص خطأ أم صواب. سجّل عدد مرات الأخطاء في ورقة تسجيل الدرجات. أوقف الاختبار إذا ارتكب المفحوص خطأين متتالين في تذكر الأرقام. ضع سطرا يفصل الأرقام التي أعادها الطالب بنجاح عن بقية الأرقام.

الأرقام المستخدمة للتدريب هي:	2	9			الإجابة الصحيحة للطالب هي	9	2		
	1	3	4		الإجابة الصحيحة للطالب هي	4	3	1	
	1	5	6	7	الإجابة الصحيحة للطالب هي	7	6	5	1

الأرقام المستخدمة في الاختبار هي:

4	2						الإجابة الصحيحة هي 2 4	صح (/) أو خطأ (x)
6	9						الإجابة الصحيحة هي 6 9	
5	3	8					الإجابة الصحيحة هي 8 3 5	
6	7	1					الإجابة الصحيحة هي 1 7 6	
4	3	9	6				الإجابة الصحيحة هي 6 9 3 4	
7	1	8	3				الإجابة الصحيحة هي 3 8 1 7	
3	2	6	1	4			الإجابة الصحيحة هي 4 1 6 2 3	
8	6	4	7	2			الإجابة الصحيحة هي 42 7 6 4 8	
9	6	5	1	7	8		الإجابة الصحيحة هي 8 7 1 5 6 9	
8	7	2	5	1	4		الإجابة الصحيحة هي 4 1 5 2 7 8	
2	5	1	7	4	3	9	الإجابة الصحيحة هي 9 3 4 7 1 5 2	
3	8	4	7	6	5	1	الإجابة الصحيحة هي 1 5 6 47 8 3	

Appendix E

Listening span test (Arabic form)

Instructions: The examiner explains to the child that he has to do two things. First, He has to listen to a sentence and judge it as true or false. Then after the examiner nods to him, he has to give the last word of the sentence. In case of more than one sentence, he has to judge each sentence directly after listening to it. Then, he has to give the last words of each sentence in order.

الارشادات : يوضح الممتحن للطالب المطلوب منه. اولا: يستمع الى الجملة التى يقولها الممتحن و يحكم على مدى صحتها بكلمة : صح/ خطأ ثم يطلب من الطالب تذكر آخر كلمة فى الجملة بعد اشارة او طرقة على الطاولة من الممتحن.

المدى	القائمة			
1	لدى السمكه شعر			
	تأكل النمور التفاح			
	الكره شكلها مربع			
2	يعيش الجمل فى الماء			
	الورد له رائحة ذكية			
	الانسان لديه اذنان			
	يعزف القط الموسيقى			
	يعمل المعلم فى المدرسة			
	ذيل الحصان مجعد			
3	السيارات لها اطارات			
	أذن الارانب طويلة			
	تأكل الذئاب العشب			
	لدى الغزال أجنحه			
	تضع الدجاجه البيض			
	تستطيع السمكه الكلام			
	لدى الناس أرجل			
	الصخور صلبه			
	السماء لونها أخضر			

4	الشمش حاره			
	يركب الموز الدراجات			
	تسطيع المنازل الغناء			
	الأنف مكانه فى الوجه			
	تعيش السمكهفى الماء			
	تنمو الأرانب على الشجر			
	أقدام البط صغيرة			
	الأشجار لديها فرو			
	تلعب الكلاب الكره			
	المنازل لها نوافذ			
	سمكه القرش اسنانها ضخمه			
	تلعب الحافلات بالألعاب			
5	البرتقال لديه أذن			
	الدببة لها ذيول طويلة			
	الأباء رجال			
	يوضع العقال على الرؤوس			
	تسير الشاحانات على الطرق			
	تأكل الأغنام العشب			
	تعزف الأشجار الموسيقى			
	تمتلك الزراقه رجلين طويلتين			
	الجزر هو البرتقال			
	تستطيع الدراجات الناريه النباح			
	لدى الناس عينان			
	الشاحنات لها اطارات			
	تعيش الأغنام فى الحقول			
	تستطيع السمكه التكلم			

	الشمش بارده			
6	تسطيع النحله القرص			
	الضفادع لديها أذن طويله			
	نرتدى الجورابفى الأقدام			
	ينمو الثيران فى الحدائق			
	الديدان لها اصابع			
	النار ساخنه			
	تبيع المحلات الطعام			
	تحتاج السيارات الى البنزين			
	الجبال صغيره			
	تطارد الكلاب القطط			
	لون الفروله أزرق			
	البنوك توجد بها الأموال			
	الليل مظلم			
	المربعات شكلها دائرى			
	تستطيع القوراب الطيران			
	تأكل الزهور الحلوى			
	الاسد لديه أربع أرجل			
	الأزهار تأكل الفطائر			

Appendix F .1

Sentence reading comprehension test (Arabic form)

على الطالب أكمال أكبر عدد من الجمل التالية بكلمة واحدة خلال 90 ثانية

مثال : 1-المرحلة الثانوية تأتى بعد .....(الابتدائية – المتوسطة – الثانوية – الجامعة)

نلعب كرة القدم فى..... (المخبز – الملعب – الملحمة – مكتب البريد) 2-

م	السؤال	ج1	ج2	ج3	ج4
1	نقرأ في مكتبة المدرسة	صورة	طابع بريد	قلم	كتاب
2	.....يعالج المرضى .	الشرطي	الطبيب	المزارع	الفارس
3	.....يكتب و يشرح الدرس.	المعلم	الطبيب	الزارع	الجندي
4	يسقط .....في الشتاء .	الحر	الريح	العاصفة	المطر
5	نرى النجوم في	العصر	المساء	الظهر	الصباح
6	نشترى الفاكهة من	البنك	الخباز	بائع الفاكهة	الصيدلية
7	.....حيوان أليف .	الأسد	الثعلب	الكلب	الحوت
8	.....من الخصال الحميدة .	الجبن	الكذب	الخيانة	الشجاعة
9	المدينة أكبر من	القارة	العالم	القرية	المحيط
10	..... حيوان مخلص .	الثعلب	الأسد	الكلب	الفأر
11	.....يخيط الملابس .	الخياط	النجار	الجندي	المعلم

م	السؤال	ج1	ج2	ج3	ج4
12	نضع أموالنا في	الفرن	المدرسة	البنك	المخبز
13	ماء البحر طعمه	عذب	حلو	مالح	مر
14	تعطينا البقرة	الخبز	الحليب	العسل	الزيت
15	.....يصنع الكرسي .	البائع	الفلاح	النجار	الصديق
16	..... يحرك ذيله .	الفارس	الكلب	الحمامة	النحلة
17	الشمس ..... كل صباح .	تغرب	تشرق	تعصف	تمطر
18	نحصل على الصوف من	الحصان	القط	الخروف	البقرة
19	..... يخاف من القط .	الأسد	الفأر	النمر	الفيل
20	الحليب لونه	أصفر	أبيض	رمادي	أزرق
21	.....صفة مذمومة .	الشجاعة	الكرم	الكذب	العدل
22	المرحلة الثانوية تأتى قبل	الابتدائية	الجامعة	المتوسطة	الروضة
23	.....الكويت و قطر و البحرين دول	أمريكية	خليجية	روسية	نووية
24	..... يقبض على اللصوص .	الطبيب	الشرطي	الفلاح	المعلم
25	هناك .....أيام في الأسبوع .	عشرة	سبعة	ثمانية	خمسة

Appendix F .2

Sentence reading comprehension test (English form)

على الطالب أكمال أكبر عدد من الجمل التالية بكلمة واحدة خلال 90 ثانية

The child has 60 seconds to complete as many sentences as he can with one word:-

Example: 1-A …….works in the hospital. (Pilot – doctor – teacher – farmer)

2-Pupils go to …… in the morning. (Club – school –airport- market)

No	Question	A1	A2	A3	A4
1	We know the time by …….	Pen	Picture	Clock	Book
2	The chicken eats ……..	Banana	Meat	Seeds	Milk
3	The …….grows plants.	Farmer	Carpenter	Doctor	Soldier
4	The ……. fights for our country.	Gun	Pen	Soldier	Teacher
5	The …… lays eggs.	Palm	Rooster	Elephant	Chicken
6	……..…..is the month of fasting.	Rajab	Shawaal	Moharam	Ramadan
7	The ……..lives in water.	Elephant	Bird	Soldier	Fish
8	A …… is an animal with two wings.	Bat	Dog	Goat	Mouse
9	Cheese is made of …….	Honey	Eggs	Bread	Milk
10	The carpenter makes chairs from …	Glass	Paper	Thread	Wood

11	Children play in the …….	Cage	Garden	Hospital	Plane
12	……..……is a metal.	Plastic	Iron	Clothes	Paper
13	The ……..is a big animal.	Elephant	Mouse	Lion	Deer
14	A …….. can be ridden by man.	Deer	Dog	Goat	Horse
15	We get honey from ……..	Ants	Bees	Spiders	Flies
16	We use the ……to travel by sea.	Train	Ship	Car	Bicycle
17	A …. is an animal with long neck .	Mouse	Fox	Sheep	Giraffe
18	We hear sounds with our ……..	Nose	Eyes	Ears	hands
19	We can learn in the …….	Cinema	Street	School	Bakery
20	A hand is a part of the ……..	Body	Club	Team	Party
21	A …… is a bird which eats meat.	Cat	Chicken	Falcon	Mouse
22	The weather is very hot in ……..	Winter	Spring	Summer	Fall
23	A …….. builds a nest on the tree.	Elephant	Giraffe	Bird	Lion
24	A mother …….. her children .	Kills	Hits	Loves	Hates
25	We pray in the……	Bank	Theatre	Plane	mosque

Appendix G .1

Devowelized text reading comprehension test(Arabic Form)

Instructions to children: Instructions to children: Read the short passages and choose the correct answer

النص الأول:بدر مثل أعلى للطالب المجد البار بوالديه المحب لأخونة، فهو فائق فى دراسته، حائز على أكبرعدد من جوائز التميز فى المواد الدراسيه المختلفة.		
1- بدر مثل أعلى للطالب..... فى دراسته	أ. المشاغب	0/1
	ب. الكسول	
	ج. الفائق	
	د. المتعثر	
2- بدر يحب.....	أ. أصدقائه	
	ب. أخونة	
	ج. أقاربه	
	د. أساتذته	
3- حاز بدر على العديد من.....	أ. الجوائز	
	ب. الميداليات	
	ج. الألقاب	
	د. الأموال	

<u>النص الثاني</u>:يعد البطريق من الطيور البرمائية ، وهو طائر بحرى يعيش غالبا فى القارة المتجمدة الجنوبية، فهو يزن سبعمائة جرام ، وطولة لا يتجاوز أربعين سنتمتر، وهو من ذوات الدم الحار لأنة لا تتغير درجة حراراته بتغير درجة حراراة البيئة.	
4- يعيش البطريق فى القارة	أ. الأوربية
	ب. المتجمدة الجنوبية
	ج. الأفريقية
	د. الأسيويه
5- كم يبلغ وزن البطريق ؟	أ. اربعة عشر جرام
	ب. خمسين جرام
	ج. ثلاثمائة جرام
	د. سبعمائة جرام
6- يبلغ طول طول البطريق	أ. 40 سنتمتر
	ب. 50 سنتمتر
	ج. 60سنتمتر
	د. 70 سنتمتر
7- سمى طائر البطريق بالبرمائى لانه يعيش فى	أ. البحر
	ب. البر
	ج. البر والبحر معا
	د. الصحراء

<u>النص الثالث</u>: تنازع شخصان وذهبا إلى جحا ، وكان قاضيا ، فقال المدعي : لقد كان هذا الرجل يحمل حملا ثقيلا ، فوقع على الأرض ، فطلب مني أن أعاونه ، فسألته عن الأجر الذي يدفعه لي بدل مساعدتي له ، فقال (لا شيء) فرضيت بها وحملت حمله . وهاأنذا أريد أن يدفع لي اللا شيء . فقال جحا : دعواك صحيحه يا بني ، اقترب مني وارفع هذا الكتاب . ولما رفعه قال له جحا : ماذا وجدت تحته ؟ قال : لا شيء . قال جحا : خذها وأنصرف		
8- كان حجا	أ. حمال	
	ب. قاضيا	
	ج. نجار	
	د. تاج	
9- طلب الرجل من المدعى أن	أ. يعاونة	
	ب. يطعمه	
	ج. يعلاجه	
	د. يصدقه	
10- ماذا كان يريدالمدعى.....	أ. الأجر	
	ب. الحمل	
	ج. الكتاب	
	د. الطعام	
11- لماذا قدم الدعى الى جحا.....	أ. ليأخذ **(لا شيء)**	
	ب. ليرفع الكتاب	
	ج. ليحمل الحمل	
	د. لِيَذْهَبَ مَعَهُ إِلَى السوق	
12 نصف حجا ب	أ. العنيف	
	ب . الْكَرِيمِ	
	ج . الصّادِق	
	د. الذكى	

النص الرابع : الدلافين هى تلك الكائنات الجميلة والودودة التي ترسم الابتسامة على وجوهنا، و التى تتمتع بذكاء غير مألوف لم نعتده في غير البشر! والغريب أن الأمر لا يتوقف عند الذكاء فقط، بل يكتشف العلماء يوماً بعد يوم أن الدلافين تتمتع بقيم ومبادئ راقية مثل الإيثار، فكثيرا ما سجلت حوادث أنقذت فيها الدلافين بشرا وكائنات أخرى (مثل الحيتان) من الأخطار التي واجهتها، والمثير ان الدلافين تستطيع التخاطب فيم بينها من خلال نظام اتصالات ، وتتمتع الدلافين كذلك بنظام توجيه راداري تستطيع من خلالة تحديد الخطر الذي يحيط بها، وتحديد أماكن الطعام!

13 الدلافين هى كائنات	أ. جميلة	
	ب. قبيحة	
	ج. منقرضة	
	د. معدية	
14 بم تسطيع الدلافين تحديد أماكن الطعام	أ. نظام اتصالات	
	ب . نظام غذائى	
	ج . نظام اجتماعى	
	نظام توجيه راداري	
15 تتمتع الدلافين	أ. بقوة عظامها	
	ب. بخشونة عظامها	
	ج. بذكاء غير مألوف	
	د. بكبر عيونها	
16عند الأخطار تقوم الدلافين	أ. بانقاذ البشر	
	ب. الحيتان	
	ج. البشر والكائنات الأخرى	
	د. السفن	
17 قال العلماء عن الدلافين انها تتمتع.....	أ. بقلب كبير	
	ب. بجسم قوى	

	ج. بأسنان حادة	
	د. بمادئ وقيم	
18 ترسم الدلافين على وجوهنا ...	أ. الألون	
	ب. الأبتسامة	
	ج. الأشكال	
	د. الصور	
19 ما الفكرة الرئيسية للنص السابق	أ. الدلافين حيوانات رائعة	
	ب. الدلفين حيوان ذكى	
	ج. الدلفين حيوان وفى	
	د. الدلافين حيوانات مخيفة	

النص الخامس: يحكى على سبيل الطرفة ان ضابطاً مسؤولاً في أحد الجيوش كان يقوم بجولة تفتيشية على جنودة. جاءت منه التفاتة الى احدى الخيام فأبصر فيها جنديين في وضع مستهجن. اذ شاهد احدهما يقرأ رسالة والثاني يغلق بيديه اذني الاول بشدة .اتجه الضابط نحوهما فسألهما عما يفعلان : أجاب الذي يقرأ : لقد وردت رسالة لهذا الجندي من خطيبته وهو أمي لا يحسن القراءة، فطلب الي قراءتها.وقال الثاني : انني اضع يدي على أذنيه لكي لا يسمع الذي يقرؤه.		
20 ماذا كان الضابط يفعل	أ. يمازح جنوده	
	ب. يفتش على جنوده	
	ج. يقوم برياضة مع جنوده	
	د. يصيح فى جنودة	
21 شاهد الضابط عندما التفت الى احد الخيام	أ. جنديا يقرأ رسالة	
	ب. جنديا يقرأ واخر يديه على أذنة	
	ج. جندياً يقرأ الرسالة و الصفحه مقلوبة	
	د. جنديا يحلق لحيتة	
22 ممن وردت الرسالة؟	أ. من خطيبه احد الجنديين	
	ب. من والدة احد الجنديين	
	ج. من جندى زميل	
	د. من عم احد الجنود	
23 لماذا كان احد الجنود يضع يديه على اذنى الأخر	أ. لكى يرفع صوته عند القراءه	
	ب. لكى لا يسمع ما يقرأ	
	ج. لكى لا يعرف ما فى الرسالة	
	د. لكى يعالجها	
24 أحسن عنوان للقصة تقترحه هو	أ. . الوضع المستهجن .	
	ب. غباء جندي امي	
	ج. الضابط الشجاع.	
	د. الضابط الجرئ	

النص السادس: البحر الميت هو بحيرة يعتبر سطحها أعمق نقطة في العالم على اليابسة، وتقع ما بين الأردن، وفلسطين. وقد أطلق على هذه البحيرة اسم «البحر الميت» بسبب عدم قدرة الكائنات الحية أو الاسماك على العيش فيه لكون مياهه شديدة الملوحة، فهي تقارب عشرة أضعاف ملوحة المحيطات، وتتغير هذه اعتمادا على العمق، كما لا تعيش فيه الكائنات الحيه بالرغم من وجود بعض أنواع البكتيريا والفطريات الدقيقة فيه، يعتبر البحر الميت من مناطق السياحة العلاجية الأكثر نشاطا في المنطقة، حيث يقال أن الأملاح الموجودة به تشفي كثيرا من الأمراض الجلدية مثل الصدفية والحساسيات الجلدية المتنوعة،

25 البحر الميت هو....	أ. قناة	
	ب. محيط	
	ج. بحيرة	
	د. ميناء	
26 يقع البحر الميت بين	أ. الاردن وسوريا	
	ب. الاردن و فلسطين	
	ج. الاردن و مصر	
	د. الاردن و العراق	
27 يذهب الناس الى البحر الميت لانه	أ. لانه لاتوجد فية حياة	
	ب. لانه ملوث	
	ج. لانه معلم للسياحه العلاجيه	
	د. لاتوجد بة سفن	
28 ما عنوان النص الذى تقترحه	أ. مزار سياحى	
	ب. البحيرة الهادئة	
	ج. بحر عميق	
	د. بحر لا حياة فيه	
29 نستنتج من النص السابق ان البحر الميت	أ. يمكن السباحه فيه	
	ب. يمكن العلاج بمياهة	
	ج. يمكن الصيد فية	
	د. يمكن التخلص الفطريات	

30 ما السبب الرئيسى فى عدم قدرة الكائنات الحية العيش فى البحر الميت؟	أ. تلوث المياه	
	ب. تلوث الجو المحيط به	
	ج. كثرة السموم الملقاة فيه	
	د. شدة ملوحة المياه	
31 ماذا يعنى وجود بعض أنواع البكتيريا فى البحر الميت	أ. كثرة الاسماك فيه	
	ب. كثرة النقايات فيه	
	ج. قدرة البكتريا على التكيف	
	د. عمق البحر الميت	
		31/____

Appendix G .2

Vowelized text reading comprehension test(Arabic Form)

النص الأول: يَنامُ أحَمَدُ مُبَكِّراً، وَيَسْتَيْقِظُ مُبَكِّراً، ثُمَّ يَذْهَبُ مَعَ والِدِهِ إلى الْمَدْرَسَةِ نَشيطاً مُتَيَقِّظاً.		
1- كَيْفَ يَذْهَبُ أَحَمَدُ إلى الْمَدْرَسَةِ؟	ه. سيراً	
	و. مُتْعَباً	
	ز. نَشيطاً	
	ح. فَرِحاً	
2- مَتى يَنامُ أَحَمَدُ؟	ه. الساعة العاشرة	
	و. مُبَكِّراً	
	ز. عصراً	
	ح. مُسْتَلْقياً	
3- يَذْهَبُ أَحَمَدٌ إلى الْمَدْرَسَةِ مَعَ.....	ه. أَبيهِ	
	و. أُمِّهِ	
	ز. أَخيهِ	
	ح. السائق	
النص الثاني: يُعَدُّ عُصْفورُ الذُّبابَةِ وَمَوْطِنُهُ كوبا أَصْغَرَ طائِرٍ في الْعالَمِ، فَهوَ يَزِنُ جِراميْنِ فَقَطْ، وَطولُهُ لا يَتَجاوَزُ سِتَّةَ سَنْتِمِتْراتٍ، وَلِذلك سُمِّيَ عُصْفورَ الذُّبابَةِ.		
4- يَعيشُ عُصفورُ الذُّبابَةِ في	ه. كَنَدا	
	و. كوبا	
	ز. كوريا	
	ح. كولومبيا	
5- كَمْ يَبْلُغُ وَزْنُ عُصْفورِ الذُّبابَةِ ؟	ه. جِراماً واحداً	
	و. جِراميْنِ	
	ز. ثَلاثَةَ جِراماتٍ	
	ح. أَرْبَعَةَ جِراماتٍ	

6- يَبْلُغُ طولُ عُصْفورِ الذُّبابَةِ تقريباً	ه. 4 سنتمترات	
	و. 5 سنتمترات	
	ز. 6سنتمترات	
	ح. 7 سنتمترات	
7- لِماذا سُمِّيَ هذا الطّائِرُ بِعُصْفورِ الذُّبابَةِ؟	ه. لِشِبَهِهِ الذُّبابَة	
	و. لِلَوْنِهِ الأَسْوَد	
	ز. لِسُرْعَتِهِ	
	ح. لِصِغَرِهِ وَخِفَّتِهِ	
النص الثالث: كانَ جُحا يَسْكُنُ في بَيْتٍ ريفيٍّ صَغيرٍ، تُحيطُ بِهِ الأَشْجارُ المُثْمِرَةُ، وَكانَ يَمْلِكُ حماراً، فَأَرادَ جارُهُ أَنْ يَسْتَعيرَ مِنْهُ الْحمارَ، لكنَّ جُحا اعْتَذَرَ إِلَيْهِ بِهُدوءٍ، وَأَخْبَرَهُ أَنَّ الْحِمارَ ذَهبَ بِهِ أَبْناؤُهُ إِلى الْحَقْلِ، وَبَيْنَما هُما كَذلِكَ إِذا بِالْحِمارِ يَنْهَقُ، فَقالَ الْجارُ: حِمارُكَ مَوْجودٌ سَمِعْتُ صَوْتَهُ، فَرَدَّ جُحا: عَجَباً أَتُصَدِّقُ الْحِمارَ وَلا تُصَدِّقُني؟		
8- كانَ جُحا يسكن في	ه. بَيْتٍ كَبيرٍ	
	و. بَيْتٍ ريفيٍّ	
	ز. خيمة صَغيرَةٍ	
	ح. كوخٍ صغيرٍ	
9- سَمِعَ الْجارُ	ه. صَوْتَ الْحِمارِ	
	و. تَساقُطَ الثِّمارِ	
	ز. تَغْريدَ الْبَلابِلِ	
	ح. أَصْواتَ أَبْناءِ جُحا	
10- ماذا كان يُحيطُ بِبَيْتِ جُحا؟	ه. الْبُيوتُ	
	و. الأَنْهارُ	
	ز. الأَشْجارُ	
	ح. السّورُ	
11- لماذا قَدِمَ الْجارُ إِلى بَيْتِ جُحا؟	ه. لِيَطْمَئِنَّ عَلَيْهِ	
	و. لِيَسْتَعيرَ مِنْهُ الْحِصانَ	

	ز. لِيَسْتَعيرَ مِنْهُ الْحِمارَ	
	ح. لِيَذْهَبَ مَعَهُ إلى الْحَقْلِ	
12- نَصِفُ جُحا بـ	ب. العنيف	
	ج. الْكَريمِ	
	د. الصّادِق	
	ه. الْكَذّابِ	

النص الرابع: يُحِبُّ النّاسُ مُشاهَدَةَ الدَّلافين وَهِيَ تَسْبَحُ وَتَقْفِزُ بِطريقَةٍ مُسَلِّيَةٍ، فَهِيَ مَخْلوقاتٌ عَجيبَةٌ غَيْرُ مؤْذِيَةٍ، يَقولُ عَنْها الْعُلَماءُ: إنَّها مُخْلِصَةٌ كَالْكِلابِ، وأَنَّ لَها ذاكِرَةً قَوِيَّةً كَالْفيلِ، ولَها قوّةُ سَمْعٍ تَفوقُ قُوَّةَ سَمْعِ الإِنْسانِ عَشْرَ مَرّاتٍ. والدُّلْفينُ مُحِبٌّ لِلإِنْسانِ، ومِنْ دَلائِلِ حُبِّهِ لَهُ قِصَّةُ الشَّخْصِ الذي كادَ يَغْرَقُ في الْبَحْرِ، وبَعْدَ نَجاتِهِ حَدَّثَ أَنَّ قُوَّةً عَجيبَةً سَحَبَتْهُ إلى الأَعْلى، ثُمَّ دَفَعَتْ بِهِ إلى الشّاطِئِ، وعِنْدَما اِسْتَدارَ لِشُكْرِ الْمُنْقِذِ لَمْ يَجِدْهُ، ولكِنَّ دُلْفيناً كانَ قَريباً مِنْهُ يَقْفِزُ بِفَرَحٍ وسُرورٍ... أَجَلْ كانَ هُوَ الْمُنْقِذُ.

13- مَنْ الذي أَنْقَذَ الْغَريقَ؟	أ. الْكلبُ	
	ب. النّاسُ	
	ج. الفيلُ	
	د. الدُّلفينُ	
14- قُوَّةُ سَمْعِ الدّلافين تَفوقُ قُوَّةَ سَمْعِ الإِنْسانِ بـ	أ. 10 مَرّات	
	ب. 20 مَرَّةً	
	ج. 5 مَرّاتٍ	
	د. 15 مَرَّةً	
15- بِمَ تَتَمَيَّزُ الدّلافينُ؟	ه. بِقُوَّةِ عِظامِها	
	و. بِخُشونَةِ مَلْمَسِها	
	ز. بِقُوَّةِ ذاكِرَتِها	
	ح. بِكِبَرِ عُيونِها	
16- كانَ الدُّلفينُ يَقْفِزُ فَرِحاً لأنه.....	ه. يُحِبُّ اللّعِبَ بِالْماءِ	
	و. أَنْقَذَ الرَّجُلَ من الغرق	

	ز. يُحبُّ أَنْ نَرْمِيَ لَهُ الطَّعَامَ	
	ح. رأى النّاسَ يُصَفِّقونَ لَهُ	
17- قالَ العلماء عَنِ الدّلافين إنَّها.....	ه. أَليفَةٌ كَالْكِلابِ	
	و. شَرِسَةٌ كَالْكِلابِ	
	ز. أَمينَةٌ كَالْكِلابِ	
	ح. مُخْلِصَةٌ كَالْكِلابِ	
18- يُحِبُّ النّاسُ مُشاهَدَةَ الدّلافينَ وهِيَ تَسْبَحُ لأن...	ه. حَركاتِها بَهْلَوانِيَّةٍ	
	و. جُلودَها بَرّاقَةٌ	
	ز. أَلْوانَها جَميلَةٌ	
	ح. الدُّلْفين مُحِبٌّ لِلإِنْسانِ	
19- ما الْفِكْرَةُ الرَّئيسَةُ للنَّصِّ السّابِقِ؟	ه. الدَّلافينُ حَيْواناتٌ أليفة	
	و. الدُّلفينُ أَنْقَذَ الْغَريقَ	
	ز. الدّلافينُ مُخْلِصَةٌ كالْكِلابِ	
	ح. الدّلافينُ تُحِبُّ السِّباحَةَ في الْبَحْر	
20- بماذا تَصِفُ الشَّخْصَ في هذا النَصِّ؟	أ. مُخْلصُ	
	ب. مَحْظوظُ	
	ج. مُغامِرُ	
	د. مَحْبوبُ	

النص الخامس: ضَلَّ أَحَدُ الْمُسافِرينَ طَريقَهُ في الصَّحْراءِ، وَشَعَرَ بالتَّعَبِ الشَّديدِ، وأَرْهَقَهُ الظَّمَأُ والْحَرارَة، فَجَفَّ ريقُهُ، وخارَتْ قُواهُ، ومَشى يَجُرُّ رِجْلَيْهِ حَتّى وَصَلَ إِلى واحَةٍ مُحاطَةٍ بالرِّمالِ الْمُبَلَّلَة، فَحاوَلَ الْوُصولَ إلى الْماءِ ولكِنَّ قَدَمَيْهِ كانَتا تَغوصان في الرِّمالِ فَخافَ الْغَرَقَ، وفَجْأَةً رَأى غَزالاً مُقْبِلاً، فَاخْتَبَأَ وراحَ يُراقِبُ الْغَزالَ الذي خَطا في الرِّمالِ خُطواتٍ عِدَّةً ثُمَّ تَراجَعَ وانْتَظَرَ وإِذا بالْماءِ يَمْلأُ الْحُفَرَ الّتي صَنَعَتْها أَقْدامُهُ فَشَرِبَ، ثُمَ انْطَلَقَ، فَقالَ الرَّجُلُ: سُبْحانَ اللهَ.

21- شَعَرَ الْمُسافِرُ بـ	ه. الجوعِ	
	و. التَّعَبِ	
	ز. السَّعادَةِ	
	ح. الضَّياعِ	
22- تَعَلَّمَ الْمُسافِرُ من	ه. أَصْدِقائِهِ	
	و. أَساتِذَتِهِ	
	ز. زِوْجَتِهِ	
	ح. الْغَزالِ	
23- يَدُلُّ مَوْقِفُ الْغَزالِ على.....	ه. ذَكائِهِ	
	و. شَجاعَتِهِ	
	ز. إِقْدامِهِ	
	ح. جُرْأَتِهِ	
24- لماذا اخْتَبَأَ الرَّجُلُ عِنْدَما رَأى الْغَزالَ؟	ه. خَوْفاً مِنْهُ	
	و. لِيَصْطادَهُ	
	ز. لِيَتَعَلَّمَ مِنْهُ	
	ح. ليدلَّهُ على الطَّريقِ	
25- الدَّليلُ على تَعَبِ الْمُسافِرِ أَنَّهُ كانَ	ه. يتثاءَبُ	
	و. عَطِشاً	
	ز. يَجُرُّ رِجْلَيْهِ	
	ح. ضائِعاً	

النص السادس: مَوْتُ الأنْهارِ في عُرْفِ الْعُلَماءِ يَعْني فَناءَ الكائِناتِ الْحَيَّةِ فيها، وَمِنْ أَمْثِلَةِ الأنْهارِ الّتي ماتَتْ ثُمَّ بُعِثَتْ مِنْ جَديدٍ نَهْرانِ: التايمز في بريطانيا، ونَهْرُ الرّاين في غَرْبِ الْقارَّةِ الأوربيّةِ، وتُعَدُّ السُّمومُ الّتي تُلْقى فيها سَبَباً في مَوْتِها، وهي خَمْسَةُ أنْواعٍ: مُرَكّباتٌ تُغَيِّرُ دَرَجَةَ حُموضَةِ الْماءِ، ونُفاياتٌ صِناعيّةٌ تَحْتَوي عَلى مَعادِنَ ثَقيلَةٍ كَالرَّصاصِ والزِّنْبَقِ، وسَوائِلُ كيمْيائيّةٌ تُرَشُّ في الْحُقولِ فَتُذيبُها الأمْطارُ وتَحْمِلُها إلى الأنْهارِ، ومَوادُّ مُشِعَّةٌ تَتَسَرَّبُ مِنَ الْمُفاعِلاتِ النَّوَويَّةِ، ومَجاري الصَّرْفِ الصِّحيّ الّتي تَصُبُّ في الأنْهارِ، فَهذِهِ الْمِياهُ نَشْرَبُ مِنْها ونَرْوي مَحاصيلَنا الزِّراعيَّةَ مِنْها، ونُرَبّي فيها الأسْماكَ، فَهِيَ إن كانَتْ مُلَوَّثَةً فَإنَّها سَتَقْضي عَلَيْنا.

26- أيُّ هذِهِ الْمَعادِنُ يُعَدُّ مَعْدناً ثَقيلاً؟	ه. الرَّصاصُ	
	و. المَغْنيسيومُ	
	ز. الأَلَمنيومُ	
	ح. اللّيثيومُ	
27- الشّخْصُ الذَّي كَتَبَ هذا النَصَّ هُوَ....	ه. رَجُلُ دينٍ	
	و. عالمُ جُغرافيا	
	ز. مُهَنْدسُ	
	ح. طَبيبُ	
28- أيُّ الأَنْهارِ التّالِيَةِ ماتَت، ثُمَّ بُعِثَت مِنْ جَديدٍ في	ه. الْفُراتُ	
النّصّ؟	و. الرّاينُ	
	ز. النيلُ	
	ح. دجلة	
29- ما عُنْوانُ النَّصِّ المُقْتَرَحِ؟	ه. تَلَوَّثُ البيئَةِ	
	و. الأمطارُ الموسَمِّيةُ	
	ز. المَعادِنُ الثقيلَةُ	
	ح. مَوْتُ الأَنهارِ	
30- نَسْتَنْتِجُ من النَّصِّ أنَّ مِياهَ نَهْرِ التّايْمز....	ه. يُمْكنُ السِّباحَةَ فيها	
	و. عَذْبِةُ	
	ز. مُلَوَّثة	
	ح. بارِدَةُ	
31- ماذا يَعْني مَوْتُ الأَنْهارِ في عُرفِ الْعُلَماءِ ؟	ه. نُدْرَةَ الْكائِناتِ الْحَيَّةِ فيها	
	و. كَثْرَةَ أسْماكِ الْقِرْشِ فيها	
	ز. انْعِدامَ الحْياةِ فيها	
	ح. جَفافَ الأنْهارِ	

Appendix G .3

Text reading comprehension test (English Form)

Instructions to children: Read the short passages and choose the correct answer

Passage One

Hello, my name is Amira. I'm eight. I come from Kuwait. . I always have my breakfast at seven o'clock. Every day I visit my grandmother and we have lunch together.

1. Amira is from ……..…

1. Dubai

2. Kuwait

3. Bahrain

4. London.

2. Amira has breakfast at …… o'clock.

1.Five –

2. Six

3. Seven

4. Four

3. Amira has her lunch with his ……

1. grand father

2mother

3. sister-

4. Grandmother -

Passage two

A poor man, who couldn't read or write, asked for work as a doorkeeper of a hotel. The owner of the hotel said: 'I'm sorry, you can't work here because you can't read or write.' The poor man was sad. He began to go from house to house selling knives and brushes. After two years, he had enough money to open a shop. He worked hard and the shop grew bigger. After ten years, the man owned ten shops and became very rich.

4. The man was selling …….

1. Knives and watches

2. Scarves and brushes

3. Knives and brushes

4. Pencils and pens

5. The man couldn't write or read because he had never been…….

1. to school

2. to house

3. to a shop

4. to a hotel

6. The man became very rich because he …

1. Worked in a hospital

2. Worked hard

3. Was a door keeper.

4. Hotel owner

7- After……..of hard work, the poor man owned ten shops and became very rich.

1. **five years**
2. **twenty years**
3. **3. ten years**
4. **Seven years**

Passage three

People are the only animals that cry. We cry when we are sad or happy. When someone dies, we cry. When a baby is born, we cry. What are tears? How do they come? We know, for example, that all tears have salt in them. We also know that there are two different kinds of tears, emotional tears and reflex tears. The first one comes from feelings and the second is the kind that comes when we get a piece of dirt in the eye or when we peel an onion .Women cry not less than four times more than men do. We don't know for sure, the reason for this .Maybe it is because of biological factors or because it is habitual for women, not men, to cry in our society. Crying is good for us. It protects us from some eye diseases, so crying makes we stay healthy.

8.We cry when we are ……..

1. **Sad**
2. **Happy**
3. **Sad and happy**
4. **Afraid**

9. The word 'it' in line 2 refers to 2. …….

1. **Salt**
2. **Tears**
3. **Babies**
4. **Factors**

10. Peeling an onion cause …….tears

1. **Emotional**
2. **Reflex**
3. **Both a and b**
4. **None of them**

11. The best title of the passage is . …….

1. **Kinds of tears**
2. **Eye diseases**
3. **Crying of women**
4. **Emotional pressure**

Passage Four

A teacher stands in his class of biology students for the final exam. He says 'I want to say that **it has been a pleasure** teaching you this semester.' He says that he knows all students have worked hard. And many of them will go to medical university after summer. So there will be no problem if anyone wants to leave the exam, they will get 80 marks in **it**. Some students took teacher seriously and left the class. When the last student to take the offer left, the teacher asked, 'Anyone else? This is your last chance.' One final student stood up and left the exam. The teacher closed the door, and took attendance of the remaining. 'I am glad to see you believe in yourselves, he says. 'You all get full marks.'

12. The underlined pronoun ***it*** refers to……

1. The class

2. The final exam

3. Teacher's offer

4.) Summer

13. The expression **it has been a pleasure** means…….. .

1. I am happy

2. I am choked

3. I am angry

4. Disappointed

14. The main idea of the second passage might be……

1 An easy exam

2. A good teacher.

3. Believing in oneself.

4. Class talk

15. The teacher gives full marks to ----------

1. None of the class

2. All the class

3. Some of the class

4. Only the clever student

Passage Five

One of South America's mysteries is Easter Island .Easter
Island also called Isla de Pascua, 3,600 km west of Chile, is a volcanic island with an interesting and partly unknown history. The island was named by the Dutch explorer Jacob Roggeveen because he encountered it on Easter Sunday 1722. He was the first European to find the island. The official name of the island, Isla de Pascua, means Easter Island in Spanish. This island is famous because of the approximately 887 huge statues which were **found** there. The statues consist of heads and complete torsos, the largest of **which** weighs 84 tons! These monuments were carved out of compressed volcanic ash which was found at a quarry at a place called RanoRaraku. Statues are still being found. Some of the monuments were left only half–carved. Nobody knows why RanoRaraku was abandoned. It is thought that the statues were carved by the ancestors of the modern Polynesian inhabitants. But the purpose of the statues and the reason they were abandoned remain mysteries

16. Easter Island lies in ……

1. Spain
2. German
3. South America
4. Rome

17. Easter Island is famous for……

1. Huge mountains
2. Huge statues
3. Modern hotels
4. Volcanoes

18. The largest statue weighs ……

1. **eighty four tons**
2. eighty seven tons
3. forty eight
4. seventy seven

19. The word '**found**' in the sixth line means …….. .

1**. Faced**

2. Carved

3. Discovered

4. Named

20. The main idea of the passage is about …..…… .

1**. Easter Sunday**

2. Polynesian Inhabitants

3. Easter Island

4. A quarry

Appendix H . 1

Word reading accuracy test (Arabic Form)

أرنب	فصل	بلادى	دارا	ماما
الرمل	رطب	البحر	شجر	فنان
القطة	يوم	غيوم	حيوانات	الشمس
الليل	سدادات	أسرة	البيت	مدينة
الكهرباء	مكافأة	النفايات	الطبيب	ميناء
فضفاضا	طائرته	الأجهزة	أضاءت	ارتدى
الظمآن	مبتكرات	مئذنة	انضباطى	الطمأنينة
قشعريرة	تبارى	قدسية	الدسائس	مسؤولية

Appendix H . 2

Word reading accuracy test (English – form)

cat	in	yes	Red	up
of	are	do	As	his
is	girl	our	Play	and
the	for	long	House	day
not	look	said	Heat	write
earth	first	rice	That	help
away	city	father	Animal	nothing
all	which	turn	Read	try
happen	many	weave	tadpole	people
down	nimble	secret	Strange	emperor
great	rhyme	lived	Master	parasol
quarrel	messenger	distance	government	beneficiaries

Appendix I . 1

Word reading fluency test (Arabic Form)

الفقرات التدريبية	
رَكَبَ	
بَيْتٍ	
حَمدُ	

فقرات الاختبار

الكلمة	الدرجة 1/ 0	الكلمة	الدرجة 1/ 0
1. أُخْتى		الأَطْعِمَة	
2. تَحْتَوى		اِسْتِخْراجُ	
3. هذانِ		بِمَواقِعِها	
4. تُسيمونَ		ذَرَأَ	
5. رَاوسِىَ		الرَّبيعُ	
6. جَمَلٌ		مُرأبِطُ	
7. دَؤوبٌ		تُجْدى	
8. بحَرَكاتِهِ		الْوحدَةِ	
9. الْفُقَراءُ		الدّوْلَتانِ	
10. التَّعببرٌ		اللُّغوىُّ	
11. أَسْطُرٍ		أُضْبُطْ	
12. تُضْنِينى		للَّهِ	
13. التَّالِيَةُ		وَالاِسْتْتيعابَ	
14. الذَّينَ		هؤلاءِ	
15. الدَّوْلَتانِ		وألْوانٍ	
		المجموع النهائى	..... / 30

Appendix I . 2

Word reading fluency test (English form)

Of	are	do	as	his	the
Girl	our	play	and	not	look
Earth	first	rice	all	which	have
Weave	animal	nothing	happen	many	felt
Messenger	tadpole	people	great	government	beneficiaries

Appendix J . 1

Word spelling test (Arabic Form)

بابا	حب	قال	جد	أرض
رسم	كلب	درسي	الخريف	النمل
الخير	ديك	ساعي	الجسر	مزرعة
سيارة	الطيور	حليبا	تلاميذ	صورا
خشوع	استأذن	الظهيرة	بائع	دراسته
فجاء	أبيك	فكرة	أقصوصة	الحضور
هدوء	وازى	وثائق	اصطلاحية	شؤون
علو	استدعى	حضيض	المستطاع	تأرجح

Appendix J . 2

Word spelling test (English form)

1	To	26	Mother	
2	Run	27	Story	
3	Legs	28	All	
4	Tell	29	Around	
5	At	30	Family	
6	The	31	Difficult	
7	Did	32	Voice	
8	Can	33	Small	
9	Like	34	Balloon	
10	Out	35	Beautiful	
11	Not	36	Write	
12	Then	37	Village	
13	What	38	Fortune	
14	Play	39	Earth	
15	Look	40	Many	
16	House	41	Piece	
17	Read	42	Space	
18	Felt			
19	Down			
20	Head			
21	Use			
22	Rain			
23	Try			
24	Below			
25	Wishes			

Appendix K . 1

Non-word reading test (Arabic form)

1	صبف	2	ذفش
3	بشخ	4	أخنص
5	أصقع	6	عاجر
7	مضخش	8	غوطق
9	منبقش	10	انزحل
11	مخفوط	12	انفغر
13	مهاكش	14	افتشد
15	مداهك	16	تصاقيب
17	اغتراج	18	استنبخ
19	تباحطن	20	انفركحن
21	استشبثن	22	انكرحطن
23	انبفارات	24	اكتفاصات
25	يتزاكشران		

Appendix K . 2

Non-word reading test (English form)

1	Sead	2	Miction
3	Moop	4	Howt
5	Bupper	6	Garken
7	Pidture	8	Catavap
9	Fraces	10	Prejend
11	Shol	12	Irange
13	Klate	14	Plavel
15	Hirth	16	Charb
17	Pule		

Appendix L . 1

Phoneme deletion test(Arabic form)

(اختبار حذف الأصوات وإعادة نطق الكلمة)

الاختبار

التعليمات : يهدف هذا الاختبار إلى قياس قدرة المفحوص على حذف الأصوات المكوّنة للكلمة (أول الكلمة أو وسط الكلمة أو آخر الكلمة) وإعادة نطق الكلمة بعد حذف الصوت المطلوب، دون كتابة أي شيء.

أمثلة/ تمارين

1. شباك.....انطق الكلمة مرة أخرى بدون (ش).....باك
2. سمكة.....انطق الكلمة مرة أخرى بدون (ة).....سمك
3. خاب.....انطق الكلمة مرة أخرى بدون (ا).....خب

1	ضباب.....	انطق الكلمة مرة أخرى بدون (ض)
2	شباب.....	انطق الكلمة مرة أخرى بدون (ش)
3	سحاب.....	انطق الكلمة مرة أخرى بدون (س)
4	مدرّسون.....	انطق الكلمة مرة أخرى بدون (م)
5	قوارب.....	انطق الكلمة مرة أخرى بدون (ق)
6	غيوم.....	انطق الكلمة مرة أخرى بدون (غ)
7	كريم.....	انطق الكلمة مرة أخرى بدون (ك)
8	زهرة.....	انطق الكلمة مرة أخرى بدون (ز)
9	خارجي	انطق الكلمة مرة أخرى بدون (خ)
10	حديقة	انطق الكلمة مرة أخرى بدون (ح)
11	حبس.....	انطق الكلمة مرة أخرى بدون (ب)
12	أفكار.....	انطق الكلمة مرة أخرى بدون (ف)
13	اجتماع.....	انطق الكلمة مرة أخرى بدون (ج)
14	اجتماع.....	انطق الكلمة مرة أخرى بدون (ج)

15	مستودع	انطق الكلمة مرة أخرى بدون (و)
16	مستهتر	انطق الكلمة مرة أخرى بدون (هـ)
17	احتكمن	انطق الكلمة مرة أخرى بدون (م)
18	استحسن.....	انطق الكلمة مرة أخرى بدون (ح)
19	طمأنينة.....	انطق الكلمة مرة أخرى بدون (أ)
20	تبعثر.....	انطق الكلمة مرة أخرى بدون (ع)
21	استمسكْ	انطق الكلمة مرة أخرى بدون (ك)
22	خروج.....	انطق الكلمة مرة أخرى بدون (ج)
23	بعير	انطق الكلمة مرة أخرى بدون (ر)
24	ضوابط.....	انطق الكلمة مرة أخرى بدون (ط)
25	قواعد.....	انطق الكلمة مرة أخرى بدون (د)
26	تصغير.....	انطق الكلمة مرة أخرى بدون (ر)
27	مسكن	انطق الكلمة مرة أخرى بدون (ن)
28	اندفاع	انطق الكلمة مرة أخرى بدون (ع)
29	الفراش	انطق الكلمة مرة أخرى بدون (ش)
30	غيوم	انطق الكلمة مرة أخرى بدون (م)

Appendix L . 2

Phoneme deletion test (English form)

Instructions : The examiner explains to the child that he will listen to a word and asked to delete a sound. It may be initial, medial or final sound. Then the child has to say the word again after sound deletion.			
Example: Cat		(K)	at
1.	Nice	(N)	ice
2.	Farm	(F)	arm
3.	Slight	(S)	light
4.	Car	(K)	ar
5.	Shine	(SH)	ine
6.	Bicycle	(B)	icycle
7.	Gold	(G)	old
8.	Travel	(T)	ravel
9.	Vehicle	(V)	ehicle

Example: Push		(sh)	pu
1.	Cup	(p)	ku
2.	Cold	(D)	koal
3.	Shrink	(K)	shrin
4.	Host	(T)	hos
5.	Castle	(L)	kas
6.	Ram	(M)	ra
7.	Kitten	(N)	kitte
8.	Glaze	(Z)	glae

9.	Chaos	(S)	kayo
10.	Mouth	(TH)	mou
Example: Simple		(M)	si/ple
1.	King	(N)	kig
2.	Frog	(R)	fog
3.	Silk	(L)	sik
4.	Begin	(G)	be/in
5.	Basket	(K)	baset
6.	Rapid	(P)	raid
7.	Teapot	(EE)	Tpot
8.	Bands	(D)	bans
9.	Catcher	(CH)	cater

Appendix. M

Rapid naming test (Arabic form)

م	ل	ن	ز	ك	ى	و	ع	ط
ه	س	ب	م	ى	ن	ك	ز	ل
و	ه	ع	ب	ط	س	ى	م	ز
ك	ن	ل	س	ط	ع	ب	و	م

Appendix. N

Vocabulary test (Arabic form)

Instructions: The examiner reads the sentence to the child and asks him to focus on the underlined word. Then decide if the word/s after the sentence explains the meaning of the underlined word or not.

استمع الى الجملة و حدد اذا كان معنى الكلمة التى تحتها خط مطابقا لما هومكتوب بين القوسين ضع √و اذا لم يكن ضع X :

رقم	السؤال	الاجابة	تصحيح
1	يدلنى والدى على كل عمل يدنيني من الخير. (يقربنى)		
2	اعترانىخطب فلم استطع الحضور .(العدو)		
3	خاق الله الملح فى مواطن كثيرة. (أوطانا)		
4	فاق سالم أقرانه فى الرياضة . (تكبر على زملائه)		
5	يجب ألا يستخف الانسان بقدرات الآخرين. (يستهين بها)		
6	كثرة المزاح أمر غير محبب.(الدعابة)		
7	صائد الحيوانات يواجه الوحوش و يَصْرَعُها. (يلحقها)		
8	صمم أحمد برنامجا مسليا على الحاسب الآلى. (أصر و عزم)		
9	تحولت الأبراج الى مَعْلَم من المعالم السياحية . (شيء معلوم)		
10	على الانسان أن يتوسط فى استعمال الملح و السكر.(يأخذ المناسب منهما)		
11	لا يكترث المثابر بالصعاب و المشاق . (يكشف)		
12	يتخذ الانسان ضيق الوقت ذريعة لاهماله. (حجة)		
13	تلكؤ المريض فى أخذ الدواء يؤخر شفائه .(توازن)		
14	لا تخلو الحياة مما يكدر صفوها. (يُفْرح)		
15	يجب أن تتصرف بما تمليه عليك أخلاقك .(تنافس)		
16	خلق الله النمل و النحل آيه من آيات الله . (درجه)		
17	يبعث العبوس فى النفس الملل و الكآبه.(الحزن)		

18	أخلاق الرسول نبراس يهدينا الى الخير و الفلاح . (علاج)		
19	يتقاضى طبيب الاسنان أجرا باهظا .(ياخذ)		
20	يبذل المعلم جهده ليرتقى بمستوى الطلاب . (يحسن)		
21	طوت الكويت صفحة الماضى بكل احداثه.(تذكرت)		
22	سار المسلمون على نهج التسامح و العفو فى كل عصر .(طريق)		
23	بقوة الارادة يستطيع ذو الاحتياجات الخاصة تلبية متطلبت حياتهم .(ترديد)		
24	نحى الحاكم قئد الجيش لفساده.(أهدر دمه)		
25	ترعى الجمال بالقرب من الخيام . (تهتم ب)		
26	تزخر البلاد بالعديد من المراكز الرياضية . (تخلو)		
27	تشع بعض البحيرات القابعة فى الجبال بلون أخضر . (الكامنة)		
28	يميل قرص الشمس الى الفلطحة .(يميل شكله الى الاتساع و الانبساط)		
29	التعصب الأعمى يؤجج الغضب و يولد الحقد فى النفوس .(يغرس)		
30	قرت عين الجندى بالنصر على الأعداء .(اطمأن و رضى)		
31	على كل عاقل ان يستشرف المستقبل .(يتمسك به)		
32	ولد الصبى فى بيت وارف النعمة . (متسع)		
33	تشع بعض البحيرات القابعة وسط الجبال بلون أخضر .(الكامنة)		
34	يميل قرص الشمس الى الفلطحة . (يميل شكله الى الاتساع و الانبساط)		
35	فى النهار تكتنف الأرض غلالة مائلة الى الأزرق . (ترتدى)		
36	لا يجدى فى تحمل الفراق الا التجمل و التجلد. (أن يتكلف الحسن و الجمال)		
37	المخترع شخصية فذة ينبغى تقديرها .(مترددة)		
38	تقع فى مثلث برمودا حوادث مريعة للنفس البشرية .(متوقعة)		
39	يجب على الشباب شحذ العزم للنهوض بالامة .(يقوى)		
40	شغف الطالب منذ صغره بالعلوم . (اهتم)		

Appendix. O

Questionnaire

عزيزى الاب او عزيتى الأم:

أشكر لكم اهتمام بتعبئة الأستمارة المرفقة والتى تعتبر جزء من دراسة تعمل على تقنين أدوات لقيلس القدرات القرائيه للطفل فى المراحل الدراسيه الاولية . اجابتك على الاسبيان سوف تحاط بالسرية التامة.

1	مع من يعيش الطفل الان؟
1 مع احد الوالدين أو كلاهما 2. مع الاقارب	
2	ما أعلى مرحلة مرحلة دراسية قد وصل الاب او الام أو الذى يقوم بالأعتناء بالطفل؟
1 دون المستوى الجامعى 2المستوى الجامعى	
3	هل هناك لغة أخرى مستخدمة للتحدث فى المنزل غير اللغة العربية؟
1. نعم 2. لا	
4	هل بيئة الطفل المنزلية غنية بالمواد الادبية مثل الكتب او القصص.حدد بالأرقام؟
1. فقيرة (أقل من عشرة) 2.غنية (أكثر من عشرة)	
5	بالتقريب كم عدد المرات فى الأسبوع التى تقرأ فيها مع او الى طفلك؟
1 نادرا (أقل من مرتين) 2 عاد ة (أكثر من مرتين)	
6	بالتقريب كم عدد المرات فى الأسبوع التى يقرأ فيها طفل ويكون الدافع ذاتيا ويهدف الأستمتاع أو الأطلاع وليس للدراسه وذلك لمدة عشر دقايق على الاقل فى المرة الواحدة؟
1 نادرا (أقل من مرتين) 2 عادة (أكثر من مرتين	
7	كم كان عمر طفلك عند تعلمة القرأن الكريم؟
أقل من سنوات عند سن السادسة	
8	كم عدد المرات التى قمت بتديس ابنك (القرأءة – القرأن) فيها ومساعدته فى حل الواجبات المنزليه فى الأسبوع؟
1 نادرا (أقل من مرتين) 2 عاد ة (أكثر من مرتين)	

English Translation of the questionnaire questions

1	With home the child lives?
	1 with one or both of the parents 2 with other extended family members
2	What is your highest level of education?
	1 below graduate 2 graduate
3	What languages are spoken in the child's surrounding?
	1 Arabic 2 Arabic and others
4	Is children's home environment rich in children books short stories and books with reading and writing activities? Specify in numbers.
	1 Poor (less than 10) 2 Rich (more than 10)
5	How often are you involved in reading with or your child in a week?
	1 Rarely(less than two times) 2 Usually (two times and more)
6	How often does your child read by himself for enjoyment not for academic purpose at less for 10 minutes in a week?
	1 Rarely(less than two times) 2 Usually (two times and more)
7	When does your child start reciting and memorizing the Qur'an?
	1 At age six 2 Younger than six
8	How often are you involved in teaching practices with your child such as reading, the Qur'an s and helping him in homework in a week?
	1 Rarely(less than two times) 2 Usually (two times and more)

Appendix. P.1

اسئله المقابله الشخصيه

- **صف لنا بعض الأنشطة المتعلقة بالقراءة داخل البيت**
- **صف الجو التعليمي أثناء القيام بأي نشاط متعلقه بالقراءة**
- **صف ما يحدث أثناء القراءة**
- **كيف تشارك في هذه الأنشطة؟**
- **عندما يقرأ طفلك أى مهاره تركز عليها**
- **صف تجربتك فى تدريس طفلك (القراءة – القرأن)**
- **ماهى الاساليب التى تتبعها عند تدريس طفلك**

English Translation of the interviews Question

Describe any reading activities that take place at home

Describe the literacy learning atmosphere when you and your child .

engage in literacy related activities?

Describe what is going on during this activities.

When the child reads, is there any particular skill emphasized.

Describe your teaching experience with your child.

What are the teaching strategies that you use when you are teaching your

child

Appendix.P.2

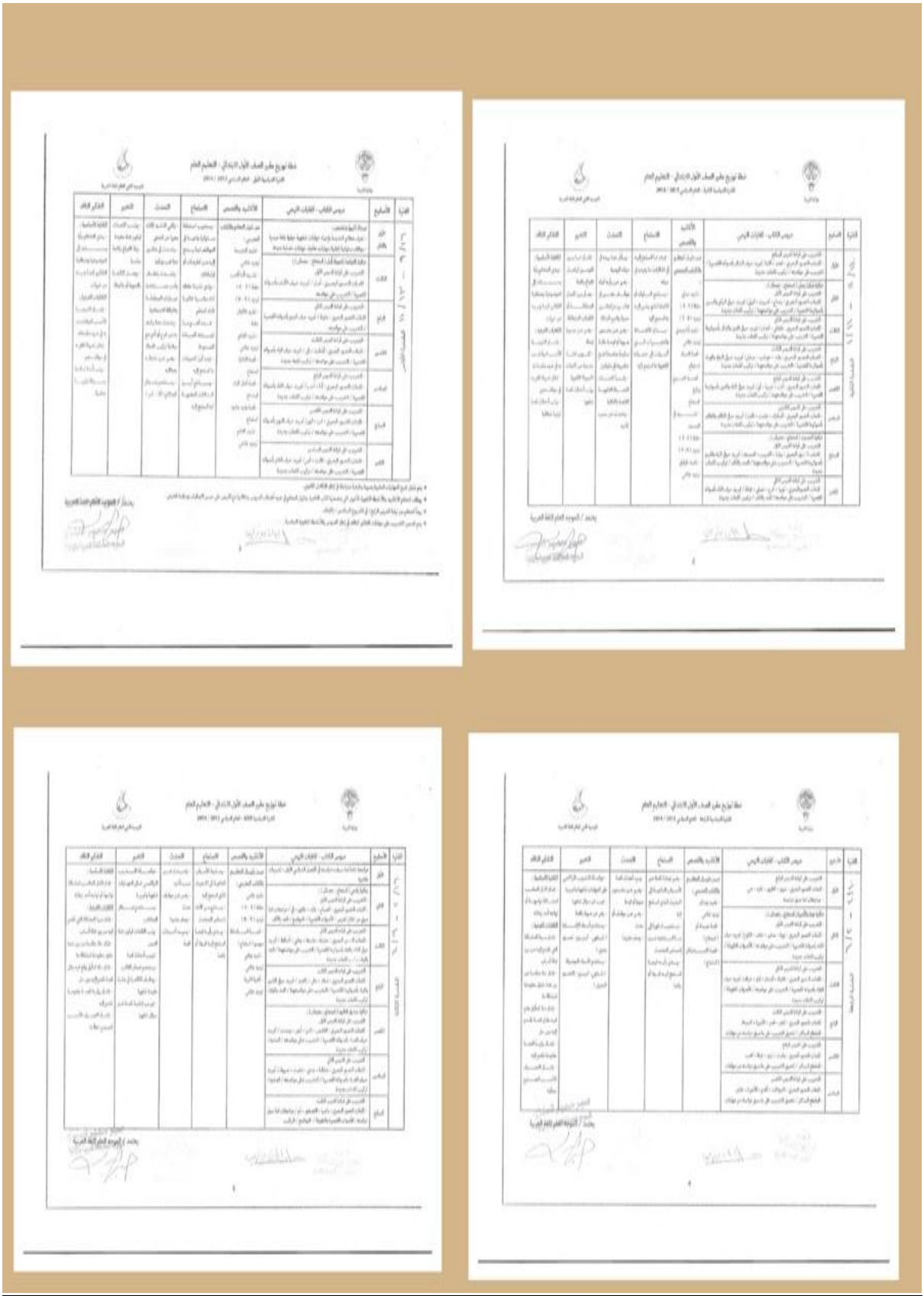
دليل استرشادي				
الأسئلة غير المباشرة				
أسئلة المقابلة	أسئلة غير مباشرة	أسئلة غير مباشرة	أسئلة غير مباشرة	أسئلة غير مباشرة
1- صف لنا بعض الأنشطة المتعلقة بالقراءة داخل البيت .	كتب مع أنشطة القراءة	جرائد ومجلات	الإنترنت وألعاب	
2- بأي لغة تكون القراءة؟	العربية	الإنجليزية	كلتاهما	آخر
3- صف الجو التعليمي أثناء القيام بأي نشاط متعلق بالقراءة .	الجلوس والاستماع له	تشجيع الولد على الجلوس بجانبك أو على حضنك ومسك الكتاب وتقليب الصفحات أثناء قراءة الصفحات.		
4- كيف تشارك في هذه الأنشطة؟				
5- صف ما يحدث أثناء القراءة.	الإنصات دون تدخل حتى النهاية دون طرح سؤال.	تشجيع على النقاش والسؤال. (هل تتوقف لسؤال عن محتويات الكتاب أم تشجع الولد على طرح الأسئلة؟)	ربط محتويات الكتاب بالتجارب الشخصية (هل تحاول إيجاد أشياء في الكتاب يعرفه الولد أو يتكلم عنه؟)	هل تستخدم مفاتيح مثل كلمات، صور لمساعدة فهم الولد والتنبؤ لما سيحدث في القصة؟
6- هل هناك مهارة معينة يركز عليها الولد أثناء القراءة؟	الدقة	المفردات	استنتاج واستذكار	استذكار المادة المقروءة

7- صف تجربتك في تعليم ولدك	تعليم الأبجدية	المساعدة على حل الواجبات المنزلية	مساعدة علاجية	
8- ما هي أساليب التعليمية المستخدمة في تعليم الولد				
9- صف تجربتك في تصحيح الولد أثناء عملية التعلم؟	تصحيح ذاتي	تصحيح موجه		
10- كيف يقرأ الولد في اللغة الإنجليزية؟	بدقة في معظم الأحيان	بغير دقة في بعض المرات	لا يخطئ أبدا	
11- صف تجربتك في تعليم ولدك القرآن الكريم	مع الولد لوحدنا	مع العائلة	تعليمه القصص القصيرة من القرآن	
12- كيف تشرح معاني مفردات القرآن الكريم؟				
13- ما هي آراؤك حول مساهمة القرآن الكريم في التعليم؟	متطلب لتعلم اللغة العربية	يقوي الحفظ		

10- أي مهارة يتم تقييمها؟				
7- هل يعمل الأولاد جماعة أو فرادى في هذه الأنشطة؟				
8- إلى أي مدى تحرص على الإتقان في القراءة الهجرية؟				

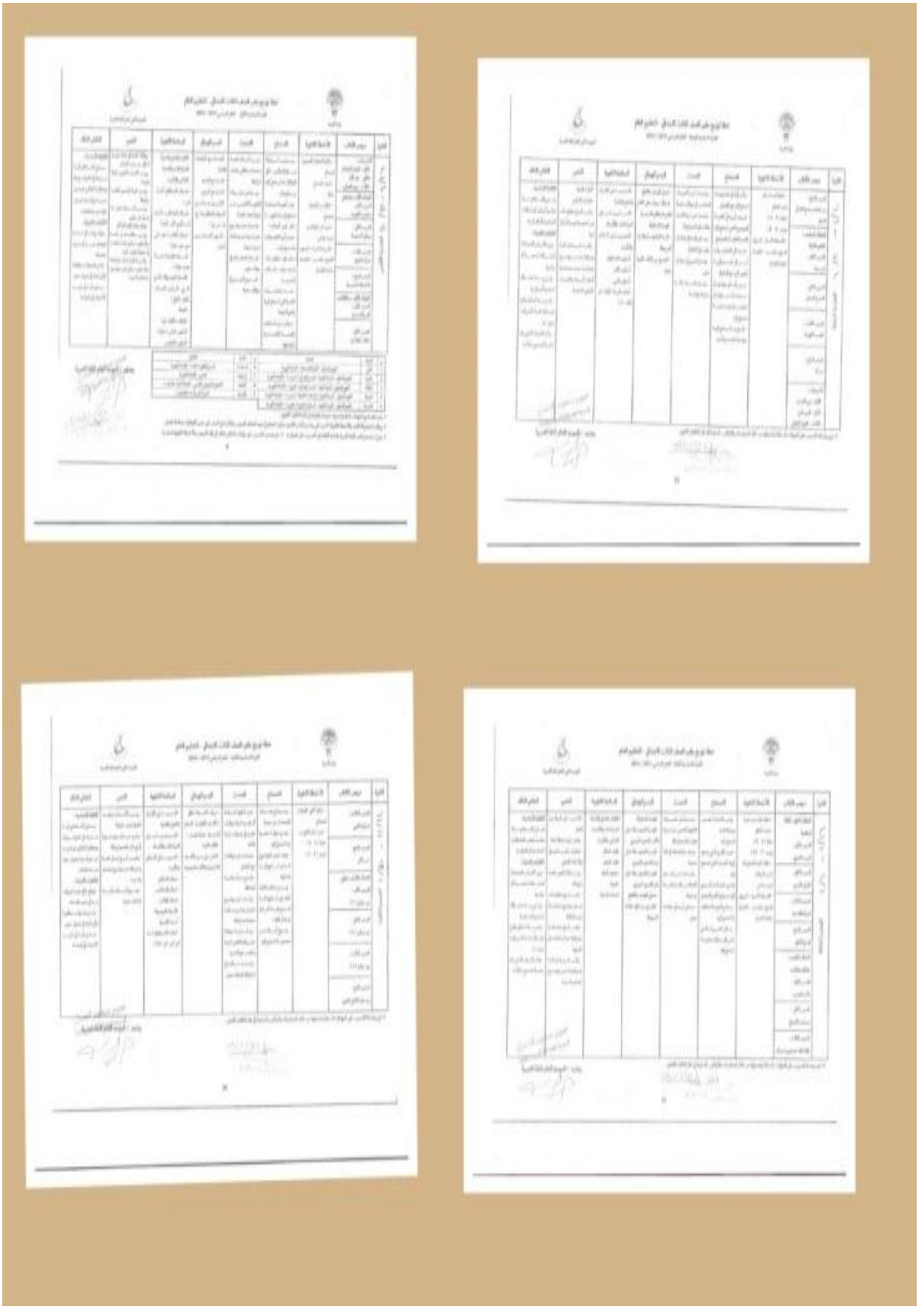
Appendix.Q

Grade 1



Grade 2

Grade 3



Grade 4

Grade 5

Grade 6