A Kit to Teach Arabic Decoding and Spelling to Students with Dyslexia

A research project by

Katia H. Hazoury

Submitted to the Lebanese American University

in partial fulfillment of the requirements

for the degree of

Masters in Education

March 2006

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March 2006

*To my mother and father who loved, encouraged
and supported me all through my life*

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Outline

I.	Chapter One:	
	A. Introduction	10
	B. Limitation	10
	C. Adaptation	12
II.	Chapter Two: Literature review	
	A. Part one:	
	1. Dyslexia	
	i. Definition	14
	ii. Causes	14
	2. Phonological awareness	15
	i. How language is processed into the brain	16
	ii. Phonological-deficit hypothesis	18
	iii. Acquired versus developmental dyslexia	18
	3. Visual-deficit hypothesis	19
	i. Word perception	20
	ii. How do we see	21
	iii. M-pathway	22
	4. Mixed-deficit hypothesis	24
	5. Types of dyslexia	25
	i. Subtypes of acquired dyslexia	25
	ii. Subtypes of developmental dyslexia	26

B. The different structure of the Arabic language

1.	Introduction	27
2.	Diglossia	27
1.	Phonological processes	28
2.	Reading comprehension	29
3.	Morphology	29
i.	Derivational morphology	29
1.	Verbal word pattern	29
2.	Nominal word pattern	29
3.	Grammatical pattern	29
4.	Phonological pattern	30
ii.	Inflectional morphology	30
4.	Orthography: Type of Arab dyslexic	30
i.	Visual-orthographic	31
ii.	Low phonological processing	32
iii.	Context reliance	32
a.	Reading vowelised text	33
b.	Reading unvowelised text	33
vi.	Word-recognition	34
a.	Reading of poor readers	34
b.	Reading of skilled readers	35
vii.	Reading accuracy	35
5.	Conclusion	36

C.	Teaching approaches and intervention	37
1.	Reading	37
2.	Automaticity	38
3.	Obstacles of reading acquisition	38
4.	Decoding	38
5.	Ways of reading	39
i.	Decoding	39
ii.	Analogy	39
iii.	Prediction	39
iv.	Memory	40
6.	Phases of development	40
i.	Linguistic stages	40
ii.	Discrimination net	41
iii.	Sequential decoding	41
iv.	Hierarchical decoding	41
D.	Phonological awareness versus phoneme-grapheme correspondences	42
E.	Activities to enhance phonological awareness	43
1.	Whole word versus phonics approach	44
2.	Phonics approach in teaching decoding	47
i.	Systematic	47
ii.	Explicit	48
iii.	Analytic	49

F. Multisensory	51
1. Benefits	52
2. Tracing and kinesthetic modalities	55
3. Conclusion	56
III. Chapter three: project description	57
A. Approaches used	57
B. Lesson plan	57
IV. Chapter four: Sample lesson	62
V. References	68
VI. Appendix	74

Abstract

The proposed project will bring into use the strategies needed in teaching decoding of the Arabic language to dyslexic Arab students following the synthetic, explicit phonics approach through a multisensory technique, based in part on the reading program *Recipe for Reading*. A detailed development of the multisensory lessons is provided, and a sample lesson is included.

Chapter One

Introduction

As the academic supervisor and a special educator at the National Protestant College, I often have to deal with students with special needs, especially dyslexics. I had enough experience to teach decoding in English by applying mainly the *Recipe for Reading* (Traub, & Bloom, 2000) and other programs. When it came to Arabic, I was always confused and tried to ignore the students' need and the parents' demand until I had to face it. I had to teach Arabic decoding to students who are hard of reading.

The first step was looking for a program designed for dyslexic students. I searched some education centers in Lebanon; I visited some speech therapists and searched the internet. All my efforts were fruitless. Even the Jordanian and Kuwaiti Dyslexia associations did not have such a program. There was a shy attempt once in Jordan that went unfinished and unpublished.

Time was passing by and my students were becoming inactive in the Arabic sessions. Therefore, I had to come up with a solution.

Limitations

I first used the school's program while applying the techniques used in the *Recipe for Reading*. I always reached a dead end that only added confusion to students' frustration. The problems I faced were in the sequence of the letters. I followed my hunch. I knew that lessons had to be systematic and that phonetically and orthographically similar letters had to be introduced separately in order to reduce confusion. This factor was missing in most programs whose sequence moved from easy to difficult regarding letter pronunciation. For example, letters like ح and ب were

consecutively introduced, likewise ح, ه and خ. The only difference among letters in the two sets was the position of the dot. This dot goes unidentified by the dyslexic student similarly to the circle and the stick in the *p*, *b*, *d*, and *q*.

Another limitation I faced was with the selection of words in every lesson. One characteristic of a good program designed for learning disabled is to be vocabulary controlled. The students were confused when they encountered words they could not read because these words were meant to be read by sight. They consist of letters that the students did not learn. I started to read the words that the students could not decipher and ended up reading most of the text, which added to the students' frustration. Having a vocabulary controlled program means that all words assigned for reading should consists only of letters that had been previously learned. This characteristic opens doors for unintentional repetition and boosts the students' self esteem and motivation when they observe their own progress.

A third limitation was the absence of visual aids especially that my students are used to a certain way of learning English by applying the *Recipe for Reading*. The students were used to identify grapheme-phonemes by referring to the sound cards which are not present in the Arabic programs and if so, not in the way that satisfies the needs of the dyslexic students.

While following the *Recipe for Reading*, I integrated the use of plastic letters which made learning more fun. Students were very happy while constructing a target word from the colorful plastic letters. I also integrated a tactile book for the English letters. The gross motor movements the students made while forming the letters helped in retrieving words and in establishing left-right orientation. As soon as the students

heard the /d/ sound, they knew that it starts like the 'a' and the /b/ like the 'l'. The tactile book is very essential in my teaching of the Arabic language especially that Arabic is an orthographic language. The preparation for such a book is costly, time consuming and needs technical support.

Adaptation

Therefore, I decided to prepare an Arabic program that teaches decoding to dyslexic students. In my preparation, I used *The Recipe for Reading* (see Appendix C for a sample lesson) basically since I have used it successfully with at least 10 students. I also used a minor adaptation of the *Simultaneous Multi-Sensory Teaching* (S.M.T.) (Brazeau-Ward, 1998) which is based on the Orton-Gillingham approach. In this program, plastic letters are used to teach sounds and names of letters. The plastic letters are to be placed in a semi-circle, and the student has to point at each letter while saying its name. In addition to the plastic letters, this program focuses on the tactile modality by providing a tactile book. After learning the letter's name and being introduced to its shape, the student has to trace it in the tactile book. From my experience, I noticed that the tactile learning provokes the students' attention to the details and the gross movements by which the letter is formed, and it enhances retention.

I also used volume one of the *Help Program* (Linguisticsystems) (Lazzari & Peters, 1987) to teach phonemic awareness and auditory discrimination. The first two lessons in the teachers' guide are dedicated to this skill. The student has to be aware that words are made up of sounds in order to make the link that the sounds are represented by symbols called letters.

Thus, the use of the previously mentioned three programs guided me in designing my project, yet the Arabic language has its own features that differ from any Latin language. The major difference was in the shape of letters and the long and short vowel sounds with each letter. I integrated colors to establish a system. Letters in their basic shapes, initial position, middle position, and the final position have different colors of orange, red, black, and green. In addition, all vowels are presented in blue. This system was present on a chart for shapes, in the plastic letters and in the tactile book. As for the student book, the target letter is always presented in red, and the entire vowel sounds are in blue.

The whole program consists of a kit that includes a teacher guide, student book, sound cards, a chart for shapes, a tactile book, and playdough.

The literature review for my project is divided into three parts. The first part deals with the definition and causes of dyslexia. The second part tackles the different features of the Arabic language with the emphasis on the Arabic orthography and what features dyslexic Arabs have concerning the Arabic orthography. The last part of my review embarks the reader in the stages of reading development, the different approaches used for teaching decoding, and the effect of the multisensory approach in teaching reading.

Chapter Two

Literature Review

Definition

Dyslexia and reading difficulty are two terms that have long been related. Reading difficulty impedes the use of the products and principles of the writing system in order to get the meaning of a written text (Snow, Burns, & Griffin, 1998).

Reading does not come naturally and easily to all children (Shaywitz, 2003). Some very bright students experience significant difficulty in learning to read, to no fault of their own. For example, the dyslexics possess the ability to understand spoken words, yet they cannot decipher the same word when written on a page. Reading seems to be beyond their abilities (Shaywitz, 2003). This frustrating and persistent problem in learning to read is called dyslexia (Shaywitz, 2003). It is a difficulty in pertaining to words (Clark & Uhry, 1995).

Researchers have reached a consensus that reading difficulty is directly linked to primary neural deficits. These deficits hamper the development of well-designed neural networks related to information processing in reading (Bensoussan, 1994). The current definition of dyslexia is:

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading

comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge (Reid, Shaywitz, S. & Shaywitz, B., 2003 p. 2)

In 1994, The Orton Dyslexia Society defined dyslexia as difficulties in decoding individual words mostly reflecting phonological processing ability (Lundberg, 1999). In 1991, Høien & Lundberg (as cited in Lundberg, 1999) revealed the distinctive features of dyslexia, stating that it is a disturbance on the linguistic functions that are critically important for the productive use of the alphabetic principle when written language is coded. This is manifested in achieving an autonomy (automaticity) in word recognition and in poor spelling.

Thus, it can be inferred that dyslexia is caused by an inefficient operation in the linguistic module, particularly at the word recognition level (Lundberg, 1999; Seymour, 1999). The circumscribed functional system of phonological module does not extend far into other domains of cognitive functioning. Consequently, it should be possible to observe malfunctioning of the phonological system coexisting with excellent functioning of more general cognitive systems (Lundberg, 1999; Shaywitz, 2003).

Phonological awareness

There is a consensus that the above-mentioned phonologic module is the 'language factory' (Shaywitz, 2003). It is responsible for putting sounds together to form words and breaking down words into their sound elements (Ellis, 1997; Snow et al., 1998; Lundberg, 1999; Shaywitz, 2003).

Studies using functional magnetic resonance imaging (fMRI) have been able to discover how a disruption in the phonological module affects the development of

phonological awareness and gives rise to a reading impairment within the brain.

Phonological awareness, or phonological sensitivity, has the potential to unravel the mysteries of reading (Ellis, 1997). It is a metalinguistic skill that refers to the ability to attend explicitly to the phonological structure of spoken words, rather than just to their meanings and syntactic roles (Clark & Uhry, 1995; Snow et al., 1998). It is clear that, in the early stages of literacy development, neurologically healthy children can establish links between spoken and printed words without using letter-sound translation rules (Clark & Uhry, 1995; Snowling & Hulme, 1999). This link is very critical to discovering the alphabetic principle or phonemic awareness (Snow et al., 1998). This requires the awareness that speech stream (word) can be segmented into units of sounds -phoneme (the smallest speech segments) (Lundberg, 1999). Therefore, phonemic awareness involves analyzing and combining the smallest units of separated sound (phonemes) in a variety of ways, in order to connect the symbols (letters) which represent them, to specific meanings (Ellis, 1997). For example, the word *cat* has three phonemes. The student should discover that /c/, /a/, and /t/ sounds must be produced and put together in order to pronounce the word *cat*. In this sense, phoneme segmentation is at the very heart of reading and spelling development (Lundberg, 1999; Shaywitz, 2003), and without it, no child can ever learn to read (Lundberg, 1999; Shaywitz, 2003).

How language is processed into the brain

Overall, the child must recognize that the letters she/he sees on the page represent the sounds she/he hears when a particular word is spoken (Snow et al., 1998; Lundberg, 1999; Shaywitz, 2003). The process of acquiring this knowledge is orderly and follows a logical sequence. First, the child starts to notice that words have parts. Second, she/he

becomes aware that these parts represent sounds. Third, she/he realizes that these letters are related to sounds she/he hears in spoken words, and the printed words have the same number and order as the spoken words. Finally, she/he understands that the printed words and the spoken words are related (Clark & Uhry, 1995; Snow et al., 1998; Shaywitz, 2003). In short, she/he understands that both spoken and written words can be pulled apart, based on the same sounds, but in print the letters represent these sounds. Thus, the awareness that spoken words are made of smaller segments represents the basic step in learning to read (Snow et al., 1998; Lundberg, 1999; Shaywitz, 2003). Once the child has made this linkage, she/he has mastered what is referred to as the alphabetic principle. She/he is ready to read (Shaywitz, 2003).

Cognitive studies have reached a consensus that phonemic awareness is crucial to the acquisition of the reading skill, not just in the early grades (Clark & Uhry, 1995; Snow et al., 1998; Aaron & Kotva, 1999; Goswami, 1999; Lundberg, 1999; Chard, Pikulski, & Templeton, 2000; & Shaywitz, 2003), but across all grade levels (Snow et al., 1998; Shaywitz, 2003). It is also recognized that such a skill is an excellent predictor for future reading problems (Snow et al., 1998; Høien 1999). Therefore, it seems logical to dedicate more instructional time to teaching phonemic awareness to preschoolers. It also seems logical to suspect that poor readers may have phonological processing problems (Clark & Uhry, 1995; Snow et al., 1998; Goswami, 1999).

In their study, Aaron & Kotva (1999) not only indicated a strong association between phonemic awareness and beginning reading skills but also specified that phonemic awareness is a good predictor of future reading achievement of beginning readers. This has been replicated by other researchers (Høien 1999; Shaywitz, 2003).

The phonological-deficit hypothesis

The upper-level language components involve semantics, syntax, and discourse whereas the lowest-level involve decoding which is dedicated to processing the distinctive sound elements of language (Lundberg, 1999; Seymour, 1999; Chard et al., 2000; Shaywitz, 2003). Scientists have been able to accurately locate a glitch within the language system at the level of the phonologic module among dyslexic students (Shaywitz, 2003). This glitch directly impairs the phonological awareness which, in turn, affects the ability to segment words into phonemes (Clark & Uhry, 1995; & Shaywitz, 2003). For example, most neurologically healthy students have the ability to detect the underlying phonemes in the word *cat* -/k/, /a/, and /t/; however, dyslexics fail to appreciate the internal sound structure of the word. They perceive a word as an amorphous blur (Shaywitz, 2003). Consequently, dyslexic children have difficulty breaking the code.

In short, the phonological-deficit hypothesis posits that a deficit in the phonologic module impairs the lowest-level of the language system that weakens decoding and word identification (Høien 1999). Children who possess good phonological skills become good readers and good spellers, and children with poor phonological skills are more likely to be classified as dyslexics (Goswami, 1999; Høien 1999; Seymour, 1999; ; Snowling & Hulme, 1999; Shaywitz, 2003) by the time they are 9 or 10 years old (Goswami, 1999).

Acquired Versus developmental dyslexia

Acquired dyslexia is not congenital and occurs to individuals who had previously been good readers. The nerve necessary for reading had been wired correctly, and now it

is disrupted due to a recent lesion or a stroke. This kind of destruction causes an outage that interrupts the pathway for reading (Lundberg, 1999; & Shaywitz, 2003).

In developmental dyslexia, difficulty in acquiring reading becomes evident from early childhood. It is not expected to find a distinct lesion or a cut in the neural system. A glitch or miswiring in the neural system responsible for phonologic analysis has taken place during embryonic development (Lundberg, Tonnessen, & Austad, 1999; Lundberg, 1999; Shaywitz, 2003).

Visual-Deficit Hypothesis

Another particularly controversial issue is whether dyslexia involves a visual deficit (Demb, Boyton, & Heeger, 1997). Many current studies attribute the sound-symbol association difficulties of dyslexic students to phonological awareness (perception) and encoding (memory) limitations; others link this phenomenon to certain specific visual deficits manifested in visual perception and visual memory (Marjorie & Siegel, 2002). Since reading requires rapid association between visual and linguistic information, it is logical to ask whether problems with either visual or language processing could cause reading difficulties (Cornelissen, 1998).

According to Whitney and Cornelissen (2005), phonological awareness deficit may be more a symptom of dyslexia rather than a cause. The more accurate cause for dyslexia involves the failure to form normal grapheme-phoneme association which could potentially arise from the grapheme (visual) side or from problems forming relevant grapheme-phoneme associations. Phoneme awareness tasks are influenced by properties of the corresponding orthographic representations. This indicates that performance on phonological tasks may strike the orthographic letter-based, rather than purely phonemic

representation (Whitney & Cornlissen, 2005). Therefore, it is expected that reading impairment following the left occipito-temporal lesions could be visual as well. Those predictions were tackled by behavioral, anatomical and fMRI data gathered in regular readers and in patients suffering from left posterior cerebral lesion.

Word perception

Reid et al. (2003) discussed two systems that are critical to the development of skilled and automatic processing of individual words. The first is located in the parieto-temporal region and processes relatively slowly. It requires spatial attention, involves word analysis, and operates on individual units of words. The second system, functioning as the visual word form area, is located in the occipito-temporal region and processes very rapidly. This system operates on the whole word and does not require spatial attention. Therefore, the visual word form area responds to rapidly presented stimuli and is engaged in words that have not been consciously perceived. Consequently, the occipito-temporal system appears to be predominant as the reader becomes more skilled and bound together the central processes that comprise grapheme, phoneme, lexical and semantic features (Cohen, Martinaud, Lemer, Lehericy, Samson, Obadia, Slachevsky, & Dehaene, 2003; Reid et al., 2003). Thus, lesions in the left occipital region may disrupt the fast and parallel analysis of letter strings specific to the right hemisphere and induce some degree of length effect in word reading (Cohen et al., 2003). Both visual systems differ in their tendency to represent alphabetic characters in a format invariant for specific case and font. When viewed in the right visual field (RVF), the alphabetic strings are encoded in a format less dependent on physical shape and case than when viewed in the left visual field (LVF) (Cohen et al., 2003).

How do we see

The fibers from each retina divide so that the information presented in the retinotopic cortices is split by the visual field and not by the eye (Whitney & Cornelissen, 2005). The left visual field projects to the right hemisphere and the right visual field projects to the left hemisphere; that is, letters to the right of the fixation are only projected to the left hemisphere, and those to the left fixation are only projected to the right hemisphere (Cohen et al., 2003; Whitney & Cornelissen, 2005). For example, in the word *CART*, the fixation is between the *A* and *R*. Letters *AR* are projected to the right hemisphere and *RT* are projected to the left hemisphere. The eyes fixate briefly when they view any visual stimuli. During this fixation, the constructed image is perceived by the brain before performing a saccadic or eye movement to the next fixation (Clark & Uhry, 1995). Most of the eye movements are from left to right in languages that start from the left. Unless the reader wants to confirm a letter or word, his eye movement goes from right to left (Clark & Uhry, 1995). Normally, the image in the first fixation is suppressed before the second fixation (Clark & Uhry, 1995). A saccadic-suppression deficit has been observed in dyslexic students. Failure to suppress one fixation before moving to the other would result in the perception of two overlapping sets of letters as the case is with dyslexic students (Clark & Uhry, 1995; Demb, Geoffrey, Boyton, & Heeger, 1998). Consequently, children with saccadic-suppression deficits are believed to read words in lists much more easily than in connected text (Clark & Uhry, 1995).

Fluent reading requires a rapid, discontinuous pattern of fixation and saccadic eye movements. The visual system samples the text image projected to the retina during brief periods of fixation (Cornelissen, 1998). In the first stage of visual word processing,

letters are analyzed in the foveal areas through a saccade. The visual input at this stage is represented in an abstract and invariant format of letter identities in the visual word form area (VWFA) specifically devoted to the processing of letter strings (sequence) located in the left occipito-temporal region through interhemispheric fibers in the corpus callosum (Cohen et al., 2003). The VWFA then projects the phonological structures to the phonologic module in the superior temporal gyrus, and it projects the semantic structures to the lexico-semantic representation in middle temporal gyrus (Whitney & Cornelissen, 2005).

Based on the above explanation, different interpretations about visual deficits are attributed to saccadic movement, motion detection, sensitivity, and visual perception.

The M pathway deficit in dyslexia

Among the most dominant yet controversial theories is the magnocellular deficit hypothesis (Stein & Walsh, 1997). The proponents of this theory maintain that an abnormality in the magnocellular (M) visual pathway contributes significantly to the reading difficulties of a large proportion of disabled readers (Amitay, Ben-Yehudah, Banai, & Ahissar, 2002). Magnocellular deficit used by researchers to reflect reduced visual sensitivity to flicker and motion (Cornelissen, 1998). The magnocellular pathway originates in the retina and projects to the primary visual cortex (V1) via the magnocellular layers. It is correlated with performance in a task requiring fine visual-motor coordination (Amitay et al., 2002). Thus, the association between developmental dyslexia and reduced motion sensitivity raises the issue whether abnormal visual processing, independent of phonological problems, affects some children's reading or not (Cornelissen, 1998).

Cornelissen suggests that magnocellular deficit, which is revealed by high motion detection thresholds, is associated with poor position decoding. This positional uncertainty could cause letter cluster, individual letters to be lost, duplicated, or incorrectly bound together, leading to orthographic inconsistency (Cornelissen, 1998).

Consequently, Cornelissen (1998) tested the hypothesis that children who are poor at motion detection made more letter errors. His experiment is consistent with the suggestion that magnocellular input is likely to be important for encoding spatial position. He sought direct evidence linking motion detection with letter position encoding.

Experiment one:

Coherent motion arbitrarily appeared on the computer in one of the two patches. The experimenter initiated each trial to indicate which panel contained coherent motion either by pointing or by naming the side on which it appeared (Cornelissen, 1998).

Experiment two:

Participants were presented with five-letter words or five-letter anagrams with equal probability of occurrence. Anagrams were generated by exchanging the positions of two of the internal letters contained in five-letter words:

Left anagrams: (L) OCEAN is for OECAN

Right anagram: (R) OCEAN is for OCAEN

Far anagrams: (F) OCEAN is for OAECN

The main finding supported the hypothesis that participants who were poor at motion detection were also more likely to make errors on high frequency L and R anagrams as well as low frequency R anagrams. Consequently, his findings confirmed an explicit,

albeit tentative link between motion detection and letter position encoding. Therefore, it is not a coincidence that poor readers almost complain that their visual words become unstable, drift on the page, or move over each other as they read (Cornelissen, 1998).

Consistent with Cornelissen's findings, Amitay et al. (2002) concluded that the magnocellular z-score is not a predictor of reading skills, yet it is correlated with performance in a task requiring fine visual-motor coordination. Moreover, Demb et al., 1997) tested the hypothesis that dyslexia involves a deficit in a specific visual pathway known as the magnocellular (M) pathway. They compared the relationship between brain activity and reading performance of the control group and the dyslexics. fMRI was used to measure brain activity in conditions designed to preferentially stimulate the M pathway. A reduced activity was shown among dyslexics in primary visual cortex, and secondary visual areas that receives a strong M pathway input. Significantly, these results imply a strong relationship between the integrity of the M pathway and reading ability (Demb et al., 1997).

The mixed-type hypothesis

Therefore, based on the phonologic-deficit hypothesis and the visual-deficit hypothesis, it can be concluded that dyslexic readers can be divided into the dysphonetic readers, who have difficulties in grapheme-phoneme convergence, and the dyseidetic readers, who have difficulties with visual recognition of whole words. There is also a mixed type: dysphonetic-dyseidetic. Students of this type have deficits in both the visual and auditory systems. They are more likely to spell non-phonetically, fail to perceive whole words, and are unable to sound out words while reading (Shaywitz, 2003).

Types of dyslexia

Rayner and Pollatsek (1989) classified subtypes of dyslexia under two categories: acquired and developmental.

Subtypes of acquired dyslexia

Surface dyslexia: is characterized by over reliance on the phonological route to sound out words. Hence, words are not recognized as wholes. For example, *island* is read as *izland* and *begin* as *beggin*.

Deep dyslexia is revealed through difficulties in reading abstract words and function words and through the inability to read nonwords. Clients of this group usually make semantic errors such as reading *ape* as *monkey*, visual errors such as reading *signal* as *single*, visual semantic errors such as reading *sympathy* as *orchestra* via *symphony*, derivational errors such as reading *builder* as *building*, and function word substitution such as reading *his* as *in*.

Phonological dyslexia is manifested through the inability to read unfamiliar, and/or pseudowords due to the impairment in phonemic assembly and/or phoneme-grapheme conversion. Clients of this group have difficulties reading words such as *pib* or *cug*.

Visual dyslexia: is revealed through visually-based errors due to a deficiency within the word recognition system. Such errors are like reading *met* as *meat*, and *rib* as *ribe*.

Attentional dyslexia is revealed through naming letters in strings and visual segmentation errors when words are shown in groups such as reading *glove* and *spade* as *glade*.

Word-form dyslexia: is characterized by slow reading due to the subvocalization process before identifying words.

Direct dyslexia is caused by damage in the semantic route and is revealed through nonsemantic reading of intact word naming without any indication of understanding the word being read.

Subtypes of developmental dyslexia

Boder classified dyslexics into three groups:

- a. Dysphonetic dyslexics: students of this group read words as wholes without decoding them since they exhibit weakness in auditory skills. Spelling is characterized by the misapplication of phoneme-grapheme rules.
- b. Dyseidetic Dyslexics: is characterized by the inability to discriminate and analyze the visual gestalt of the word and by laborious process of sounding out words. Spelling is characterized by letter/word reversals and confusions.
- c. Dyseidetic-dysphonetic dyslexics: students of this group do not represent a single dyslexic syndrome (Rayner & Pollatsek, 1989)

Mitterer (as cited in Rayner & Pollatsek, 1989) classified developmental dyslexia as follows:

- a. Whole-word: errors are predominantly visual. Students read whole words by sight if words are in their sight vocabulary and they read pseudowords as real words.
- b. Recording: errors are predominantly phonetic. Students read more regular than irregular words and give regular pronunciation of pseudowords.

Other classifications include:

- a. Auditory-linguistic dyslexics or language-deficit dyslexics: is manifested in the inability to carry out rapid verbal tasks.
- b. Visual-spatial dyslexics: is manifested through visual, spatial, and oculomotor difficulties (Rayner & Pollatsek, 1989).

Introduction: Arabic features

The Arabic language has a distinctively different nature from any other Latin language in terms of orthography, morphology, and diglossia. These features affect the reading acquisition and the types of miscues that novice and skilled readers make. This section of the literature review describes the three features of the Arabic language, and their effects on reading acquisition by novice/dyslexic readers as opposed to skilled readers. The main concern would be on the Arabic orthography, since it is directly related to my project.

Arabic dyslexia is a very new field of research that only Abu-Rabia dealt with from different perspectives. Therefore, most of the references will be based on his body of research.

Diglossia

Diglossia is a linguistic phenomenon that refers to the diversity between the spoken and literary versions of the same language as the case in Arabic (Abu-Rabia, Share, & Mansour, 2003). This creates a linguistic distance between the two varieties of the same language (Haddad, 2003) which is believed to hinder the acquisition of reading Arabic (Abu-Rabia, 2002; Haddad, 2003) due to the fact that literary Arabic and spoken Arabic differ in vocabulary, phonology, grammar, morphology, and syntax (Abu-Rabia et al., 2003). The literary version is officially acquired in schools with formal learning; and

when first encountered, can be viewed almost as a second language in reading, writing, and speaking (Abu-Rabia et al., 2003 & Haddad, 2003).

The major symptom of the linguistic distance between the two dialects reveals phonological difference (Haddad, 2004). This condition contradicts the hypothesis that children are familiar to a certain extent with the phonological structures of their native language that they will learn to decode (Haddad, 2004). For example, while learning to read the word *dog*, novice learners associate letter 'd' with sound /d/, 'o' with /o/, and 'g' with /g/. Hence, the phonemic sequence of the spoken word corresponds to the same sequence of letters in the written word. However, the word *dog* is pronounced as /kalb/ in the classical Arabic and /kalib/ in the spoken one (adding the phoneme /i/). Therefore, a specific phonological representation of a spoken word might differ from its phonological representation in the standard version although it is phonetically related to it (Haddad, 2004). Maamoury (as cited in Haddad 2004) maintains that literary Arabic shares most of the phonemes with all spoken vernaculars, yet no single spoken Arabic vernacular has the same set of phonemes as in the modern standard Arabic. This situation also contradicts the fact that children learn to decode spoken words by relating phonemes to grapheme symbols as in the English language.

Haddad's findings supported Ayari's assumption that diglossia of the Arab world hinders children's Arabic reading acquisition (Abu-Rabia, 2002). Based on her research, Haddad concluded that first graders showed great accuracy in decoding spoken structures, yet found particular difficulty in decoding phonological structure that was not within their spoken vernacular (Haddad, 2003). In addition, beginning readers had particular difficulties isolating modern standard Arabic (MSA) phonemes embedded

within MSA syllabic structure (Haddad, 2003; 2004). Finally, MSA phonemes and syllabic structures were a major source of decoding inaccuracy among children despite the high reading accuracy rates (Haddad, 2004). Thus, the oral linguistic knowledge of literary Arabic that children bring to reading, both at the level of the word and at the level of speech, is severely shortened (Haddad, 2003).

Consistent with Haddad, Abu-Rabia et al., (2003) maintained that the lack of exposure to literary Arabic at home contributes to the phonological lag resulting in low performance of phonological processing which, in turn, contributes to low performance in reading comprehension. In 2000, Abu-Rabia tested the effect of early exposure to literary Arabic on reading comprehension by Arab children. The results indicated better results from children exposed to literary Arabic than those only exposed to spoken version (Abu-Rabia, 2002).

Morphology

The derivational morphology

The two types of derivational Arabic morphology are verbal word patterns and nominal word patterns (Abou Rabia, & Jasmin 2004). The former conveys the semantic meaning through verb roots in fifteen different verbal word patterns; and the latter has semantic consistency and derives through nine patterns.

The grammatical pattern of the Arabic language is characterized by roots and patterns (Azzam, 1990). The consonantal roots are generally triliteral or quadrilateral. That is, Arabic words derive from three or four consonants (Abou Rabia & Jasmin, 2004; & Azzam, 1990). The roots provide the distinctive features of every word and reflect its basic lexical meaning. The patterns, on the other hand, provide the specific grammatical

meaning and the function of a particular word. From a certain pattern we can tell the word's gender and number; we can also tell if it is abstract or a concrete, and so forth (Azzam, 1990).

There are three phonological patterns for the construction of words: first, the short vowel builds into roots as in /kataba/ meaning "he wrote." The orthographic order of the consonantal root is not broken in this pattern. Second, the orthographic order of the consonantal root is broken by infixes (vowel letters) which are inserted between the root consonants as in /katib/ meaning "writer." Finally, additional prefixes or suffixes are combined with the root word to convey a specific semantic as in /yaktob/ meaning "he is writing" (Abou Rabia & Jasmin, 2004).

Inflectional morphology

This system is constructed by attaching prefixes and suffixes to the root word (Abou Rabia & Jasmin, 2004). The verbal inflectional system is semantic and considers persons, verbs, number, and gender through the addition of suffixes in the past tense and prefixes and suffixes in the future and present tenses as well as in the imperative form (Abou Rabia & Jasmin, 2004, Azzam, 1990). If we take the root verb أكل /akala/ (he ate), we can derive the words أكل (food), مأكول (eaten), آكل (eater) and the verbs يأكل (is eating) اكل (eat in the imperative form). Thus, the morphological units of the Arabic language rely on intertwining root and word patterns.

Orthography

According to Abu-Rabia (1995), orthography is the understanding of the writing conventions of the language and the correct and incorrect spellings of words. The Arabic

writing system is an alphabetic, phonologic, inflectional, consonantal language which utilizes diacritics for vocalization (Azzam, 1990; Abu-Rabia, 1997).

The characters of the Arabic letters vary in shape depending on their position in the word. There are six vowels in the Arabic writing; three short vowels and three long vowels. Short vowels are represented only by additional diacritics. They are rule-governed according to word meaning, inflection, and function in a sentence; and are gradually removed from the text with increased grade level (Azzam, 1990; Abu-Rabia, 1997). The absence of vowels will be compensated for by increased dependence on grammatical and lexical decision-making (Azzam, 1990).

This section discusses four different features of Arab poor/dyslexics as opposed to skilled readers in regard to Arabic orthography: the type of Arab dyslexics; the over reliance on context by skilled readers; different processes in word identification; and isolated words that reduce reading accuracy.

Type of Arab dyslexics

The Arab dyslexics are believed to be visual-orthographic, unlike the phonologic dyslexics in other Latin languages. Abu-Rabia and his colleagues (2003) conducted a study to investigate some cognitive processes of normal readers as opposed to dyslexics.

The results showed out-performance of the control groups matched by age and reading level on the dyslexic readers in the phonological decoding, syntax, morphology, and working memory. However, on orthographic measures, the dyslexic students outperformed the control group matched by age; and they performed as well as the control group matched by the reading level (Abu-Rabia et al., 2003). Therefore, Arab dyslexics are believed to be better at the visual-orthographic processing than at the

phonological processing. This result is consistent with another study by Abu-Rabia (1995) aimed at indicating the most effective reading strategy of the dyslexic student: the visual-orthographic strategy (Abu-Rabia, 1995; Abu-Rabia & Siegel, 1995). This strategy involves a direct lexical access without any intermediate phonological processing (Abu-Rabia, 1995).

Abu-Rabia relates the low performance of the phonological processing to three attributes. First, the phonological lag related to lack of exposure to literary Arabic at home. Both the lack of exposure to literary Arabic and diglossia in Arabic contribute to the poor results in phonological processing (Abu-Rabia et al., 2003; Haddad, 2003). Second, the development of visual processes over phonological channels makes young and reading-disabled children access meaning more through orthographic features, and less through the phonological code (Abu-Rabia, 1995). Third, the distinctive feature of the Arabic orthography prompts the reader's eyes and memory. (Abu-Rabia stated that the Arabic orthography makes it easier for poor readers to identify whole words when they access meaning through the visual orthographic structures) (Abu-Rabia, 1995).

Over reliance on context

Unlike Latin orthographies, the Arabic orthography requires skilled readers to rely more on context than poor readers because of the homograph phenomenon as described below. This raises the probability that different orthographies may provide different context effects for all types of readers (Abu-Rabia & Siegel, 1995).

Vowels are important features that need to be studied in the Arabic orthography to help analyze the reading miscues made by the dyslexic students. Beginning readers are usually introduced to vowelized Arabic, but skilled readers to unvowelized Arabic

(Azzam, 1990; Abu-Rabia, 2002; Haddad, 2003). Both the presence and the absence of vowels demand simultaneous perception and processing of many rules by poor and skilled readers (Abu-Rabia et al., 2003).

Abu-Rabia (2002) discussed the nature of reading in Arabic, focusing on vowels, sentence context, and reading comprehension by both skilled and less skilled/poor Arabic readers (Abu-Rabia, 2002). The results showed that, while reading a fully vowelized text, poor readers need to control the vowel sounds, which are not placed between the vowels but over, in, and above them, while processing the rules of the different shapes of the visually similar letters in respect to their positions (Abu-Rabia, 2002). The presence of vowels provides a predictable sound-symbol correspondence, but makes the writing system visually complex, which requires a significant relation between visual processing and reading (Abu-Rabia et al., 2003). A minor error in short vowels and/or confusion of visually similar letters can lead to a reading miscue. For example, أكل (food), أكل (feed), and أكل (ate) (Abu-Rabia, 1995; Abu-Rabia, 2002). This is critical for word identification and decoding (Abu-Rabia, 1995; Abu-Rabia, 2002; Abu-Rabia et al., 2003).

If the text is not vowelized, skilled readers must rely on their contextual clues and prior knowledge in order to avoid homographs, which is again a cognitively demanding task (Abu-Rabia & Siegel, 1995; Abu-Rabia et al., 2003). In literary Arabic, almost every word in a passage can be a homograph representing several meanings: a noun, a verb, or a conjunction (Abu-Rabia & Siegel, 1995). For example, the word مثل when presented unvowelized could mean a verb (resemble), or a noun (proverb) (Abu-Rabia & Siegel, 1995). Therefore, pronouncing a word with an inappropriate vowel changes its structural function in the sentence and gives it a different meaning (Abu-Rabia & Siegel,

1995; Abu-Rabia, 1997). Further, when short vowels are not present, the sentence context is a crucial factor to foster word recognition and disambiguate homographs (Abu-Rabia, 2002). This makes the reading process for skilled readers with unvowelized texts an interactive-dynamic process of context and word recognition (Abu-Rabia, 1997; Abu-Rabia, 1997c). As such, skilled readers rely more on context than poor readers in reading words with and without vowels. This finding contradicts the well established hypothesis that poor readers rely more on context than skilled readers (Abu-Rabia & Siegel, 1995). Arabic is probably the only Semitic language in which the readers must first understand the gist of the text in order to read correctly (Abu-Rabia, 2002).

Word-recognition

In word-recognition, the above findings also contradict the well-known reading development model in other orthographies such as Latin (Abu-Rabia, 1997c). This model usually divides the development of reading into three stages: sight word vocabulary stage, decoding with the application of phonology, and orthographic reading in 'large chunks' (Abu-Rabia, 1995). This third stage differs in the English and Arabic languages. In Arabic, the reading process of 'larger chunks' is highly complex and requires skillful reading (Abu-Rabia, 1997c).

Therefore, Abu-Rabia (2002) proposed a new model to explain reading process in Arabic orthography. The reading process of the poor readers who read vowelized texts is as follows: They use their phonemic awareness to decode orthographic units. The faster the reader manages to build up the right phonological representation, the more chances he has to access the mental lexicon (meaning) and then receive priming assistance from the

sentence context (Abu-Rabia, 2002). Meaning and sentence context enhance and compensate each other during the reading process (Abu-Rabia, 2002).

The reading process for skilled readers who read unvowelized texts is as follows: Skilled readers rely heavily on sentence context and other resources that they bring to the text (morphology and syntax). They are aware of the significance of the short vowel at the end of the word that marks the word's grammatical function (Abu-Rabia, 2002).

The most important concept of this process is this trilateral/quadrilateral root model which makes morphology a key variable in reading Arabic (Abu-Rabia et al., 2003). The reader's eye identifies the roots of words, which conveys initial lexical access and general understanding of the gist of the sentence (Abu-Rabia, 2002). The reader is not obliged to use phonological and syntax information for exact phonological representation for lexical access purposes. The sentence context provides priming to help the reader retrieve the exact semantic that fits the context. This silent reading process does not require the processing of vowelization of ends of words. The processing of affixes and context ensures that the processing of phonology, syntax, and grammar is not required for this part of the process (Abu-Rabia, 2002). Therefore, vowels and context are essential elements in word recognition and reading comprehension. Thus, it is assumable that reading isolated words hinders reading accuracy.

Reading accuracy

Another series of studies carried out by Abu-Rabia (1997 & 1997c) tested the influence of vowels on context and reading accuracy among poor and skilled Arab readers. All paragraphs, sentences, and isolated words were presented in three different styles: fully vowelized, partially vowelized, and unvowelized. The result shows that

reading vowelized Arabic paragraphs is a combination of word recognition and vowel processing (Abu-Rabia, 1997). Vowels proved to be an essential facilitator in the process of word identification and reading comprehension (Abu-Rabia & Siegel, 1995; Abu-Rabia, 2002). Consistent with this finding, skilled readers and poor readers performed less successfully with the partially unvowelized words than with the fully vowelized words (Abu-Rabia, 1997), and they both performed very poorly in reading isolated unvowelized words (Abu-Rabia & Siegel, 1995; Abu-Rabia, 1997; Abu-Rabia, 2000). Therefore, contradictory to Latin languages, unvowelised isolated words greatly reduce reading accuracy (Abu-Rabia, 1997). Further, when these words are read in context, as sentences and paragraphs, the role of vowels is reduced and shows an insignificant effect, which reflects the essential role played by the context (Abu-Rabia, 1997).

Conclusion

In conclusion, four unique characteristics of the Arabic orthography have been discussed in this review: Arab dyslexics are believed to be visual-orthographic readers rather than phonologic readers; vowels and contexts play a mutual role in word recognition and reading comprehension which requires skilled readers to depend more on context than poor readers; skilled and poor readers follow different processes in word-identification; and isolated words reduce reading accuracy. Morphology and diglossia are other features of the Arabic language that need to be considered to provide a better view of the reading process and to pinpoint other differences between normal and dyslexic Arab readers.

Teaching approaches and intervention

The unawareness in converging spoken language into written symbols lies at the heart of the dyslexia problem. Accordingly, there has reached a consensus that students should acquire the alphabetic system in order to become skilled at reading words (Ehri, 2002). Moreover, learners who are unable to segment the speech stream into phonemes or are unable to associate the basic units of sound to the alphabetic symbols are the most disadvantaged in the acquisition of reading (Ellis, 1997; Aaron & Kotva, 1999; Lundberg, 1999; Chard et al., 2000). Therefore, blending phonemes together in order to form oral words is critical to acquiring reading skills, and segmenting oral words into phonemes is critical to spelling skills (Chard et al., 2000). These connections are fleshed out gradually to the extent that the learner's orthographic knowledge fully represents specific mapping between letters in print and the phonemes in spoken words (Snowling & Hulme, 1999). In this part of the literature review, I will discuss the stages of reading acquisition, the different approaches of teaching reading, and the intervention techniques used to overcome dyslexia.

Reading

Learning to read involves two basic processes: decoding and comprehension. The former involves learning to decipher print, i.e. transforming letter sequences into familiar words. The latter involves comprehending the semantics of the print (Ellis, 1997; Snowling & Hulme, 1999; Chard et al., 2000; Ehri, 2002). Skillful readers perform the two processes together. While their attention is focused on the meaning of the text, their deciphering mechanics operates unconsciously (Ehri, 2002).

The cognitivists refer the inability to read to a deficit in the phonological awareness, whereas, the behaviorists' point of view maintains that the lack of automaticity of decoding fluency results in poor comprehension. The automaticity theory maintains that if a reader has to devote ample attention to decoding, insufficient attention will be available for comprehension i.e. constructing the meaning of text (Høien 1999; Tønnessen, 1999; Chard et al., 2000). Hence, rapid and correct decoding is the milestone in word recognition (Høien 1999; Chard et al., 2000).

As a conclusion, the obstacles that throw children off course on becoming skilled readers are three: the difficulty in understanding and using the alphabetic principle, the failure to acquire and use comprehension skills, and the lack of motivation since students with poor decoding skills are motivated to avoid reading (Snow et al., 1998; Chard et al., 2000). In this sense, a gap between achieving and non-achieving readers is created, and it widens through out the school years, establishing what is called Mathew's effect -the rich get richer and the poor get poorer- (Chard et al., 2000).

Decoding

Reading is the ability to translate print into meaning (Chard et al., 2000; Ehri, 2002). The first step in reading is decoding or word identification, which is the ability to convert the printed words into their spoken language equivalent (Chard et al., 2000). Phonemic awareness constitutes the milestone of decoding.

Once a child has mastered a few of the phoneme-grapheme convergence (PGC), he is equipped with the tools to start tackling unfamiliar words. He is able to analyze, synthesize, and then decode the printed word. He then, is able to understand why particular letters are chosen and put in a certain order (Polly & Waller, 1994). Dyslexics

have difficulties, right from the start, with learning PGC and letter orientation. They have difficulty visualizing letters and are uncertain how to form letters even after intensive teaching (Polly & Waller, 1994). However, decoding is believed to be a necessary yet insufficient in accelerating word-reading speed. Once it is fully mastered, a continuous encounter with the written language is needed for further progress in the acquisition of reading skill (Aaron & Kotva, 1999).

According to Ehri (2002), there are four ways by which children read words as they process text: decoding, analogy, prediction, and memory. The first three ways are used to attack unfamiliar words, whereas, reading from memory is used to retain the previously read words from memory (Ehri, 2002).

Decoding is transforming letters into sounds and blending the sounds to form recognizable words. Skilled readers know how common letter patterns are assembled into pronunciations; therefore, common letter patterns are easier to decode by readers. However, reading English does not always depend on decoding because many spellings have variables or irregular pronunciations (Ehri, 2002).

Analogous reading applies to reading a new word by recognizing how its spelling is similar to an already known word, such as reading *fountain* by analogy to *mountain*.

Goswami maintains that beginning readers use their knowledge of rhyming words to read other words by analogy, yet decoding skills is required to analogize using sight words from memory (Ehri, 2002).

While following prediction, readers use context clues or beginning letters in order to predict the identity of unfamiliar words. Usually, when words are miscued, readers substitute a word that fits the sentence structure and syntax (Ehri, 2002). Thus, for

readers to guess words effectively, they must know most of the surrounding words in a text. To use these accurately, readers must use processes other than contextual guessing (Ehri, 2002).

The last way to read words is by sight. Skilled readers process nonphonetic words, such as *island*, *yacht*, *guitar* from memory. They read words as whole units without pausing between sounds. This way is faster and more accurate than decoding although words read by sight deviate from the conventional PGC. Adams and Huggins (in Ehri, 2002) maintain that not only nonphonetic words are read from memory, but also all words can become sight words.

According to Ehri (2002), text reading functions most efficiently when words are read precisely and automatically by sight, with little attention paid to decoding and more focus is devoted to comprehension. On the other hand, the other three ways of reading words cause attention to be shifted to an individual word in order to recognize it. However, even very skilled readers may not know all words by sight, so they need to use other strategies in order to identify unfamiliar words (Ehri, 2002).

Phases of development

According to Marsh, Friedman, Welch and Desberg (as cited in Awaida, 1992; Snowling & Hulme, 1999), the cognitive development theory of reading is divided into four stages: First, the linguistic stage when the child can correctly read words only in his visual lexicon. This stage is similar to Frith's "logographic phase" whereby the novice reader is highly dependent on the look of a word within a particular context (Clark & Uhry, 1995) so that she/he employs the same perceptual abilities as when memorizing other visual issues in his surrounding. For example, she/he recognizes the word *look* from

the two circles (Awaida, 1992; Snowling & Hulme, 1999). The novice reader uses the whole language approach and is unable to use phonemic segmentation.

The second stage is the discrimination net, guessing when the graphemic information becomes essential for guessing words. The child compares the graphemic information in a new word to that in other similar words already present in his mental lexicon. She/he looks for common features found in the new word and the other stored ones. The learner starts by using the initial letters as a clue, and then he moves to other features, such as the length of the word and the middle and end letters (Awaida, 1992).

The third stage is the sequential decoding at which the child is taught the alphabetic principle. This stage is equivalent to the cipher or the alphabetic phase in Frith model of reading development (Clark & Uhry, 1995). A child who is now around seven-year old notices that letters in words have different sounds. She/he can produce nonwords by transferring graphemes into phonemes and then blending the phonemes together. It is at the alphabetic stage that dyslexia children fail to read. They can use their logographic strategies, yet are unable to use the alphabetic principle to decode new words or to invent spelling (Clark & Uhry, 1995).

The final stage is the hierarchical decoding (Awaida, 1992). It is equivalent to the orthographic phase in Frith's theory of reading development (Awaida, 1992; Clark & Uhry, 1995). At this stage, the child acquires complex rules of orthographic structure, and he begins to use analogy as a route to decoding, especially with exceptional words (Awaida, 1992; Snowling & Hulme, 1999).

Phonological awareness versus phoneme grapheme correspondences

Researchers agree that the main cause of dyslexia is the inability to acquire the alphabetic principle, resulting from the deficiency in acquiring phonemic awareness resulting from an inability to form an awareness of the phonemic structure of speech (Seymour, 1999; Chard et al., 2000). "Only when dyslexic readers are asked to map letters into sounds do we see evidence of a fault in the circuitry." (Shaywitz, 2003, p. 87)

There is always a debate whether phonological awareness is a precursor to beginning reading or is a result of initial experiences with print (Levy, 1999). It is unquestionable that children with good phonological awareness become good readers and spellers (Goswami, 1999). In her research, Ehri concluded that phonological awareness is a crucial factor in cipher reading, and contributes to analogy reading (Clark & Uhry, 1995). In addition, Tonnessen (1999) concluded from his literature review that phonological awareness is a necessary condition for decoding.

On the other hand, research sponsored by the National Institute of Child Health and Human Development (NICHD) and the Learning Disability Research Centers achieved convergent results that are extremely compelling. The results demonstrated that 15 to 20% of children do not successfully learn to read unless they receive direct instruction in phonological awareness (Ellis, 1997). Furthermore, in their findings from research on the development of phonological awareness, Ehri and Wilce established a bidirectional relationship between decoding and phonological awareness (as cited in Snow et al., 1998); that is, appreciation of spoken words is necessary for the child to discover the alphabetic principle. However, results from many studies showed that instructions regarding phoneme-grapheme correspondences appear to facilitate the

growth in phonological awareness (Snow et al., 1998). Baron rejected the idea that phonemic awareness is a homogeneous skill that naturally appears during the last stages of the oral language development. He explained that phonemic awareness is a heterogeneous skill whose acquisition involves a complex pattern of interaction between print and speech. The acquisition of such a skill is required both before and after children learn to read and spell (Levy, 1999).

The strong correlation between reading and phonological awareness appeared to be strengthened by the association between phonemic awareness and children's ability to sound out pronounceable nonwords and unfamiliar printed words (Snow et al., 1998). As Share maintained, skillful phonological decoding provides the child with a self-teaching mechanism useful for attacking words that have not been encountered previously (Snow et al., 1998).

In summary, training in phonological awareness if associated with letter-sound instructions makes a tremendous contribution in assisting at-risk children in learning to read. This effective training proved to have narrowed the gap between poor readers and initially more skillful readers (Høien 1999).

Stanovitch (as cited in Ellis, 1997) outlined several activities required for training in phonemic awareness. These activities include:

Phonemic deletion: if we take away /k/ from *cat*, what word would be left?

Word-to-word matching: do *pen* and *pool* begin with the same sound?

Blending sounds: what word would we have if we put together /s/ /a/ /t/?

Isolation sounds: what is the first sound in *dance*?

Phoneme segmentation: what sounds do you hear in the word *door*?

Phoneme counting: how many sounds do you hear in the word *cat*?

Phoneme deletion: what sound do you *hear* in *meet* that is missing in *eat*?

Odd word out: what word starts with a different sound: *bag, nine, beak, bike*?

Sound-to-word matching: is there a /k/ in *cat*?

Whole-word versus phonics approach

Although the main task in reading is to extract meaning from print, the first task confronting the child is to decode the visual orthography in order to reveal the message hidden in the script (Levy, 1999). There are two main approaches used for word recognition: decoding, which is converting graphemes in words into their corresponding phonemes, and whole-word reading, which requires processing the word as a whole unit (Aaron & Kotva, 1999). Throughout the history of teaching reading, a great debate was witnessed between proponents of teaching reading through structured language approaches involving phonics, and proponents of the whole-word approach who suggest that it is sufficient to grasp the relation of a whole word from the text (Ellis, 1997).

It is believed that as soon as decoding skills are mastered – being able to read nonwords correctly – children start to recognize words accurately and effortlessly. Usually, sight-word reading might not be considered an independent component before the age of four because it is built on decoding and not fully mastered (Aaron & Kotva, 1999). Therefore, decoding strategy is predominantly used when children learn to read, whereas sight word reading marks the stage in which children read in order to learn (Aaron & Kotva, 1999).

Although whole word learning appears to have some advantages, it makes no use of the alphabetic nature of English and reduces reading to a logographic form (Levy,

1999). It is to the disadvantage of the students following this approach that the orthographic representations of the English letters were not designed to form distinctive visual forms when they are combined into words resulting in remarkably similar look of words e.g. *cat*, *rat*, *mat* (Levy, 1999). Levy pointed out that the orthographic regularities in the English language derive from rules of letter sequence that is not marked by visual distinctiveness. This enhances the argument whether English words are easily processed by sight or by phoneme-grapheme regularities (Levy, 1999).

Buchanan, Hildebrandt, & Mackinnon (1999) indicated that the phonologically dyslexic patients who are unable to sound out words rely on the whole-word route. They access the semantic information from the text, a technique that allows students to read irregular words out aloud yet decreases their abilities to read nonwords. On the other hand, deep dyslexic students are also unable to read nonwords, and make semantic miscues while reading. These results correlate with Bensoussan (1994) who concluded that half of the dyslexic students rely on whole-word based strategy while normal readers show a tendency toward letter-level decoding. She explained that the phonologically impaired readers use the whole-word approach in order to compensate for poor phonological skills.

Snow et al. (1998) mentioned that children who are not developmentally prepared to benefit from explicit letter-sound instructions are at advantage for using whole-language approach. On the other hand, Levy (1999) reported that dyslexic students who followed the whole-word approach and others who followed phonics instructions - sounding out and blending sounds- outperformed the control group who received non-reading skills in equally reading regular and irregular words. However, the whole-word

trained dyslexics outperformed the phonics group on spelling of irregular words, and the control group outperformed both dyslexic groups in reading new words.

Another study of American children by Felton assessed the impact of beginning reading instruction on kindergarteners who are at risk for reading disability. One group was given sound-symbol training and basic phoneme segmentation. The other group received context bases instruction emphasizing meaning and context. By the end of the first and second grades, the first group outperformed the other group on all measures of reading and spelling (as cited in Aaron & Kotva, 1999).

Regardless of the approach used, there is always a block in students who do not learn to read. This could be due to the non systematic ways that determine a satisfactory match between the way an individual child learns to read and the teaching approach used. In conclusion, phonemic approach and the whole-language approach can complement each other for the improvement of reading level among all readers (Ellis, 1997). Keeping in mind that studies sponsored by NICHD to determine the matching of learners' type to the effective teaching approach directly reflected the knowledge of phonemic awareness (Ellis, 1997). Furthermore, Snow et al. (1998) concluded that phonologically oriented training programs not only facilitate word recognition but also produce the strongest gain in phonemic awareness and phonological decoding. On the other hand, Aaron and Kotva (1999) concluded that remedial instruction targeted at the weak reading component is more effective than an undifferentiated global approach.

It could be concluded that phonics instruction programs seem to be more effective in teaching learning disabled students than the whole-language approach. This last

section will discuss the different approaches of teaching phonics and the effect of the multisensory approach in increasing the advantage of teaching reading.

Phonics approach in teaching decoding

There is a unanimous agreement among reading specialists that phonics should be part of the reading instructions (Clark & Uhry, 1995). Research on effective reading methodology suggested that early and direct teaching of phoneme-grapheme relationships better enhances decoding abilities than later explicit phonics instruction especially among dyslexic children (Clark & Uhry, 1995). However, the most important point in this regard is to make sure that phonics is taught systematically (Chard et al., 2000).

Systematic

The term 'systematic phonics' refers to the carefully planned and sequenced instruction. The scope and sequence for phonics instruction never subscribes to one paradigm; but rather follows some basic logical principles. Those principles involve moving from easy to difficult instructional activity; teaching the most useful information early and the less useful information later in the course; providing blending activities with phonetically regular words in order to highlight the sound-letter relationships; providing ample opportunities for practicing newly taught sounds and letters; and insuring cumulative review for the previously taught materials (Chard et al., 2000).

Chard et al. (2000) documented the report of the National Reading Panel about phonics instructions. This report points out that the ability to read and spell was improved among kindergarten children who received systematic phonics instruction. This finding highly advocates teaching phonics in kindergarten and first grade, although

it might be contrary to conventional wisdom that students at the age of 5 and 6 might not be ready for phonics.

Explicit

The explicit phonics approach, also called synthetic, refers to the instructional technique where grapheme-phoneme correspondences are explicitly taught before they are blended to form syllables or whole words (Clark & Uhry, 1995). The teacher directly tells students the sound represented by an individual letter before students see it in a word. The letters are first presented on a small card, sometimes called sound cards, for practice (Clark & Uhry, 1995; Chard et al., 2000). After ample practice, this sound is then synthesized into a word together with other previously learned letters (Clark & Uhry, 1995). For example, if we take the word *cat*, following the synthetic approach, children take apart the three letters, sound out the phoneme for each letter, and then blend the phonemes together to pronounce the targeted word. Thus, the targeted words for reading are built from known parts (Clark & Uhry, 1995; Chard et al., 2000). However, in writing, the sequence is reversed. First, children say the word, segment it into phonemes, and then write each grapheme representing the pronounced phonemes until they write the entire targeted word (Snow et al., 1998). The explicit instruction directs the students' attention to the phonological structure of oral language and to the connections between phonemes and spellings. It helps children who have not grasped the alphabetic principle decode unfamiliar words (Snow et al., 1998).

As early as 1985, Anderson et al. observed a decline in reading scores among select groups of children. In their seminal study, they advocated the need for explicit teaching methods (Ellis, 1997). In addition, Chard et al., (2002) maintained that explicit,

systematic phonics instruction is a valuable and essential component for a successful classroom reading program.

Analytic

The analytic phonics approach is sometimes referred to as fundamental, incidental, or intrinsic (Clark & Uhry, 1995). Unlike synthetic phonics, the analytic phonics approach refers to teaching reading through analyzing the common phoneme in a set of words (Snow et al., 1998). The whole word is introduced first, and then students are encouraged to deduce the grapheme-phoneme relationships as they appear in the word (Clark & Uhry, 1995). There is only one difference between analytic phonics and basal readers. In the former, words are presented according to their phonemic elements that are systematically introduced, whereas in the latter, words are introduced according to their frequency in children's vocabulary (Clark & Uhry, 1995).

Following the analytic phonics approach, the teacher informs the students that /m/ is the sound that we hear at the beginning of the word *mat*. Activities related to the analytic approach might include discussions on how *pot*, *park*, *part*, and *pen* are alike. Students realize that the initial phoneme /p/ in the word *pot* is the same as in *part*, *park* and *pen*. While writing, students rely on inferential learning. As such, children deduce that they must write the grapheme 'p' that represents the phoneme /p/ (Snow et al., 1998). This approach suggests the use of onsets and rimes in particular words (Snow et al., 1998). Proponents of this approach suggest that working at the word level -relating whole to parts- and paying attention to the beginning and ending of words help children successfully learn to read. This approach helps children focus on how to break down the word rather than how to build it (Snow et al., 1998).

Whether phonics should be taught synthetically or analytically has been the subject for hot debates among educators and curriculum designers (Chard et al., 2000). Opponents of explicit phonics charge that many consonant sounds cannot be correctly produced without distorting them by adding a vowel sound to make them pronounceable. For example, in pronouncing the word *dog*, the child might replace the short /o/ sound with a schwa that would go unrecognized by novice readers (Chard et al., 2000). In addition, if associating graphemes to phonemes, the word *basket* will not sound the way we know it. The /e/ is a schwa and not a short /e/ sound.

Opponents of analytic phonics approach, where sounds are never isolated, point out that this technique places high phonemic segmentation demands on sound blending abilities which are most probably weak in children with poor phonological awareness and beginning readers (Clark & Uhry, 1995; Chard et al., 2000). Clark & Uhry (1995) maintained that the primary results of some comparison studies between analytic and explicit phonics approaches support the use of the explicit phonics for children with phonological deficits. This critique was supported by Joanna Williams' findings that analytic phonics approach has proven to be less successful with fifth-grade dyslexic students than with normal readers (Clark & Uhry, 1995). Another point against analytic phonics approach is that it demands extensive reading for the development of a broad basic knowledge of words in order to compare newly encountered words. The dyslexic students then are disadvantaged since they seem to read much less than normal readers (Clark & Uhry, 1995).

Multisensory

As early as 1963, it was established that the reason why a high percentage of school children fail to acquire literacy skills is inadequate classroom instruction (Joshi, 2002). Therefore, a number of studies were conducted to identify the best programs that could facilitate the process of acquiring literacy skill. As mentioned earlier, numerous findings suggested that systematic decoding instruction that emphasize synthetic phonics programs yielded to the best results (Joshi, 2002). Many of these programs had different applications, including the Orton-Gillingham multisensory reading programs which were believed to be very effective in improving reading skills in both clinical settings and small groups (Joshi, 2002). The ultimate goal of Orton-Gillingham reading programs is to develop reading comprehension which will emerge once decoding skills and vocabulary knowledge are well developed (Joshi, 2002).

Since the 1920s, the use of multisensory techniques in remedial intervention with dyslexic children has become widespread. The multisensory approach is defined as the use of the sensory modalities -visual, auditory, and kinesthetic and tactile- pathways in order to reinforce learning in the brain (Hoefer, 2004). The instructional procedures are systematic, sequential, explicit, and directly impart instruction and utilize visual, auditory, kinesthetic, and tactile modalities for teaching reading (Joshi, 2002). Therefore, this procedure came to be known as the VAKT approach referring to four sense modalities (Clark & Uhry, 1995).

This approach was first applied by Grace Fernald who instructed students with reading difficulties to trace letters or words while saying their names aloud. Fernald pointed out that this technique would enhance memory schemas for stimulus information (Clark & Uhry, 1995). Beth Slingerland then developed an Orton-Gillingham related

approach in order to remediate students with specific language disorder (Joshi, 2002). This procedure came to be known as the VAKT approach (Clark & Uhry, 1995) where two or more sensory modalities are use simultaneously to express or to receive information (Joshi, 2002).

Polly and Waller (1994) argued that "the multisensory approach is necessary to overcome and to compensate for weaknesses while building on strengths. Such an approach has the advantages of reinforcement from several learning channels at once." (p. 41) Therefore, the child will use his ears, eyes, speech and his hand to use auditory, visual and kinesthetic senses together and when both auditory and visual recalls are weak, the child may learn better through tactile and kinesthetic work (Polly & Waller, 1994).

The assumed benefits of the multisensory remedial training programs are summarized in four points. First, they are assumed to help establish visual-auditory associations in learning grapheme-phoneme correspondences through kinesthetic activities; second, they help establish left-to-right progression; third, they encourage attention to details within letters or words that assists in word retrieval from long-term memory; and fourth, they give more feedback to the teacher (Clark & Uhry, 1995).

Although many of the programs incorporating the VAKT strategies have proven effective and have gained the practitioners' confidence, there is little empirical data to support their effectiveness (Clark & Uhry, 1995; Joshi, 2002). In 1979, Susan Bryant compared the effects of VA with VAKT on children with reading disability. Keeping all other instructional variables constant, she found no differing effects due to treatment between the two methods on reading and spelling although the VAKT procedures demanded more student engaged time (Clark & Uhry, 1995). Bryant suggested two

possible effects of multisensory instruction that have not been detected so far: it provides more feedback to the teacher and the child in initial learning and it minimizes boredom through the distributed and varied practice (Clark & Uhry, 1995).

John and Myklebust, of the institute of language disorder at the Northwestern University, maintained that the involvement of two sensory modalities may confuse learning disabled students since they appear to be prone to sensory overload (as cited in Polly & Waller, 1994).

Among researchers, only a very few discouraged the use of a multisensory teaching. Many clinics and private centers follow this approach in the remediation instructions and acknowledge its positive effects. Cox used mirrors in order to emphasize different speech sounds. The use of mirrors helps demonstrate different oral positions in pronouncing sounds hence stressing the importance of developing oral-motor awareness in children who suffer from auditory conceptualization deficits (Clark & Uhry, 1995).

Numerous studies have acknowledged the impact of multisensory learning on learner. Hoefer (2004) investigated the effects of using a multisensory approach to improve reading skills in learning disabled students. Students had to increase their reading scores by at least twelve words per minute based on the Dynamic Indicators of Basic Early Literacy Skills. All students were taught reading using direct multisensory reading instructions. After a six-week treatment, students' ability to retrieve the sound/sounds taught has increased. In addition, the progress monitoring scores showed remarkable growth although it was inconsistent from week to week (Hoefer, 2004).

Thorpe and Borden (1985) discussed the importance of the visual, auditory, and kinesthetic modalities in learning sound symbol relationship used to teach reading and

spelling. The conclusion of this study supports the contention that multisensory instruction succeeds in teaching literacy since it increases the student attention on task (Thrope & Borden, 1985).

Joshi, (2002) investigated the effectiveness of using multisensory teaching techniques with first-grade children. She wanted to test the impact of multisensory teaching on first graders' abilities of decoding, comprehension, and phonological awareness as compared to another group of children taught in the conventional way. The results indicated that the multisensory group that followed the Orton-Gillingham principles outperformed the other group in all decoding, phonological awareness and comprehension skills.

The above results correlate with Anselmo and Kulp's study conducted 1997 tested whether a phonemic awareness/multisensory instructional program would increase prereading skills in at-risk kindergarten students. The results showed a positive effect on the students' ability to identify initial consonant sounds although they were not able to match corresponding upper and lower case letters (as cited in Hoefer, 2004).

All proponents of the multisensory approach acknowledge the effects of the tactile or kinesthetic modalities being the only thing that differentiates VAKT from VA programs (Clark & Uhry, 1995). Tracing or kinesthetic modality is defined by the feel for how the pen should move when writing (Polly & Waller, 1994). According to Hulme, tracing directs attention and increases the detailed information of the stimuli to be remembered and stored in memory (Clark & Uhry, 1995). According to Polly and Waller (1994), tracing helps form a link. Large tracing movements of letter-shapes can be made in the air so there is gross muscular movement. Repeated practice of such an activity

increases students' confidence concerning a particular letter. Subsequently, children can practice tracing it with eyes closed creating an opportunity to form a link: The correct letter-sound is said aloud as the letter-shape is being traced (Polly & Waller, 1994).

Joshi pointed out that her students faced some difficulty remembering the sound. After one week of prompting in tracing techniques, students were able to remember the sound that the letter makes while tracing it (Joshi, 2002). Moreover, Hoefer (2004) was so pleased with the progress her students made in remembering the tracing and how the tracing helped retrieve the sounds.

Hulmes examined the effect of tracing on visual recognition. His results show that tracing significantly reinforces the students' abilities to remember letters, but not letter sequence, and bring this recognition performance up to that of normal readers (Clark & Uhry, 1995).

In conclusion, it should be noted that if a strong multisensory program does not enhance reading, it will never adversely affect the process of reading acquisition. When applying such programs, one might recognize benefits that are directly related to the actual reading acquisition process such as letter recall, letter recognition, decoding, reading comprehension, and phonological awareness. The other benefits consistently noted in following multisensory programs are not directly related to the reading acquisition process per se, but the positive learning atmosphere this technique creates. The multisensory approach eliminates boredom, increases student's involvement time in learning, and gives attention to details.

Chapter Three

Project Description

From the literature review, I concluded that the best way to design a program for learning disabled students, particularly dyslexics, is an explicit multisensory approach. Since I believe in such a program and have tested its success firsthand by teaching my students to decode English through the use of *Recipe for Reading*, I based my program on such an approach taking into consideration the unique structure of the Arabic language.

My project, حروفي الأولى (My first Letters), is a multisensory program that uses the explicit phonics approach. The main characteristics of my project can be summarized in a few points.

First, this project focuses on reading and writing using the explicit multisensory approach.

Second, it is very structured. It starts with the simple units of sounds and proceeds to the more difficult ones. The sequence of letters of this program takes into account that the visually and phonetically similar letters and sounds are introduced apart. It provides ample opportunities for drill and practice.

Third, it is cumulative. Every lesson is built up upon previously learned concepts; that is, all words are vocabulary controlled and build only on previously learned letters and words. In very few cases, essential sight words are introduced and the student is informed about how to read them by sight.

Fourth, it is systematic. The sequence of the skills in every lesson establishes a routine that makes the student feel on track and lets him focus on the new sounds rather than on how the lesson is progressing.

Fifth, it uses the four sensory modalities: auditory, visual, kinesthetic, and tactile. The student will always find a way to compensate in case she/he is poor in one of these modalities.

Finally, it does not require a lot of teacher training. The teacher's guide is detailed and comprehensive and includes a script to be used by the teacher and color coding. Any teacher who is familiar with the dyslexia and is dedicated to helping dyslexic students learn to read would make a good use of the program.

The sequence of the lessons is as follows:

A. Required review

Visual kinesthetic: The student places the plastic letters in order and starts to name them while tracing them.

Visual auditory: The teacher reviews with the student the names and sounds of the previously learned letters by using the orange plastic letters and sound cards.

Visual kinesthetic: The teacher reviews with the student the shapes of every learned letter using the chart for shapes and the red, black, and green plastic letters.

Visual: The teacher reviews with the student the rule of the 6 letters that are not attached to any other letters from the left.

B. Introduction of a new lesson.

1. Introduction of the new letter:

Auditory: The teacher starts with a tongue twister where the target letter's sound is repeated. The student has to tell what sound is more frequently repeated (all the information is provided in the teacher's book. See appendix B).

Visual auditory: The teacher introduces a key word for the target letter. She helps the student associate the letter's shape to the letter's sound by using the sound card.

Kinesthetic and tactile: The student has to trace the letter in the tactile book forming the right gross motor movement. Then, she/he has to form the basic shape of the letter from play dough before she/he sky writes and desk writes the letter forming the right gross-motor movement.

Visual kinesthetic: The teacher guides the child to circle the different shapes of the target letter as present in words (see Number 1 in the sample lesson).

Visual kinesthetic: The teacher helps the student identifies the different shapes of the target letter by using plastic letters and the tactile book.

Visual kinesthetic: The student colors the different shapes of the letter using the right colors: orange for the basic shape, red for initial position, black for middle position, and green for the final position (see Number 2).

Kinesthetic: The student writes the letters form memory as they appear in a word (see Number 3).

Kinesthetic: The student fills in the blank the right shape of the letter to complete some words (see Number 4). (The teacher reads the words for the student in the primary stage when not all letters are covered).

2. Introduction for short and long sounds:

Auditory: The teacher mentions two words having the target letter with a long and short sound. The student has to explain how the sounds are different.

Visual kinesthetic: The teacher shows how the sounds are formed by placing a blue plastic diacritic over the letter to represent a short sound and a blue plastic letter next to the letter to represent a long vowel sound.

Oral kinesthetic: The student is asked to write the letter and the diacritic and infix to form short and long vowel sounds (see Number 6).

(The above three steps are repeated with all vowel sounds and the *soukoun*. The students complete numbers 6 to 12 as related activities).

C. Application and drill and practice:

Auditory visual kinesthetic: The student has to read words and circle the target letter with a short vowel sound, and underline the target letter with a long vowel sound. (The teacher reads the words for the first few lessons). At this point, the student should be able to identify the letter shapes and the short/long sounds especially that they are presented in different colors: red and blue.

Auditory kinesthetic: The teacher says words and the student has to identify the place of the target letter (initial, middle or final position). Then, he/she has to write the letter on the dash representing its position with the right diacritic or long vowel sound (see Number 14).

Visual: Number 15 is the application of real decoding. The student reads the sentences by applying all the rules she/he has learned. All words present are vocabulary controlled. The sample lesson is the third lesson in the book. Thus, the student should be able to letters ب and د, ر. The underlined word is meant to be read by sight.

Visual kinesthetic: Exercise 16 aims at orthographic discrimination. The student has to read the word on the right and match the similar word on the left.

Auditory kinesthetic: The teacher dictates the student on words consisting of letters already learned. The student could use all the visual aids to complete this exercise: plastic letters, sound cards, and the charts. The student is advised to follow the self-correction strategy. In case he/she misspells a word, the teacher makes him/her read the misspelled word and compare it with the target word (see Number 17).

In the future, if the program proves effective with dyslexic students, it could be augmented by workbooks, stories to reinforce letters, handwriting activities, story comprehension using the cloze technique, multiple-choice or matching, and finally some word games such as Wordo (an adaption of Bingo), crossword puzzles, scrambled letters, etc.

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Appendix A

Extract form teacher's guide

الهدف: التمييز بين الأصوات الطويلة والقصيرة

كيف تسمع صوت الباء في "بطة"؟ /ب/

كيف تسمع صوت الباء في "باسم"؟ /با/

"ب" و"با"

أنظر الى شفتي: "ب" و"با"

إذا يوجد صوت قصير وصوت طويل. "ب" و"با"

/ب/ هو الصوت القصير و /با/ هو الصوت الطويل.

يكرّر التلميذ الكلمتين مع الصوتين ثلاث مرات.

هل صوت الباء طويل أو قصير في هذه الكلمات؟

بطة /ب/ قصير

باقة /با/ طويل

باسم /با/ طويل

بقنونس /ب/ قصير

بحر /ب/ قصير

حرف الباء

بَقِيتَ بَطَّةً رِيَابَ الْبَيْضَاءِ فِي الْبَرِّيَّةِ.

١. ضع دائرة حول حرف الباء.

بِئْرَ بَانِ نَبْعَ

أَرْنَبُ لَبِيبُ طَبِيعَ

٢. لَوِّنْ حرف الباء بمختلف أشكالها.

٣. اكتب شكل الباء في:

أول الكلمة وسط الكلمة آخر الكلمة

٤. أكتب الباء بالشكل المناسب حسب موقعها في الكلمة.

نـ مع عنـ در

ر ل ر يع سـ تان

دو لا در نـ يذ

٥. ضع دائرة حول /بَ/ و /بَا/.

بَطَّة بَابُ بَدْر باسـم

٦. أكتب الباء مع الفتحة والألف و كرّر الصوت.

بَ

بَا

٧. ضع دائرة حول /دُ/ و /دو/.

بوري بستان بومة دبوس

٨. أكتب الباء مع الضمة والواو وكرر الصوت.

بُ

بو

٩. ضع دائرة حول /بُ/ و /بي/.

ربيع بحار طبيعة بساط

١٠. أكتب الباء مع الكسرة والياء وكرر الصوت.

بِ

بي

١١. ضع دائرة حول الباء مع الحرف الساكن.

نَبِيعُ أَبْيَضُ سَبِيعُ

١٢. أكتب حرف الباء مع الصّوت الساكن.

ب

١٣. ضع دائرة حول الباء مع الصوت القصير و سطرًا تحت الباء مع الصوت الطويل.

مثلاً: بَدْر بَان

رَبِيع	بُدُور	بِنَايَة	بُسْتَان	بَرِيَّة
نَبِيذ	زَنَبَق	رَبَاب	أَرْنَب	بَابِي
بَاسْم	بَطَّة	بُئْر	بُورِي	بُنِي
بَسَاط	بُورَة	بَحَار	زَبِيب	بَرِيد

١٤. أين تسمع صوت الباء في هذه الكلمات؟ أكتب حرف الباء مع الحركات في الفراغ المناسب.

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

١٥. اقرأ الجُمْل التالفة.

هَذَا دُبُّ بَرَبَرٍ.

بَرَدٌ رَوْدِي.

هَذَا دَرَبٌ دَارِي.

١٦. ضع دائرة حول الكلمة التي توافق.

دَرْبُ

دَرْبُ

دُرُوبُ

بَدْرُ

بَرْدُ

بَرْدُ

رُودِي

رُودِي

رُوبِي

بُدُورُ

بُدُورُ

دُرُوبُ

١٧. إملأ

_____	_____	_____
_____	_____	_____
_____	_____	_____

Lesson 14

ch

ch says (ch), as in

Trace and copy the letter.

ATTIC

HOUSE

BASEMENT

ch ch ch ch

ch

ch

ch ch ch ch ch

ch

ch

Recipe for Reading Workbook 1

ch says (ch), as in

Circle the pictures that begin with **ch**.

Recipe for Reading Workbook 1

Circle the word that matches.

	pot
Chad	
	Chad

	ham
chop	
	chop

	chat
chat	
	dig

	kid
chap	
	chap

	chip
chip	
	Kim

	cap
chit	
	chit

Recipe for Reading Workbook 1

Read the word and circle the picture it names.

chit-chat
chap
chip
chat
chip
chop

Recipe for Reading Workbook 1

Write the word under the picture.

Chad

chip

chip

chop

chap

chit-chat

chip