

# **LEBANESE AMERICAN UNIVERSITY**

## **Effects of Lindamood Phoneme Sequencing Program (LiPS) on a Bilingual Student: A Case Study**

By

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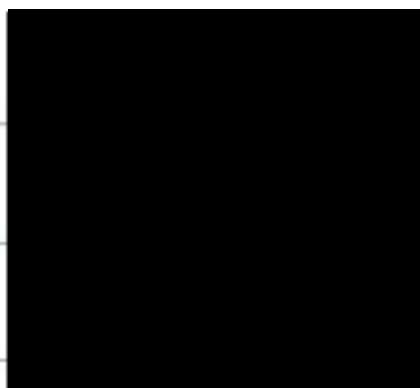
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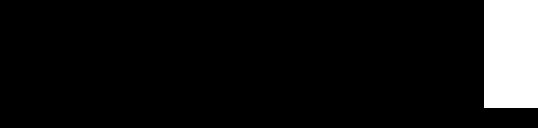
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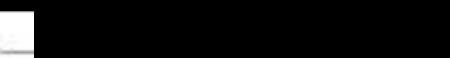
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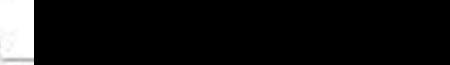
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# **Effects of Lindamood Phoneme Sequencing Program (LiPS) on a Bilingual Student: A Case Study**

**Sarah A. Jurdi**

## **Abstract**

The purpose of this case study was to determine the effectiveness of Lindamood Phoneme Sequencing program (LiPS) on phonemic awareness (PA), reading, and spelling in a bilingual teenager diagnosed with dyslexia, and the extent of effectiveness on each skill. To that end, the researcher compared the student's scores before and after the intervention on a number of standardized achievement tests.

The intervention took place over a period of six weeks. Data was also gathered using the Intermediate-Grade Checklist for Teacher Observation of a Child's Reading Skills before and after the intervention, informal interviews were also conducted with the student's parents and English teacher before and after the intervention, and a journal was utilized to note the student's performance during the observation and intervention sessions. The results showed that the intervention program considerably improved the target skills. There were important gains in the student's phonemic awareness, reading, and spelling scores in the post assessment results, in addition to the feedback obtained from the class observation and the informal interviews. The results also showed that both PA and reading improved at a faster rate than spelling. Implications for teaching phonemic awareness and recommendations for future research are outlined.

**Keywords:** Dyslexia, Phonemic Awareness, Reading, Spelling, Lindamood Phoneme Sequencing program (LiPS), Woodcock-Johnson (WJ III) Tests of Achievement.

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# **Chapter One**

## **Introduction**

The gift of reading and spelling is necessary in today's life. Reading and spelling abilities are indispensable to progress in school subject areas and they are the base for all educational learning. Reading and spelling are vital components for an individual to function independently at school and to transmit these abilities to one's life and jobs (Harwell, 2001). However, not all humans are endowed with such a blessing. Some students could have good social skills and average or above average grades in academic subjects, such as math or science; however, when it comes to spelling or reading tasks, these students will struggle in the classroom. They might hesitate, guess words, or try to sound out the words (Hudson, High, & Al Otaiba, 2007). They might even develop fear of having to read in front of their peers, or they will probably be discouraged to read or spell in front of others at all. These students are sometimes labeled as stupid, underachievers, or lazy. On the contrary, these individuals are smart. They have an average or above average IQ. Extensive research has been carried out in the area of neurology. It has been proved that the brain of individuals with dyslexia is normally developed; nevertheless, without specialized training and instruction during reading and spelling tasks, their brain does not function in the same way as normally developing readers. This difficulty is a result of an imperfect wiring in the brain which results in dyslexia. It causes the student to have trouble in learning to read and spell words (Uhry & Clark, 2005).

Awareness on specific learning disabilities has been increasing among schools and parents in Lebanon, especially during the last decade. Among the most prevalent learning difficulties that one being focused on nowadays, is dyslexia. Consequently, special educators have focused their attention to finding the appropriate intervention for the remediation of its symptoms.

Dyslexia is a specific learning disability which is neurologically based (Birsh, 2005). “It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities” (Uhry & Clark, 2005, p. 26). This difficulty results from a deficit in phonological awareness, which includes the understanding and the capability to differentiate sounds within words, in addition to the capacity to associate sounds/phonemes to their symbols and transmit these aptitudes to verbal, encoding, and decoding tasks (Harwell, 2001). Dyslexia is a lifelong condition; however, its symptoms can be remediated if the student is provided with a research-based remedial program or method (Harwell, 2001). Fortunately, nowadays it is easy for a teacher to find out if a student has dyslexia, by mainly referring the student for a psycho-educational assessment.

Dyslexia is the most common learning disability. Eighty percent of students with LD have a difficulty in the areas of reading and spelling. One out of five students is likely to have dyslexia (Harwell, 2001). Originally, it was assumed that dyslexia is evident in boys more than girls, but more recent studies have confirmed that as many males as females are affected by dyslexia (Hudson et al., 2007).

Much research has been conducted on dyslexia in order to find the appropriate intervention to remediate its symptoms. Studies have revealed that students with dyslexia show significant improvement after receiving remediation in a research-based intervention program delivered in a systematic, explicit, and intensive manner. Many intervention programs have been developed that provide instruction in phonemic awareness (Harwell, 2001). Researchers in the field are striving to study the effectiveness of remedial reading and spelling programs in order to help students with dyslexia succeed in school and life.

## **Purpose and Rationale**

In Lebanon there is increasing awareness about dyslexia. This issue is exhibited by the increasing number of graduates in special education, the usage of remedial programs in schools

and private clinics, and the availability of a number of professional educational psychologists to assess referred students. Thus, it is expected that the number of students with dyslexia to be on the rise (A. Oueini, personal communication, March 4, 2012). As mentioned earlier, one out of five students is likely to have dyslexia, which means that a teacher might have at least one student with dyslexia in her/his classroom. Hence, it is imperative for educators in general and special educators in particular to familiarize themselves with effective research-based interventions that remediate the symptom of dyslexia in order to allow the students to be independent in age given tasks. The purpose of this case study was to remediate phonemic awareness in a bilingual ninth grader who attends a special education classroom (exclusive setting) in an urban school in Beirut.

Much research studies have revealed that phonemic awareness is a fundamental component and a main predictor of decoding ability (Harwell, 2001). Reading fluency is a necessary component of good comprehension (Polloway, Patton, & Serna, 2005). Hence, decoding ability is imperative since reading to get meaning is the essence of reading. However, reading ability does not grow naturally. For some students it comes naturally wired in their brains, others need and are reliant on quality instruction to develop it. Thus, it is necessary for educators to make good judgment on about what intervention program to choose for students with dyslexia and how to teach it (Birsh, 2005). Lindamood Phoneme Sequencing program (LiPS) has flourished in Lebanon in the last five years. Many studies have been conducted on the effectiveness of LiPS in remediating phonemic awareness. For that purpose, a neuropsychologist was invited to Lebanon to train special educators on the program. However, it is still a dilemma for most special educators whether LiPS improves more spelling or reading abilities or vice versa, or if these skills get remediated at the same rate. Most importantly, special educators often reveal a great concern whether LiPS is effective for bilingual students as it is effective for native speakers. Therefore, it was imperative to study the impact of its

effectiveness on phonemic awareness, reading, and spelling on a bilingual student. The researcher intended to examine the effectiveness of Lindamood Phoneme Sequencing program (LiPS) on phonemic awareness, spelling, and reading in a bilingual teenager diagnosed with dyslexia in order to explore the possibility of LiPS if it is effective for bilingual students and whether it would prove to be more effective in one area more than the other.

Realizing the significance of phonemic awareness (PA) as a core fundamental cause of dyslexia, several intervention programs have been developed in the last decade that address PA (Pokorni et al., 2004). Many researchers have documented the effectiveness of LiPS in relation to other intervention programs that focus on phonemic awareness where significant improvement in phonemic awareness skills was made by students who received remediation in the LiPS program (McIntyre, Protz, & McQuarrie, 2008). Therefore, the intervention program that was used in this case study was LiPS. The results of this study enabled the researcher to test if this program improved the student's phonemic awareness, reading, and spelling skills.

The following questions were explored:

1. Does a research-based intervention, namely, Lindamood Phoneme Sequencing program (LiPS) to a bilingual student with dyslexia help increase PA, spelling, and reading skills?
2. What were the main changes observed after the intervention period, do PA, spelling, and reading improve at the same rate?

## **Hypothesis**

It was hypothesized that using LiPS as an intervention program improves PA, reading, and spelling skills for this bilingual ninth grader. There was an assumption that there will be a significant improvement in the student's scoring in these areas in the psycho-educational assessment after discontinuing the intervention. It was expected that the students PA, reading, and spelling scores in the psycho-educational assessment will improve at least one standard

deviation. There was also an assumption that there will be a slight more improvement in the student's PA and reading scores than spelling as evident from research studies conducted on the effectiveness of LiPS, and studies on the nature of spelling complexity.

### **Operational Definition**

The definition of dyslexia was published in 2002, which was a product of a collaboration involving the International Dyslexia Association (IDA) and the National Institute of Child Health and Human Development (NICHD) (Uhry & Clark, 2005). Uhry & Clark (2005) provide the definition of dyslexia, which states that dyslexia is a specific learning disability that is neurological 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 (p. 26).

Hence, viewed in that realm, individuals with dyslexia are intelligent individuals, with an IQ of average to above average, but they have a difficulty in decoding and/or encoding words (Uhry & Clark, 2005).

Phonological processing is the ability of an individual to recognize, segment, or manipulate sounds in words (Pokorni et al., 2004). Phonological awareness is essential to reading skills attainment (McIntyre et al., 2008).

Lindamood Phoneme Sequencing program (LiPS) is a remedial research-based program that stimulates phonemic awareness. LiPS improves "efficient and accurate word decoding and encoding" (Hudson et al., 2007, p. 507).

## **Literature Review**

My literature review was divided into three general parts:

- Dyslexia: definition, history and prevalence, causes, prognosis
- Phonemic awareness: studies on the relationship between phonemic awareness and dyslexia, studies that worked on remediating phonemic awareness to remediate dyslexia
- Lindamood Phoneme Sequencing program (LiPS): studies on the effectiveness of the program in remediating dyslexia

In an attempt to provide support for my hypothesis, the work of two pioneers in the field of phonological awareness research: Elkonin and Liberman were cited. Also, the work of other prominent researchers like Bryant and Bradley were referred to.

The researcher intended to shed light on the studies that used LiPS as a remedial program for improving reading and spelling abilities through intensive training in phonological awareness. Studies on the effectiveness of LiPS were discussed; mainly the work of Torgesen, J. K. et al., McIntyre, L. et al., and Pokorni, J. L. et al. The bulk of the research was taken from American and British journals and books; such as the Journal of Child Psychology and Psychiatry, Neuropsychological Rehabilitation, Annals of Dyslexia, Developmental Disability Bulletin, and Dyslexia Theory and Practice of Instruction.

## **Methodology**

Design. In this intrinsic case study, A-B-A single-subject design was used to study changes in PA, reading, and spelling of a bilingual student with dyslexia who was exposed to a remedial program.

Participants. The main participant was a fourteen-year old (ninth grader) girl diagnosed with dyslexia, who is referred to as Nour. Nour is a Lebanese student who lives with her family, consisting of her parents and her younger brother. Nour attends an inclusive school that

contains both mainstream and special classes. Nour attends a special ninth grade class. She receives all the subjects in the resource room (special classes) in a small group setting, tutored by special educators. However, Nour has never received instruction in a remedial spelling and reading program. Nour has been assessed twice by the same educational psychologist. The first assessment was conducted in April 2008 and a recent one was conducted in May 2012. Nour was diagnosed with dyslexia in both reports.

Consent has been given by both Nour's parents and the staff at the school, in conformity with the standard procedure for ethical guideline.

Instrumentation: Nour was assessed immediately before and after the intervention period. Test of Nonverbal Intelligence, 3<sup>rd</sup> Edition (TONI-3) and 4th Edition (TONI-4), Woodcock-Johnson (WJ III) Tests of Achievement, and Woodcock-Johnson (WJ III) Tests of Cognitive Abilities were used as means to identify the areas of difficulty that Nour exhibits in the 2008 and 2012 psycho-educational reports that were conducted before the intervention took place. Nour was re-assessed immediately after finishing the intervention period to measure her progress on Letter-Word Identification, Sound Awareness, Word Attack, and Spelling subsets of the Woodcock-Johnson (WJ III) Tests of Achievement.

During the first assessment (2008), TONI-3 was used as the fourth edition (TONI-4) was not yet published. TONI-4 is a nationally representative tool that assesses a person's intelligence, abstract reasoning, ability, and problem-solving capability. It is the latest version of the instrument. TONI-4 does not require language. The student is not asked to read, write, talk, or listen during the test. The tool is designed for individuals between the ages of 6 and 89. The assessment contains 60 entries which are individually administered. All the items are abstract such as; void of images or cultural figures and signs. Therefore, learning, practical, or cultural conditions will not negatively influence the assessment's end results. The entire items are set in an easy to difficult organization (Brown, Sherbenou, & Johnsen, 2010). Every item

consists of one or more element of the following eight features: “shape, position, direction, rotation, contiguity, shading, size and/or movement” (Brown et al., 2010, p. 2).

Woodcock-Johnson III (WJ III) includes two batteries: “the Tests of Cognitive Abilities and the Tests of Achievement” (Mather, Wendling, & Woodcock, 2001, p. 3). Both batteries include tests that are individually administered. The tests are intended to assess the student’s “general intellectual ability (g), specific cognitive abilities, predicted achievement, oral language, and achievement across a wide age range” (Mather et al., 2001, p. 3). This tool is designed for individuals between 2-95 years of age (Mather et al., 2001). WJ III (ACH) is an extended and modified edition of the assessment. It contains 22 tests which are structured in five main areas: “reading, mathematics, written language, knowledge, and oral language” (Mather et al., 2001, p. 3). As regarding reading, the researcher focused on the measures of Letter-Word Identification, and Word Attack. Letter-Word Identification assesses a feature of decoding and demands the student to recognize and state single letters and isolated words. Word Attack evaluates phonological and orthographic knowledge. It necessitates the student to pronounce non-words which follow the spelling rules of the English language. As regarding phonemic awareness, the researcher focused on the measure of Sound Awareness (Mather et al., 2001). Sound Awareness assesses four features of phonological awareness: “rhyming, deletion, substitution, and reversal” (Mather et al., 2001, p. 70). It requires the student to analyze sounds and manipulate them. As regarding written language, the researcher focused on the test of spelling, which assesses the student’s ability to spell the accurate spelling of dictated words (Mather et al., 2001).

An informal and semi-structured interview was conducted with Nour’s parents in order to gather information about Nour’s difficulties and what intervention has been previously done.

An informal and semi-structured interview was also conducted with Nour's English teacher regarding Nour's performance in spelling and reading and if she receives any accommodation or modification in those areas.

Nour was observed in class regarding her performance in spelling and reading tasks. Lastly, a journal was used to note down Nour's performance during the observation and intervention sessions. The researcher utilized the journal in order to document Nour's performance in class during reading sessions and in tasks that required her to spell words. Nour's performance during the LiPS sessions was also highlighted.

## **Procedures**

Baseline: The researcher gathered information about Nour's difficulties in spelling and reading through her recent psycho-educational assessment. Additionally, the researcher was able to collect information about Nour's difficulties, her performance in spelling and reading, whether she received training before, and if she received any accommodation or modification in those areas. The researcher was able to obtain these information through informal and semi-structured interviews conducted with Nour's English teacher at school and Nour's parents.

Furthermore, Nour was observed for 15 minutes, five times a week, for one week. The observation took place at different times of the day in order to find out Nour's performance in spelling and reading tasks. The main setting where the observation took place was in Nour's classroom during the English sessions. The observer used the Intermediate-Grade Checklist for Teacher Observation of a Child's Reading Skills to observe and record Nour's ability in phonic and morphemic analysis, in addition to her ability in using context clues to read unknown words.

Intervention: After one week of gathering information regarding Nour's current functioning in the areas of PA, spelling, and reading (the baseline phase), a transition was made to the intervention stage. The researcher used the Lindamood Phoneme Sequencing program (LiPS)

during this phase. The intervention took place two times a day, five times a week, on a one-on-one basis in a private room, without distractions. Each session lasted around 50 minutes. The LiPS program targeted the following skills: accurate articulation of consonant and vowel sounds, in addition to the accurate identification of the mouth movements that take place when pronouncing the sounds, tracking of single sounds using colored blocks and mouth pictures, reading and writing simple and complex nonsense and real words using colored blocks and then followed by letter tiles and pencil writing. Implementation of the LiPS intervention took place for a period of 6 weeks.

Follow-Up: Two days after discontinuing the intervention, Nour's progress was measured using a psycho-educational reassessment on the subtests of: Letter-Word Identification, Word Attack, Sound Awareness, and Spelling. These tests are parallel to the ones administered in the baseline phase. Besides, Nour was observed in the English sessions for 15 minutes, five times a week for one week in order to get further feedback on her progress in reading and spelling tasks using the Intermediate-Grade Checklist for Teacher Observation of a Child's Reading Skills. Furthermore, informal interviews were conducted with Nour's parents and English teacher in order to obtain more detail on their feedback.

## **Data Analysis**

This chapter explicitly described Nour's ability in phonemic awareness, reading, and spelling as depicted in her psycho-educational assessment before the intervention (baseline phase) and after the intervention has ended (follow-up phase). A detailed description of the class observation, parents' interview, and English teacher's interview during the baseline phase and the change of performance during the intervention stage were presented. Tables that illustrate Nour's performance during the baseline and follow-up phases were as well presented. Moreover, an analysis of the documented data in the journal was also provided.

## **Assumptions**

It was expected that Nour's phonemic awareness, spelling, and reading skills will increase from the pre-intervention phase, and will be maintained after stopping the intervention. It was as well expected that there will be a discrepancy in the improvement regarding spelling and reading skills after the intervention has ended.

## **Chapter Two**

### **Review of Literature**

According to previously conducted research, there is a general consensus that students with dyslexia have difficulties learning to read and spell. These difficulties are due to a deficit in phonological awareness, which involves the understanding and the capability to differentiate sounds/phonemes within words, in addition to the capacity to associate them to their symbols and transmit them to verbal, encoding, and decoding tasks (Harwell, 2001). This chapter provides a synthesis of the recent available research on dyslexia. The articles include various experimental research and case studies. The first part of the literature review included the definition, history, prevalence, causes, and prognosis of dyslexia. The second part of the literature review included studies on the relationship between phonemic awareness and dyslexia. Studies that worked on remediating phonemic awareness to remediate dyslexia were also discussed. The last part of the literature review focused on Lindamood Phoneme Sequencing program (LiPS), as well as on studies that focused on LiPS to remediate phonemic awareness in students with dyslexia.

#### **Dyslexia**

Dyslexia is a term that refers to specific difficulty in word reading and spelling, and a result of a deficit in phonological awareness. Dyslexia is neurologically based in children who have adequate cognitive functioning (Lyon, Shaywitz, & Shaywitz, 2003).

#### **History & Prevalence**

The word dyslexia was initially utilized by the German ophthalmologist, Rudolf Berlin, in the year 1887. It originated from the Greek *dys*, which means difficult, and *lexicos*, which means concerning words. Theories on the origin of dyslexia have transformed over time (Uhry

& Clark, 2005). A Scottish ophthalmologist, James Hinshelwood, was the first to provide scientific studies on children who had difficulty reading. Hinshelwood assumed that reading difficulty is a result of either a brain defect or a consequence of birth injuries to the brain. He called reading disorders as “congenital word blindness” because he believed that these individuals have deficits in the left hemisphere of their brain, specifically in the areas responsible for storing visual memory. These deficits, according to Hinshelwood, impede the children’s ability in remembering the names of letters, as well as the name of words (Hinshelwood, 1917). Samuel Orton, an American neurologist, has also presented scientific work on dyslexia where visual processes were involved as well. Orton asserted that reversals in reading result from difficulties with cerebral supremacy in the beginning phases of reading. He hypothesized that together the left and right visual areas of the brain responsible for receiving input transmit the information received as a mirror image to the visual cortices. He claims that in most individuals, one side of the brain dominates over the other and represses the picture from the less dominant hemisphere. Orton concluded that children with dyslexia view mirror images of words and letters, which he called “strophosymbolia”, or twisted symbols, because they have difficulty inhibiting backward images (Orton, 1928).

It has been verified that dyslexia is not only restricted to reading, but to a definite skill in reading, which is word-reading, or decoding. Philip Gough, in his hypothetical “simple view of reading”, proposed that effective reading comprehension ability relies on two variables are: listening comprehension (comprehending the meaning of verbal language) and decoding (word identification) abilities (Gough & Tunmer, 1986). As such, individuals with reading difficulty could have trouble in either decoding a word, which is the word reading stage, or they could have difficulty comprehending what they have just read (Gough & Tunmer, 1986). Gough’s model has been tested by Hoover by using statistics and records from 900 children (Hoover, 1994). Hoover used the Iowa Test of Basic Skills to assess the children. He examined the result

of the following subsets: listening comprehension, word reading, and reading comprehension to verify Gough's two proposed independent variables to reading comprehension. Hoover discovered that each component is essential but not adequate for reading achievement. He found that dyslexia is a difficulty at the word-reading stage, and it is decoding that causes difficulties in reading comprehension, not listening comprehension (Hoover, 1994).

The definition of dyslexia was brought out in the winter 2002 publication of the International Dyslexia Association (IDA). The definition was a product of the Dyslexia Consensus Project, which involved the International Dyslexia Association (IDA) and the National Institute of Child Health and Human Development (NICHD). The key points of the definition state that dyslexia is a learning difficulty that is specific to word reading and spelling, is neurologically based, and caused by a deficit in phonological awareness. The definition also points out that difficulties in reading comprehension, background information, and vocabulary growth are secondary effects to dyslexia (Uhry & Clark, 2005).

There are several misunderstandings about the nature of dyslexia. Among the most common misinterpretation is that dyslexia is a difficulty in letter or word transpositions; such as (b/d) and (was/saw) (Hudson et al., 2007). There is also a misconception that sentences seem to move around the page for individuals with dyslexia (Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001). In reality, the incidence of reversals in reading and spelling may perhaps or not designate a primary reading difficulty because reversals are universal among both good readers and children with dyslexia in the beginning stages when children learn to decode and spell. Therefore, reversals are not accurate indicators of dyslexia (Hudson et al., 2007).

Dyslexia is inclined to be inherited. Children or siblings of a person with dyslexia have a possibility to have dyslexia than others who come from families of good readers. Family

members of an individual with dyslexia have a 50% probability of having a reading and spelling difficulty (Uhry & Clark, 2005).

Functional Magnetic Resonance Imaging (fMRI) has impacted the research done on dyslexia. The fMRI offers images of several cortical regions' activation throughout various reading tasks (Uhry & Clark, 2005). There are several pathways in the brain for stating sounds of words in the beginning stages of reading, and for instant word recognition during skillful reading. The brain of individuals with dyslexia does not function as normal readers during reading tasks (Uhry & Clark, 2005). According to Pugh et al. (2000), the left hemisphere becomes activated during phonological tasks, such as the decoding of novel words. This system is related to the correct sounding out of words so that they become identified and comprehended. The system is found to be different in individuals with dyslexia than good readers. In fact, individuals with dyslexia recompense by activating other parts of the brain when phonological information is being processed (Pugh et al. 2000). Correct training in phonological awareness does not only provide training in reading skills, it also alters the way in which the brain works during reading tasks (Blachman, Schatschneider, Fletcher, & Clonan, 2003). Shaywitz et al. (2000) explain this change as the ability to "rewire" or "normalize" the brain.

Dyslexia occurs in around 80% of children who are referred for special education (Harwell, 2001). It affects approximately 3-10% of students (Bishop & Snowling, 2004). One out of five students is likely to have a reading and spelling difficulty (Harwell, 2001). It was hypothesized that males are four times more likely to have a reading and spelling difficulty than females. Many studies have been carried out to investigate the proportion of females to males. These studies involved the Connecticut longitudinal Studies, Bowman Gray Medical Center, and the Colorado Reading Project. These projects tested a large number of students inside school areas, rather than figuring the proportion of males to females in samples of

students referred for evaluation. They found out that proportion of males and females to have dyslexia was roughly the same when computing the number of students who had discrepancy between their reading skills and IQ. The proportion of males was hypothesized to be higher than females because males are referred more for assessment because of problems in attention and behavior (Uhry & Clark, 2005).

## **Prognosis**

Although dyslexia is generally regarded as a lifelong condition, there is proof that the symptoms of dyslexia can be ameliorated or overcome with appropriate intervention (Birsh, 2005). Diagnostic instruments are available to identify children at the age of five (Harwell, 2001). Early intervention is vital in the remediation of dyslexia. Direct, systematic, and intensive instruction in phonemic awareness and phonics is essential for students with dyslexia (Birsh, 2005). Imaging studies show changes in the brain's activity prior and post the intervention (Shaywitz et al., 2004). In a study, 10 students with dyslexia and 11 normal readers were imaged prior and post to 28 hours of intervention that solely the children with dyslexia have received. Both groups were measured on out-of-magnet reading tests and on the level of activation during letter-sound identification tasks. Prior to the intervention, students with dyslexia showed major under-activation in the areas of the brain responsible for reading and language during phonological activities as compared to the normal children. After the intervention, the students who received remediation displayed a significant increase in activation in the areas of the brain responsible for reading, whereas the control students displayed no discrepancy between both images (Aylward et al., 2003).

Spelling is considered a difficult task for a good number of students. Sadly, few research studies are carried out on spelling as compared to reading or other academic skills to get insights into the nature of spelling difficulties. A lesser amount of information is known

about spelling ability in the population on the whole than is recognized on reading achievement (The International Dyslexia Association, 2008).

Birsh (2005) states that it is unusual to come across a fine speller who is poor at decoding. It is also unusual for a student with dyslexia who exhibits a difficulty in decoding and not show difficulty in encoding skills. On the other hand, it is likely for a student with dyslexia to be quite fine at decoding, but show difficulty in spelling (Birsh, 2005). Moats (as cited in Birsh, 2005, p. 261) conducted observations on students who have difficulty in spelling. She found that students who read well but spell poorly, have difficulty remembering accurate letter patterns. They also have slight problems with difficult encoding patterns, in addition to problems with the characteristics of the structure of language. However, difficulties in phonological processing are not included in this list of deficits. On the other hand, students who read poorly and spell poorly do have difficulty in phonological awareness, an issue which hinders the mastery of spelling skills. Moats, Oakland, Black, Standford, Nussbaum, & Balise (as cited in Birsh, 2005, p. 261) state that with adequate training, students who spell and read poorly will develop their reading skills, however they hardly ever master encoding. Birsh (2005) affirms that difficulties in spelling seem to continue in adolescents and adults with dyslexia.

Darch (2002) conducted a study to verify that students with LD who have trouble in spelling employ special techniques and strategies than children with no difficulties. The research states that difficulties in spelling appear to be complex to remediate for students with LD. The reason for the difficulty is that the students are less skillful than good spellers in using spelling techniques and research-based strategies that allow for the systematic usage of encoding rules. Darch first conducted a qualitative study by interviewing a little amount of students with LD to understand their way of thinking as they attempt to spell words. The researcher formed a hypothesis from the data collected to be utilized in a quantitative study.

Difficulties in using spelling strategies were discovered in students with LD. Consequently, a quantitative study was conducted, and it consisted of a larger group. The results of the assessments were contrasted statistically to find whether there is a major distinction between the groups, or if it was differences among teaching strategies as in the qualitative study. The outcomes of two spelling programs were contrasted: Spelling Mastery Program, which is a program that trains children to utilize spelling rules; besides the Laidlaw Spelling Program that utilizes writing activities based mainly on word families and motivational activities. The scores showed that spelling ability of students with LD drastically progressed further than the students that were trained in the motivational model. The outcome provides support and recommendation for research-based training and instruction in spelling.

### **Relation between Phonemic Awareness and Dyslexia**

Phonological awareness is a meta-cognitive capability of an individual to concentrate on the structure and appearance of a word than its meaning. It is also the ability to realize that verbal language is comprised of a sequence of sounds or phonemes which take up a specific sequential arrangement (Uhry & Clark, 2005).

Rigorous research has been conducted on phonological awareness due to its apparent link to dyslexia of the other phonological processing skills. D. B. Elkonin and Dr. Alvin Liberman are the two pioneers in the phonemic awareness field. They conducted research on the relationship between phonemic awareness and dyslexia in the 1960s and 1970s (Uhry & Clark, 2005). The first researcher, Elkonin, conducted studies on the training of phonological awareness to indicate its causality in later reading capability. His studies involved the usage of pictures to produce verbal language and a figure of the sound representation of the word in a structured manner. The child was requested to say the word aloud, stretch out the sounds, and say each sound while placing a card-board counter onto each of the squares under the picture. This procedure provided a concrete model of the individual sounds and their order in a word

(Elkonin, 1973). The second researcher, Isabelle Liberman along with her students in the United States at the University of Connecticut, as well as her colleagues at Haskins Laboratories, conducted considerable research on phonological awareness (Uhry & Clark, 2005). Liberman requested children to tap the number of phonemes in a word by means of a wooden rod. She found that no one was able to state the number of sounds correctly at the age of four, only some at the age of five, and nearly everyone at the age of six. Her work also propose that children with dyslexia have poorly developed abilities in representing sounds of words, and that the ability to analyze verbal words predicts later abilities in reading (Liberman, 1973).

Several British researchers have provided evidence of a link between difficulties in phonological awareness and reading difficulties (Uhry & Clark, 2005). Bradley and Bryant (1983) carried out a longitudinal study in England and validated the fundamental causal role of phonemic awareness in the early stages of development and later proficiency in reading. They studied hundreds of children over time and found that pre-readers that had proper phonological awareness abilities turn out to be good readers. Also in this study, Bradley and Bryant provided pre-readers with training in phonological awareness and found that these children had future benefit in reading and spelling abilities more than the control group (Bradley & Bryant, 1983). The results of the early studies were confirmed over time through much researches conducted in the late 1980s and 1990s, funded by the National Institute of Child Health and Human Development (NICHD) and more sources (Uhry & Clark, 2005).

Phonological awareness and phonic skills are known to be fundamental characteristics in learning to read and write words. These two terms are frequently confused. Phonological awareness is relatively different from phonics. Phonics is an association of letters and sounds. In contrast, phonological awareness involves only sounds (Birsh, 2005). Phonology is the capability of an individual to pay attention to a spoken word and be able to analyze its “sound

structure”, as called by the Russian psychologist, D. B. Elkonin (Elkonin, 1973, p. 560). Phonological awareness includes an analysis of language at several stages, for example: words in sentences, syllables in words, onsets and rimes in words “(e.g., /b/-/eak/ in beak and /str/-/etch/ in stretch), single phonemes or sounds in words (e.g., /c/-/a/-/t/ in cat)” (Uhry & Clark, 2005, p. 98). Most importantly, the ability to analyze initials sounds and all phonemes in words are significant in decoding skills. A number of examiners have conducted research on the tasks associated with phonemic awareness (Uhry & Clark, 2005). Adams (1990) lists the phonemic awareness skills in an estimated sequence of difficulty. The first is reactions to rhyme, where children aged three and four can learn by heart nursery rhymes, along with rhyming words. This issue has been confirmed in a British study, where researchers evaluated preschoolers every year till they learned how to read. They found that preschoolers who had the ability to learn nursery rhymes by heart were more skillful in later reading (Maclean, Brayant, & Bradley, 1987). The second task is categorizing or matching by sounds, where children aged four or five are able to match words by means of rhyme. The third activity is segmenting a little part of words, where a child is asked to isolate the initial phoneme in words. It also requires children to blend phonemes into words, where the teacher pronounces the sounds separately and the student blends the phonemes into a word. The forth task is segmenting all the phonemes in words, which requires the students to tap the number of sounds or say them aloud in the correct order of the word. The fifth and final task is phoneme deletion or elision (Adams, 1990).

Training in phonemic awareness does not only contribute to word decoding and encoding (reading and spelling), but also to reading comprehension. In a meta-analysis of ten studies by Linnea Ehri, a member of the Reading National Panel, phonemic awareness training yielded to a positive result in reading comprehension. This issue was a result of an increase in

word decoding through training in phonemic awareness, which helped in the facilitation of reading comprehension (Ehri et al., 2001).

Training in Phonemic awareness started to be a normal part of beginning literacy curriculum during the late 1980s and 1990s. Phonemic awareness became also a basic component of remedial reading and spelling programs for children with dyslexia. The National Reading Panel proposes that training in phonological awareness begins early on, as its results are greatest in the early stages, such as preschool and kindergarten. There is sufficient proof from several studies that early training in phonemic awareness enhances the child's phonemic awareness ability before reading instruction takes place (Uhry & Clark, 2005).

Current studies also successfully confirm that phonological awareness training represents a universal foundation for dyslexia intervention (Joly-Pottuz, Mercier, Leynaud, & Habib, 2008). Phonemic awareness is important for decoding skills in alphabetic writing, as the English language. There is a strong causal relationship between awareness of phonemes and reading, where growth in phonological awareness causes improvement in decoding (Duff & Clarke, 2011).

### **Lindamood Phoneme Sequencing Program and Remediating Dyslexia**

“The Lindamood Phoneme Sequencing (LiPS) Program for Reading, Spelling, and Speech” was developed by the linguistic, Charles Lindamood, and the speech pathologist, Patricia Lindamood (Lindamood & Lindamood, 1998, p. 3). LiPS was initially named the ADD program (Auditory Discrimination in Depth) (Lindamood & Lindamood, 1998, p. 4). It was revised in 1998 and called the Lindamood Phoneme Sequencing (LiPS) program. LiPS is designed for developing readers from preschool to grade 3, or for struggling learners with dyslexia. LiPS is a systematic program which can be employed with kindergarteners to boost the growth of both, the auditory awareness and perceptual understanding of sounds in speech.

It is also a remedial program for children and adults with reading and spelling difficulty (Lindamood & Lindamood, 1998). “Of all the programs for intervention and remediation of reading problems, the LiPS program represents the most intense and thorough training in phonological awareness” (Uhry & Clark, 2005, p. 305). LiPS is based on the “sensory-cognitive” processing belief (Lindamood & Lindamood, 1998, p. 4). The program is planned to improve and develop the efficient and correct reading and spelling of words. The technique used in LiPS is obtained from multisensory methods utilized with speech therapists. LiPS does not relate sounds to letters (phonics) in the beginning phases of the program. Instead, it centers on the “oral-motor activity” that creates sounds, where it associates phonemes or sounds to the movements of the tongue, lips, and teeth that are involved in producing speech sounds (Lindamood & Lindamood, 1998, p. 4). Through the awareness to assimilate “the three senses of hearing, seeing, and feeling” in the task, the program was found to be fundamental in training individuals to develop awareness of speech sounds and auditory conceptual function in order to be independent in the decoding and encoding of words (Lindamood & Lindamood, 1998, p. 4). This takes place when working with individuals in both; developmental or remedial manner (Lindamood & Lindamood, 1998). LiPS trains individuals the required skills to read words, as well as to recognize single phonemes and blends in words (Lindamood & Lindamood, 1998). During the beginning stages of the program, individuals are engaged in activities, such as finding out the actions of the mouth, lips, as well as the tongue that are needed to generate particular sounds. This method utilized in the LiPS program which requests students to state how the sounds feel through their focus on the oral and motor actions as they pronounce them, is the basic element in the effectiveness of the program (Kantrowitz, Underwood, & Wingert, 1999). For instance, the sound /p/ is labeled as a “lip popper” since the lips begin together and then come away from each other (Kantrowitz et al., 1999). This provides students a different way to realize sounds for letter. Student with dyslexia have

difficulty segmenting words, where they cannot discriminate the sounds in words. However, by using the oral-motor features, students are able to discriminate the sounds by focusing on the movements of the mouth as it makes different and separate movements (Kantrowitz et al., 1999). Thus, awareness through the sounds' pronunciation, students are provided with feedback about the sounds said and felt. After students are able to state and label the sounds with their mouths, succeeding practice activities in sequencing, decoding, and encoding employ the oral feature of sounds to recognize and arrange them within words (Lindamood & Lindamood, 1998). LiPS focuses on a meta-cognitive ability and sensory feedback from the senses so that the student can self-correct. This is the distinctive characteristic of the program, which is the practice of the Socratic questioning technique, where instructional responses and comments focus on inquiries that focus on input from the senses (Lindamood & Lindamood, 1998, p. 4).

Much research has been conducted on the effectiveness of LiPS on PA, reading and spelling by several researchers, such as Porkini et al., 2004; Torgesen et al., 1999; and McIntyre et al., 2008.

Porkini et al. (2004) carried out a comparison study on LiPS, Fast ForWord, and Earobics programs to study the efficacy of the three corrective reading programs which assert to develop skills in phonemic awareness. 60 students with language impairment and deficits in reading, seven to nine years of age, were randomly assigned to one of the three intervention programs conducted by a large school district. The students received three, one hour session each day of remediation, throughout 20 days summer program. The researchers studied comparisons of individual students within and between groups. In the first question, if one of the three intervention programs resulted in more improvement in phonemic awareness than the others, the end results showed that students who received training in the LiPS program did a notably better job in the capability to blend sounds than the students who received training in

the other two interventions. For the second question, if participants in individual intervention groups progressed in PA, skills linked to reading, or language, also, considerable improvement in phonemic awareness was made by the students who were trained using the LiPS program.

A comparison study was also carried out by Torgesen et al. (1999) to examine the effectiveness of three intervention programs to a control group. The purpose of the study was to determine the impact of three instruction conditions in preventing reading difficulties in children. The participants were chosen from a group of students considered at- risk for reading difficulty in preschool. The students were given 88 hours of one-on-one training till the end of grade two. The first intervention included the development of phonological awareness and phonics, which is based on the LiPS program. It is referred to as PASP. The Embedded Phonics (EP) program was the second program used in the study, where phonics training took place within exercises in reading and writing. The third instruction took place within the regular classroom curriculum (RCS). It supported regular education. The PASP treatment group which received phonemically explicit instruction had considerably better skills compared to the students in the EP group. Students in the PASP group showed better results in PA; phonemic reading; and on untimed word reading. These students were also better in word level decoding abilities than children in the RCS and NTC group (Torgesen et al., 1999, p. 589).

Another study was conducted to evaluate the efficacy of the LiPS program on phonemic awareness skills of 227 students in a rural school between preschool and grade one. The study included students who were typical achievers and others who were categorized as at-risk for reading difficulty. The researchers intended to find out if phonemic awareness improves after the intervention terminates. The students' results on a preschool screening instrument were measured to their own results on a screening instrument in grade one. The scores indicated that improvement in phonemic awareness and phonics (letter/sound) was made

by all the participants who received training in the LiPS program. In addition, the scores showed that students who were considered at-risk for a difficulty in reading showed more improvement in phonemic awareness and phonics (letter/sound association) in the classrooms where teachers used the LiPS program than other student that were not considered at-risk for reading difficulty (McIntyre et al, 2008).

In brief, as presented above, there is clear-cut evidence that dyslexia is a difficulty in encoding and decoding abilities, which is a result of deficits in phonemic awareness. Individuals with dyslexia require explicit intervention in phonemic awareness that has been evidenced to improve reading and spelling abilities. Much research has been conducted on the effectiveness of the LiPS program in improving phonemic awareness skills, decoding, and encoding skills.

# **Chapter Three**

## **Methodology**

The following chapter explains in detail the methodology used in this study. It consists of the design, participants, settings, materials and resources used, procedure and data analysis.

### **Design**

An intrinsic case study, A-B-A single-subject design, was carried out in order to determine the effectiveness of Lindamood Phoneme Sequencing program (LiPS) intervention in improving phonemic awareness, decoding, and encoding skills in a teenager diagnosed with dyslexia. A qualitative case study was selected to be the appropriate method for responding to the research questions that lead this study. According to Thomas (2003), a case study

typically consists of a description of an entity and the entity's actions. Frequently, case studies also offer explanations of why the entity acts as it does. Entities that are the focus of case studies can be of various sorts, such as individuals, groups, organizations, or events (p. 33).

A qualitative case study provides a thorough, comprehensive explanation, and analysis regarding a particular case, a societal unit, or a particular phenomenon (Merriam, 2001). Merriam (2001) pointed out that descriptive or qualitative case studies are essentially helpful in providing fundamental information regarding a realm of education in which a small number of studies have been carried out. She added that new programs as well as practices are usually the center of case studies in the field of education.

A single-subject design has been purposely selected for this research as it is usually employed to study the transformations in a person's behavior as a treatment or an intervention is being applied on the student (Fraenkel, Wallen, & Hyun, 2012). Tillman & Burns (2009) indicate that the main advantage of utilizing the "A-B-A design is that the statement of change is strengthened with the return to baseline" (p. 40). Hence, the behavior is sustained as the intervention is being discontinued. When A-B-A and A-B designs are being compared, A-B-A design is found to be more suitable because the mere conclusion which can be taken from A-B design is realized when the intervention occurs only. A change in the aimed behavior could be observed or not. Nevertheless, including a third stage, a verification one, permits a second record of an alteration in behavior in a predicted way. As the behavior is sustained after discontinuing the intervention, the researcher's assurance is increased that any alteration in the aimed behavior was not by chance. Still, it should be taken into consideration that the alteration in behavior is not only attributed to the intervention. A replication of the research study ought to be carried out in order to add to the validity of the outcomes (Tillman & Burns, 2009).

In this intrinsic case study, an A-B-A single-subject design was used to study changes in the participant's PA, reading, and spelling abilities after implementing and discontinuing the intervention. An initial baseline phase was designed to collect information about Nour's current PA, decoding, and encoding skills. Nour's current psycho-educational assessment, as discussed in Chapter One, was used to assess the areas of difficulty that Nour exhibited. An informal interview was conducted with Nour's parents in order to gather information about her difficulties and whether she has received intervention before. An informal interview was also conducted with Nour's English teacher to gather information about her performance in reading and spelling and if she receives any accommodation or modification in those areas. Nour was also observed in class to note her performance in spelling and reading tasks. The subsequent phase was the intervention one which took place during six weeks. During the intervention

stage, the researcher implemented the LiPS program with Nour in a two 50 minute sessions per day, five days a week. Finally, two days after discontinuing the intervention, a follow-up phase was conducted to measure the changes in Nour's PA, decoding, and encoding skills. Parallel tools of the psycho-educational assessment used in the baseline phase were used in this phase. It included the same phonemic awareness, reading, and spelling subsets of the Woodcock-Johnson (WJ III) Tests of Achievement.

## **Participants**

The main participant in this case study was Nour (pseudonym). Nour is a 14 year old girl who attended grade nine in an integrated private school in Beirut. Nour is a bilingual student. She received her education in all the subject areas in a self-contained class, in a small group setting, tutored by special educators. However, Nour does not receive remedial training in a reading and spelling program.

Nour was selected because she fitted the criteria for eligibility to participate in this study: The criteria were as follows (a) Nour has been diagnosed with an alarming profile of dyslexia; (b) Nour displays weaknesses in PA, decoding, and encoding skills; (c) Nour has not received training in the LiPS program or any other remedial reading and spelling programs.

Nour displayed difficulties in phonemic awareness skills during her early childhood, as well as troubles in reading and spelling abilities since her early grades. However, neither her parents nor her teachers at her previous school have suspected that her difficulties were due to a neurobiological difficulty and they did not realize the need to refer her for a psycho-educational assessment. Nour's teachers at her previous school have finally referred her for a psycho-educational evaluation in 2008, when Nour was in grade 5, as she was far behind her peers in reading and spelling tasks.

Nour has undergone two psycho-educational evaluations since then, conducted by the same psycho-educational therapist. The first assessment was conducted in April 2008. Nour was in grade 5.8. She was referred for assessment because of difficulties in spelling and reading. The assessment consisted of Test of Nonverbal Intelligence, 3<sup>rd</sup> Edition (TONI-3), Woodcock-Johnson (WJ III) Tests of Cognitive Abilities, and Woodcock-Johnson (WJ III) Tests of Achievement. The purpose of this assessment was to identify Nour's strengths and weaknesses and make the proper recommendations. During the assessment, Nour appeared comfortable and calm, though she frequently seemed distracted. Nour occasionally answered too fast to test questions. She sometimes gave up quickly after trying complicated tasks. Nour was diagnosed with dyslexia. Her overall intellectual ability when measured by the WJ III GIA (general intellectual ability) was in the average range. Nour's standard scores were the following for the Spelling, Word Attack, and Letter-Word Identification subsets: Spelling 62, equivalent to grade 1.7, Word Attack 74, equivalent to grade 1.7, Letter-Word Identification 73, equivalent to grade 2.4. Nour's report included notable recommendations to remediate her difficulties; however, the teachers at Nour's previous school were not trained in providing Nour with the needed intervention. Nour changed her school in 2011-2012 to a private school that includes a special education department, which is Nour's current school.

The second and the more recent assessment was conducted in 11 May 2012. Nour was referred for re-assessment to measure her progress since the last evaluation conducted in April 2008. During this assessment, Test of Nonverbal Intelligence, 4<sup>th</sup> Edition (TONI-4), Woodcock-Johnson (WJ III) Tests of Cognitive Abilities, and Woodcock-Johnson (WJ III) Tests of Achievement were administered. TONI-4 is a nationally representative tool that assesses a person's intelligence, abstract reasoning, ability, and problem-solving capability. It is the latest version of the instrument. TONI-4 does not require language. The student is not asked to read, write, talk, or listen during the test. The tool is designed for individuals between

the ages of 6 and 89. The assessment contains 60 entries which are individually administered. All the items are abstract such as; void of images or cultural figures and signs. Therefore, learning, practical, or cultural conditions will not negatively influence the assessment's end results. The entire items are set in an easy to difficult organization (Brown et al., 2010). Every item consists of one or more element of the following eight features: "shape, position, direction, rotation, contiguity, shading, size and/or movement" (Brown et al., 2010, p. 2).

Nour's performance in TONI-4 was in the average range, Age Equivalent: 14-6, Deviation Quotient: 102. Woodcock-Johnson III (WJ III) includes two batteries: "the Tests of Cognitive Abilities and the Tests of Achievement" (Mather et al., 2001, p. 3). Both batteries include tests that are individually administered. The tests are intended to assess the student's "general intellectual ability (g), specific cognitive abilities, predicted achievement, oral language, and achievement across a wide age range" (Mather et al., 2001, p. 3). This tool is designed for individuals between 2-95 years of age (Mather et al., 2001). WJ III (ACH) is an extended and modified edition of the assessment. It contains 22 tests which are structured in five main areas: "reading, mathematics, written language, knowledge, and oral language" (Mather et al., 2001, p. 3). As regarding reading, the researcher focused on the measures of Letter-Word Identification and Word Attack. Letter-Word Identification assesses a feature of decoding and demands the student to recognize and state single letters and isolated words. Word Attack evaluates phonological and orthographic knowledge. It necessitates the student to pronounce nonwords which follow the spelling rules of the English language. As regarding PA, the researcher focused on the measure of Sound Awareness. Sound Awareness assesses four features of phonological awareness, which include: rhyming activities, removing sounds, replacing sounds, and reversing phonemes. It requires the student to analyze sounds and manipulate them. As regarding written language, the researcher focused on the test of spelling, which assesses the student's ability to spell the accurate spelling of dictated words (Mather et

al., 2001). Nour's standard score in Word Attack skills is 76, equivalent to grade 2.4. Thus, her ability to pronounce nonwords is very limited. Nour's standard score in Sound Awareness skills is 83, equivalent to grade 4.2. Thus, she falls within the low average range. Nour's standard score in Letter-Word Identification skills is 86, equivalent to grade 4.9. She also falls within the low average range. Nour's standard score in the Spelling subset is 76, equivalent to grade 3.4. She falls in the very low average range.

In the above mentioned results, there is a general agreement that Nour has difficulties in her phonemic awareness, reading, and spelling skills, given the discrepancy between her IQ and the scores on the PA, reading, and spelling subsets. Moreover, Nour falls 7 grades behind her grade level in Word Attack skills, 5 grade levels in Sound Awareness, 4 grade levels in letter-Word Identification, and 6 grade levels in Spelling.

## **Materials and Instrumentation**

### **Lindamood Phoneme Sequencing Program**

The LiPS program focuses on developing and improving phonemic awareness and builds a solid foundation for correct decoding and encoding abilities. In an attempt to develop phonemic awareness, the program is centered on the capability of recognizing and classifying single phonemes and identifying their order in words. This ability in sound awareness lies beneath the individual's capability to self-correct in word identification and word attack, in addition to a proficiency in encoding skills (Lindamood & Lindamood, 1998). In the initial phase of the program, the individual is trained in pronouncing the sounds. This phase focused on the oral-motor action which produces phonemes (mouth movement). During this stage, the individual consciously integrates "the three senses of hearing, seeing, and feeling in the task" (Lindamood & Lindamood, 1998, p. 6). The capability of feeling the sounds and recognizing the difference between them while articulating them helps in the growth of sound

awareness through the feedback from the three senses (Lindamood & Lindamood, 1998). The program develops from single sounds to series of phonemes in non-words, and then to series of phonemes in actual words. LiPS focuses on creating the climate for training in the initial stage. This issue entails assisting the individuals to realize the method and procedure in learning, a matter that will motivate the learner to be dynamic and completely engaged throughout the stages. This stage highlights that the student is held responsible to think with her/his eye, ear, and mouth; thus the sensory feedback. This phase also makes the student aware that the trainer will ask questions to help her/him feel and think of the sounds rather than giving instructions to be learned by rote memory. In the second stage, the student classifies phonemes based on the resemblance and dissimilarity in the sounds' production (Lindamood & Lindamood, 1998). During this stage, students are trained to utilize information from the senses: ear, eye, and mouth, in order to identify individual consonant and vowel sounds, classify, and label them. The students learn to link the sound they say, the manifestation of the mouth movement, as well as the physical feeling of producing the sound. In the third stage, the students track phonemes in sequence of letters for the spelling of words and in sequence of sounds for the reading of words. At this stage, the students are trained in tracking sounds with tangible objects; such as mouth pictures or colored blocks before connecting the sounds with letters to encode and decode words. In the fourth stage, students are involved in associating phonemes to letters in encoding and decoding words with simple syllable words then multi-syllable ones. The fifth and final stage is self-correction in speech sounds, encoding, and decoding activities. During this stage, the student is well prepared from the previous stages to begin with the spelling and reading of non-sense and real words using letter tiles and pencil writing (Lindamood & Lindamood, 1998).

## **Lindamood Phoneme Sequencing Program Journal**

The researcher took notes of the student's performance during each LiPS session and after it. Keeping a journal allowed the researcher to monitor Nour's progress and document her responses whenever she had difficulty.

## **Procedures**

The current study was performed by abiding by the ethical principles proposed by the Council for Exceptional Children (CEC) (Rumrill & Cook, 2001). Before beginning the study, the researcher carried out a formal meeting with the student's parents, coordinator of the special education department at the school, and a special educator (Nour's English teacher). The reason of the meeting was to present the parents and special educators with the rationale of the study, along with an explanation of the process. The parents were notified about the advantages of the intervention. They were also given the choice to withdraw their daughter from the study whenever they wanted, regardless of the reason. After carrying out the meeting, the researcher requested the parents to sign an informed consent (see Appendix I). The issue of confidentiality was taken into consideration, where the researcher utilized a pseudo-name (Nour) while referring to the student so she remains unidentifiable.

## **Baseline**

Before starting the intervention, a short meeting was carried out with Nour's parents so as to provide them with information regarding the intervention, mainly what it consists of. In addition, the informal and semi-structured interview was conducted with Nour's parents in order to gather information about her difficulties and what intervention has been previously done. After obtaining their permission, a new psycho-educational assessment was conducted to identify the areas of difficulties that Nour exhibits. Additionally, an informal and semi-

structured interview was conducted with Nour's English teacher to gather information about her performance in spelling and reading, and if she received any accommodation or modification in those areas.

During the baseline stage, Nour was observed for 15 minutes, five times a week for one week. The observation took place at different times of the day in order to find out her performance in spelling and reading tasks. The main setting where the observation took place was in Nour's classroom during the English sessions. The observer used the Intermediate-Grade Checklist for Teacher Observation of a Child's Reading Skills to observe and record Nour's ability in phonic and morphemic analysis, in addition to her ability in using context clues to read unknown words.

## **Intervention**

The researcher used one type of intervention in this study, which is the Lindamood Phoneme Sequencing program (LiPS). The examiner provided training in phonemic awareness, reading, and spelling to Nour for a period of 6 weeks. The LiPS program targeted the following skills: proper articulation of consonant and vowel sounds, coupled with accurate identification of the mouth movements that take place when pronouncing the sounds, tracking of single sounds using colored blocks and mouth pictures, reading and writing nonsense words using colored blocks and then followed by letter tiles and pencil writing. Implementation of the LiPS program usually took place two times a day, five times a week, on a one-on-one basis in a private room, without distractions. Each session lasted around 50 minutes. The teacher introduced the sound first, and then the student repeated it and stated what worked in her mouth as she pronounced it. The student would then find the "brother" for consonant sounds; based on the similarity of the mouth movement. As for vowels, the student stated the sounds and discriminated between them based on the position of the tongue. The student then gave

labels for the sounds and found the mouth pictures that resemble the mouth movement as the sound is being pronounced. At the beginning of each session, the researcher would go over the sounds learned in the previous session to make sure Nour has mastered them. The examiner kept a journal during the LiPS sessions in order to document Nour's performance, mainly if she had difficulty in pronouncing the sounds or in describing her mouth movements as she stated the sounds. The journal was particularly needed during the tracking, reading, and spelling stages.

## **Follow-Up**

Two days after completing the intervention, Nour's progress was measured using a psycho-educational re-assessment using the same tools utilized in the baseline phase.

## **Data Analysis**

A thorough description of Nour's ability in spelling and reading as depicted in her psycho-educational assessment during the baseline phase was documented. A detailed description of the observation and informal interviews with the parents and English teacher were also documented. Based on the gathered information, the target skills which required remediation were documented. The intervention was implemented after that for a period of six weeks. The examiner utilized a journal to document Nour's performance during the intervention stage. At last, after discontinuing the intervention, a re-assessment in tests parallel to the ones conducted in the baseline stage were implemented. The discrepancy in the scores pre and post the intervention was documented. In addition, visual illustration was offered so as to compare Nour's performance before and after the intervention. An analysis and synthesis of both the journal and assessment data was discussed. Finally, the results obtained from the performed observations and informal interviews with the parents and English teacher were provided in a summary.

This chapter has provided the design used, participants, materials and instruments, settings, procedure, and data analysis procedure. The data analysis and end results inferred from this study will be discussed in the subsequent chapter.

## **Chapter Four**

### **Results**

The current study aimed at examining the effectiveness of an intervention program in improving phonemic awareness, reading, and spelling abilities in a bilingual teenager with dyslexia. The intervention consisted of the Lindamood Phoneme Sequencing program (LiPS). The main purpose of this study was to find out the effectiveness of the intervention program in this particular teenager with dyslexia. The second purpose was to identify the major changes observed after the intervention stage. Data associated with the changes observed throughout the intervention phase were collected from journals written by the researcher. The data during the baseline and follow-up stages were collected using the Woodcock-Johnson (WJ III) Tests of Achievement and the Intermediate-Grade Checklist for Teacher Observation of a Child's Reading Skills. The current chapter presents the results of the data analysis.

#### **Changes Observed During LiPS Sessions**

The researcher met with Nour twice a day, five times a week, for a six week period to provide training in the LiPS program. The intervention sessions took place on a one-on-one basis, in a private room. According to the data collected from the journal, Nour was very cooperative throughout the LiPS sessions. She was a bit shy during the first two sessions. However, starting from the third meeting forward, Nour became more relaxed and at ease in both, relating to the researcher and her remediation program.

The following procedure is adapted from the LiPS manual (Lindamood & Lindamood, 1998).

## **Setting the Climate for Learning**

During the first session, the researcher introduced the first step of the program, which is Setting the Climate. This step was fundamental as it helped Nour recognize what she and the researcher will do throughout the sessions. It also made her aware of the reasons for receiving the training and how they will engage during the training sessions. In Setting the Climate, the researcher and Nour drew a profile of somebody learning. The head was the center of attention in the picture, particularly the regions of the brain which are held responsible for learning. The researcher discussed with Nour that the brain obtains information via the senses. They drew an eye, ear, hand, and mouth in the brain picture to demonstrate the organs that will be used in the program to transmit senses to the brain. Thus, the visual sense is obtained through the eyes, the hearing sense via the ear, and the sensory-motor sense by means of the mouth and hand. Nour was aware that she will be trained to see, feel sounds, and hear them. The researcher made sure that Nour grasped that by the “feeling” aspect, she will sense her muscles move and her skin touching things. The examiner told Nour that this is called the “sensory-motor” area. Nour acknowledged that neither guessing nor having information memorized will take place at all during her training. On the contrary, Nour will be actively involved in the training process. This issue took place through asking her directed questions where Nour had to find by getting the information from her senses. Nour displayed her astonishment at the end of the first meeting as she will be somehow in charge over the training course, and that learning will not be as ordinary sessions; mainly the teacher saying information and students responding to them. Nour reflected that reading and spelling were going to be greatly easier as the training will provide her a check system as she reads and spells. Thus, she will be capable of figuring out the words and discovering her own mistakes.

So far, Nour understood that she would make use of her brain and senses in order to be engaged in the learning process. The researcher performed few sensory-awareness exercises so as to take away any mislead idea that Nour might have had. The examiner commenced with the sound /p/. Nour was asked to repeat the sound after the researcher, feel how her mouth moved as she was saying the sound, and notice what part of the mouth worked as the sound was pronounced. The examiner proceeded with two additional activities. Nour was asked questions in the process, which was the manner employed in the program to assist students in feeling everything themselves. Meanwhile, it was clearly comprehensible for Nour that she will employ all those regions of her brain during the sessions in order to listen to the phonemes, look at the letters, feel how the sounds are made in her mouth, and lastly talk about what she noticed.

## **Overview**

Nour was guided in consciously experiencing the articulation of the sounds and in realizing the unique oral-motor aspect of every sound. She was also helped in comprehending the relationships and differences among phonemes, since contrast helps perception. The examiner drew Nour's attention that no two phonemes are precisely the same; yet significant relationships are present among them. Speech sounds were described and organized on the foundation of similarity and dissimilarity in the sounds' "oral-motor" characteristics.

The researcher's choice of words has been very critical throughout the sessions, and not spontaneous. For instance, instead of saying "Listen to this sound," the examiner used the phrase "What do you feel your mouth doing?"... "Check this sound" ... "Watch this sound" (p. 35). Thus, the researcher made sure to use the exact words provided in the manual with the aim of allowing the training to be a multisensory experience for Nour as possible.

During the intervention, the researcher introduced the 24 consonant and 15 vowel sounds that are included in the English language. Nour was asked to feel and describe her mouth movement(s) as she articulated each sound. The examiner's role was to stimulate Nour's sensory processing through questioning by means of choice and contrast. The sounds were categorized into groups according to their features. The 24 consonant sounds were organized into 11 groups and the 15 vowel sounds were arranged into 4 groups. Each group was represented with mouth pictures and labeled according to their features. The labels were general names for the technical terms that linguistics uses to categorize phonemes. The reasons of labeling the phonemes resided in crystallizing their significant motor aspects and in helping Nour visualize her own feelings. This issue allowed the examiner and Nour to accurately converse about the phonemes and their position in words, so as to aid in tracking the identity and sequence of phonemes in syllables which Nour was going to work with in a later stage. Tracking sounds was the connection that linked each stage together till reaching the ultimate aim of the program, which was proficiency in decoding and encoding. Feeling phonemes followed by hearing them within words helped Nour correct her mistakes in reading and spelling instead of being told that a word is incorrect.

Nour fully discovered the sounds presented during each session. The examiner would say the sound aloud and Nour would say it again, and observe what worked in her mouth and how. Nour usually observed her mouth movements using a mirror, and when needed, she would get her fingers inside her mouth in order to confirm what worked as she pronounced the sound. The mirror was utilized as a form of the multisensory feature of the program. It was mainly used in the sounds that Nour had difficulty feeling. The mirror was also used when Nour had trouble describing her mouth actions until she saw the action take place. This was an illustration of the support that a single sensory method can offer to another.

During the initial stage of the program, every phoneme was explored, labeled, and its mouth picture was selected; yet, letter names as well as symbols were not integrated at this level. This entails that the training started with the concrete stage toward the abstract one, not the way around as the case with phonics training. The purpose of using this method, as the authors of the program reveal, resides in that through the thorough practice with both consonants and vowels as “oral-motor movements” first, is capable of facilitating the establishment of sound-symbol associations afterward as a step by itself.

The researcher implemented the intervention as presented in the LiPS program. The sessions were tailored using the outline presented in the manual, as sequence is vital in the program.

### **Introducing Consonant Pairs- The Brothers**

The researcher started with the discovery process of consonant sounds first. Sixteen sounds of the consonants were clustered in pairs. They were known as “brothers”. Two phonemes in every pair were formed by identical mouth movements, except that one of the phonemes is unvoiced (whispered) and the second is voiced. Nour was aware that by the notion “voiced”, the sound would go together with vibrating vocal cords. The eight pairs of voiced-unvoiced sounds were given the term “quiet and noisy brothers” (P.10). They were learned in a determined sequence and labeled based on their “oral-motor kinesthetic” features. The order in which the pairs were introduced was as follows: /p/ and /b/, labeled as Lip Poppers; /t/ and /d/, labeled as Tip Tappers; /k/ and /g/, labeled as Tongue Scrappers; /f/ and /v/, labeled as Lip Coolers; /th and th, labeled as Tongue Coolers; /s/ and /z/, labeled as Smooth Air; /sh/ and /zh/, labeled as Fat Air; and /ch/ and /j/, labeled as Fat-Pushed Air. The pairs were presented in the recommended order with the intention that Nour begins with the broadest contrasts in feeling. The pairs were discovered and explored by Nour, and not explained to her. The examiner

presented one pair at a time and Nour practiced the sounds until she was able to articulate them properly, label them, and find their mouth picture. The researcher then introduced an additional pair, and Nour practiced them all once more.

Appendix II includes a scan of Lindamood's various phonemes, their corresponding lip movements, and labels.

The researcher handled Nour's mistakes through Socratic questioning which "responds to the response" (p. 36). This teaching method developed Nour's capacity in thinking about her own responses and self-correcting them. The aim of this technique was to lead Nour to independence, which was the ultimate purpose of the program. For example, in the discovering process of /p/, Nour was able to feel what was working in her mouth. She stated that her lips worked as she said the sound and gave it the label, Lip Popper. Then, her task was to find the second brother for the pair. Nour grouped /p/ and /d/ as brothers. At that instant, the examiner requested Nour to say /p/ and then /d/, and asked her if the lips popped for both phonemes. After that, Nour was given choices of sounds to compare and contrast in order to find out the brother of /p/. Nour compared and contrasted the sounds in terms of quiet and loud brothers, and if the sound made the same mouth actions as /p/. Nour was able to discover that /b/ was the loud brother of /p/ by both; feeling her mouth movements for both and checking if /b/ was the noisy sound. The researcher avoided "No" as a reply to Nour's answers, and constantly praised and recognized anything partially correct between the question and Nour's response. The researcher would restate Nour's response in another way and ask further questions to assist her to double-check her answer. The program affirms that the students have to be the one to reject inaccurate options, and they ought to recognize the reason(s) for discarding them.

What follows is an example of a session which Nour had difficulty initially in discovering her mouth actions and in finding the second pair of the sounds. The researcher's aim for the session was for Nour to discover and practice the pair of sounds; /k/ and /g/. The researcher asked Nour to watch the researcher's mouth while stating the sound /k/, and then make the sound herself and check what she felt. The researcher asked her whether her tongue or lips worked for that sound. Nour repeated the sound several times, and said nothing worked and nothing seemed to move in her mouth. The researcher requested her to look in the mirror to check if anything was moving. The examiner opened Nour's mouth wide as she said the sound so she can check it, and asked her if she saw the tongue moving. Nour replied that her tongue moved up. Then, the researcher asked her if the tongue went up to the front or to the back. Nour replied that it moved at the way back. The researcher discussed with her that this was the reason why /k/ was difficult to feel and see unlike the previously introduced sounds. Afterwards, the researcher provided Nour with a further description of the tongue's movement by putting her hands (researcher's hands) on top of each other to depict the position of the tongue in the mouth. The researcher asked Nour whether the tongue hold there as it goes up in the back or it scraped touching something to create the sound. Nour responded that it scraped against the roof of her mouth as she said the sound /k/. Nour's response was ideal. At that instant the researcher replied that they will label /k/ as a Tongue Scrapper. Next, Nour checked if /k/ was a quiet or noisy brother by putting her fingers on her throat. If she felt the vibrations, then it would be a loud brother. If it was whispered, then it would be a quiet brother. Nour found that it was quiet and then moved to choosing the Tongue Scrapper picture. The researcher asked her what she looked for in the picture. Nour answered that is had to be the picture with the tongue operating at the top in the back of her mouth. Nour found the picture alone and told the researcher that they had to find the noisy brother. The researcher provided Nour with a number of sounds. Nour checked each choice of sounds to verify if the tongue

worked at the back and if it was a noisy brother. Nour discovered the correct sound, which was /g/.

During the consonant discovery process, Nour had difficulty pronouncing /sh/ and /j/, and trouble finding their mouth pictures. By intensive training and practice, and by following the same discovery process presented above, Nour mastered their articulation and recognized that /sh/ and /zh/ were a pair of brothers, and /ch/ and /j/ were another pair of brothers.

To reach mastery, Nour was required to associate each sound with its mouth picture, along with labeling it. The associations were primarily established via the discovery process and problem solving activities. Eventually, they were done at an automatic level of responses, which was established progressively via daily practice activities.

### **Introducing Other Consonant Groups- The Cousins**

After mastering the brother sounds, Nour was introduced to the remaining eight consonants, which were categorized as “cousins”. The researcher contrasted cousins with brothers in order to set the work. Nour was told that she will not feel the same mouth actions while articulating “cousins” sounds, and examining whether a sound is voiceless or voiced was not the issue that distinguished a phoneme from another in this group of sounds; yet, the sounds in each group were related. Nour was guided in feeling, experiencing, and describing the characteristic aspect of one phoneme in the group first, followed by labeling that phoneme and choosing a picture that depicted it. Afterwards, she was assisted in discovering the additional phonemes in that group which share a familiar aspect, yet with oral-motor distinctions between them. The cousin sounds were grouped into 3 categories, which were: /m, n, ng/, labeled as Nose Sounds; /w, h, wh/, labeled as Wind Sounds; and /l, r/, labeled as Lifters. Nour was capable of stating each sound and finding the related sounds in each group.

However, her main difficulty was in articulating the sound /ng/. Nour revealed that she did not realize that /ng/ was one sound.

### **Tracing Sequences of Consonants**

After introducing all the consonant sounds, Nour practiced them to make sure she has mastered the sounds. First, Nour assembled all the pictures. She described them and provided the label of each one, while stating the sounds that go with it. The sounds were practiced receptively and expressively. For the former, the researcher would say a sound. Nour would repeat the sound in order to feel it, and then point to its picture, label it, and identify the sounds that go with it. As for the latter, still with the pictures assembled, the researcher would point to a picture and Nour would say the sounds that go with it, and label it. Games were also included in this phase in order to establish speed and automaticity. Bingo is a well-known game that was utilized to give further practice; expressively and receptively. Nour was involved in tracking activities which was the connection that linked each stage together, as previously mentioned. The tracking activities were in sequences of isolated consonant sounds which Nour had to identify in terms of number, similarities or differences, and order, with the goal of attaining 100% accuracy.

### **Introducing Vowels**

Prior to introducing vowel sounds, Nour discovered their role in language and the reasons that make their usage essential. The researcher recalled with Nour that she has been using numerous areas of her brain to assist her in learning about phonemes and that in discovering vowels, she had to make the “feeling” element work in particular. In conventional phonics training, 10 of the existing 15 vowel sounds are known as “long” and “short”. Students frequently have trouble discerning between them and linking vowel sounds to their letter names or symbols. This is because the categorization of what is known as long and short

vowels does not have a foundation for physical distinctiveness which students can employ to recognize which ones are long and which are short. The researcher set up the notion that differences in vowel sounds can be distinguished via the location of the tongue. Besides, the feeling awareness was broadened to motor feedback of the four groups of the mouth shapes.

Colored felt squares, vowel mouth pictures, a nose picture, ear felt, and a mirror were used during the vowels discovery sessions. The researcher and Nour assembled a side-view picture with the goal to make Nour understand that the picture they were making was to depict how vowels are formed in the mouth, how the tongue descends in small steps to produce each different phoneme, and the how the jaw tends to go down too as the tongue descends.

Additionally, the researcher wanted to draw Nour's attention to how the form of the mouth can be observed, felt, and labeled too. The researcher explained to Nour that the tongue makes the majority of the work when vowels are being pronounced. The tongue goes to the front on few, downward towards the bottom on others, and to the back for the rest. By using questioning techniques, Nour was guided to initiate the picture by placing the nose and ear felts first. The nose was to signify the position of the tongue at the front of the mouth and the ear was to signify the position of the tongue at the back of the mouth. The researcher stated that twelve vowel sounds are placed in the vowel circle, and they stand for the first three groups of vowel sounds. The researcher exaggerated the pronunciation of vowel sounds in order to help Nour notice the small contrasts between the sounds, because of the tiny distinctions that exist between vowel sounds. During the discovery process of vowels, Nour repeated the sounds after the researcher, by putting her hand under her chin and determined if her tongue went to the front or to the way back when producing each group of sounds. Nour stated the entire sounds. She recognized that her tongue was moving towards the front on the first six sounds and she located six colored felts that signify them. Nour was asked to notice how the jaw goes down step by step for the sounds, which were called the "front stairs" of the Vowel Circle. The

sounds were /ee/, /i/, /e/, /ae/, /a/, /u/. “X-ray studies also verify the descending position of the tongue in producing these sounds” (p. 113). Thus, the researcher was not establishing a false association; but basically overstressing an existing association to arouse awareness. For the second group of two vowels sounds; /o/ and /aw/, Nour stated that her tongue and jaw moved down to the “basement”. She placed two colored felts to represent them. Nour was also capable of stating that the tongue worked at the back for the last 3 sounds; /oe/, /oo/, and /oo/ (back stairs sounds). She placed three colored felts to represent them on the vowel circle.

The researcher then confirmed the movement of the tongue and its position by contrasting sounds; for instance /ee/ and /oo/. Afterwards, the researcher transferred Nour’s attention to the mouth pictures, which allowed her to describe the form of the mouth for every sound, and give labels to each group. Nour placed the picture felts next to each group of sounds. The primary six sounds were labeled as Smiles, the next two sounds as Rounds, and the final 3 sounds as Opens. Nour practiced the sounds by examining gross distinctions where the researcher would say a sound and she would provide its label and point to its position and picture in the Vowel Circle. Nour had difficulty pronouncing /i/ and /e/ in Smiles. She needed several repetitions and practice in order to master them. Besides, Nour would frequently close her mouth while articulating /u/. She relied too much in the primary sessions in putting her hand under her chin to check how the jaw and tongue worked for the sounds. Nour also depended on the mirror to aid her in checking her articulation. In addition, Nour frequently had difficulty in the transition between Open to Round sounds.

Then, the researcher introduced the fourth and last group of vowels, which consisted of four vowel sounds, labeled as Sliders. The label Sliders was given to those sounds because the mouth does more than a single mouth movement when pronouncing each sound. Upon discovering the sounds, Nour would repeat the sound and the researcher would then give her choices so she can describe two mouth forms with slide amid them. Nour worked well during

this task. She appeared confident, yet careful in applying the method. Nour was capable in stating from what mouth shape the sounds starts to which mouth shape the sounds slid. For example, Nour was able to state that in the /ow/ sound, the mouth slid from Smile sound to Round sound. Nour worked well with the other three sounds too; /oi/, /ie/, and /ue/. She placed colored felt for each sound and put them on one side of the vowel circle. Nour's main difficulty in Sliders resided in the /ie/ sound, where she often stated that it was two sounds.

### **Tracing Sequences of Vowels**

Nour practiced the vowels using the similar method employed previously with consonants. Nour assembled the Vowel Circle with colored felts. She put each picture in its appropriate place on the circle and reviewed the labels. On a receptive level, the researcher would say a sound, Nour would repeat it to feel it, and then she would provide its label and point to its picture. On an expressive level, also with the Vowel Circle assembled, the researcher would point to a picture and Nour would say the sounds associated with it and label it. Once Nour was competent in assembling the circle without any help, the researcher would say a sound, without showing her its picture, and Nour would label it. In an opposite manner, the researcher would give Nour a label and she would state its sounds.

### **Tracing Sounds within Simple Syllables and Words**

After mastering the consonant and vowel sounds, Nour progressed to the third stage of the program, where she was engaged in activities that aimed at tracking sounds in simple syllable words. Two modes of tracking sounds were used at this stage; mainly by using mouth pictures and colored blocks. Nour assembled the consonant and vowel sounds mouth pictures, so that it will be easier for her to find them during tracking activities. Nour arranged all the pictures in rows based on their pre-established categories. Tracking syllables initiated with a vowel. Nour was given a hint that she will do one change at this phase, and that her task was to

feel the sound and demonstrate it through the pictures. A consonant was then added to the vowel. After that, substitutions in the sounds were made till Nour was working well with them. Five types of changes were incorporated in the tracking phonemes activities: adding, removing, replacing, shifting, and saying the same sound again. Nour understood the procedure in tracking, where she would say the old and new pseudoword or real word, and then touch and state the old and latest word. Nour was able to make the modifications to the words and label everything that shifts. As for the pacing, Nour tracked two sounds first (CV and VC words); such as, “ki” and “ab”. Then she moved to three sounds (CVC); such as, “oin”, “voi”, and “roud”. Nour had one difficulty during this phase, which was confusion in aligning the “sh/zh” and “ch/j” mouth pictures. The researcher performed several stimulating awareness activities till Nour mastered them. Feedback from the auditory senses started to substitute it as a way for Nour to contrast a syllable or a word by a different one.

As Nour’s articulatory feedback grew to be increasingly automatic, and she was capable of performing the procedure and doing the majority of the changes correctly by symbolizing the sounds concretely using mouth pictures, she progressed to tracking the sounds more abstractly, using colored blocks. Nour took time in tracking with blocks as she didn’t have any idea about the concept of blocks. The researcher explained to Nour that one block was applied to demonstrate one sound. If two phonemes were similar in a word, Nour would place two blocks of the identical color. After that, an equivalent method that incorporated the five types of change used with mouth pictures was also used with colored blocks. Eventually, Nour was able to develop her ability in tracking and contrasting speech sounds presented in a particular sequence within syllables. She was able to identify the number of sounds in pseudowords and real words. She could also tell the similarities or differences in sounds, and state their order in simple syllables words.

## **Manipulating Letters for Spelling and Reading**

In the fourth stage of the program, Nour was involved in spelling and reading series of real and pseudowords by means of letter tiles or with felt symbols. Nour was delighted upon the introduction of letter tiles, as it was an indicator of progress for her. Nour began with spelling as it is the smallest step further from tacking. After writing a word, Nour would always read it back. Nour was encouraged to get her finger track under every word while its being decoded. This issue reduced errors greatly. Thus, for spelling, the researcher would say a word and Nour was asked to repeat it, label the sounds, and find the equivalent letter tiles to encode it. Nour was not requested to label the sound later, except if she had mistakes or showed doubts or guessing in her responses. Then Nour moved to reading. She was encouraged to state every novel word she gets across as a whole. Once both spelling and reading were established, activities that included some of each were done in every session to establish accuracy and automaticity in her abilities

## **Orthographic Expectancies**

Nour then progressed to the next stage where she was introduced to the orthographic expectancies of the English language. This stage added a further level to Nour's growing phonemic awareness, and expanded her pace than merely feeling the sounds. Nour was able to predict the real spelling and reading of new and other added words. Nour comprehended and applied the orthographic patterns of high-frequency rules that have an effect on the visual pattern of words, which are: the *silent 'e'* to the end of words in spelling and reading, when *two vowels go walking, the first one does the talking* rule (ea, oa, ai), the 'c' and 'g' in reading and spelling, the spelling of final "ge vs. dge", the spelling of final "ck vs. k", the doublers rule "f, l, s, z", and few other sounds, such as /qu/, "y" as a vowel, and /x/.

The expectancies were presented in reading first, and then followed by spelling. Nour was competent in reading and writing CV-VC words. She sometimes had difficulty writing CVC words; such as the word “foid”. Nour had also difficulty applying the orthographic expectancies in spelling. Nour had trouble applying the “tch vs ch” at the end of words, where she would write t-sh instead (cantsh instead of canch). Frequently, Nour had difficulty in the correct spelling of letters that sound the same, but have different spelling; such as substituting /ow/ with /ou/, /aw/ with /a/, and the letters that give the /ee/ sound. Nour sometimes was unsuccessful in applying the doublers rule. She also used to substitute the sound /o/ with /u/ from time to time. Nour displayed confusion in applying the “ck vs k” at the end of the word. She needed several repetitions and practice to establish accuracy in it. Nour was more proficient in tracking the correct phonemes using pictures and blocks, or even in stating the sounds orally than the accurate spelling of sounds using letters. Nour’s ability in stating and analyzing sounds has drastically improved during the training sessions. She just sometimes confused between the sounds /oa/ and /ou/, and other times she would pronounce /ow/ as /oe/ in reading; such as the word “bow”. Nour showed more easiness in reading tasks than spelling ones too. She was often very careful in reading activities. Nour would take her time to decode each sound of the word silently, and then say it out loud as one word. The researcher took several sessions during this stage till Nour’s reading became more automatic and her spelling more correct.

### **Tracking Sounds within Complex Syllables and Words**

After tracking simple syllables, Nour progressed to tackling complex syllable words. Nour had difficulty in that task where she often missed sounds in words. For that reason, the researcher constantly asked Nour to read the word again and state its sounds out loud. “Conspicuous” was one of the words that Nour had difficulty initially in reading it, and major difficulty in writing it.

Nour was engaged in activities similar to the ones she has been doing with letter tiles, except that she used pencils instead in this stage. Nour would say each sound as she writes it; exactly as she was stating each sound as she placed each tile. After the spelling of a word, Nour would always read it back to confirm it. This was the checking component. Nour practiced the spelling and reading of complex syllable words thoroughly till she was competent in them.

At last, Nour tracked complex syllables using the three modes utilized before; mainly practicing pseudowords and real words using pictures, blocks, letter tiles, and pencils. Nour showed an exceptional improvement in all the presented sounds. She was very excited and proud of her progress.

### **Informal Interview with Nour's Parents**

An informal and semi-structured interview was conducted with Nour's parents in order to gather information about her difficulties and what intervention has been previously done. Nour's mother was present during the meeting as she was the one responsible for following up with Nour's education since her childhood. According to the mother, Nour was perceived as an intelligent child when she was young. She recalled that Nour has been articulate since the age of 2, and did not notice that her child was different from children her age. Nour's mother presumed that she might have considered Nour's development as normal, since she is her eldest child and the mother did not have anyone to compare Nour to. Nour's difficulties started to appear when Nour went to kindergarten and grade school. At kindergarten, Nour's mother was told that her daughter had difficulty understanding rhymes and singing nursery rhymes along with her friends. The mother added that Nour could not easily tell what word rhymes with given words. However, the mother did not take it as an alarming sign of any difficulty, since she was not familiar with dyslexia back then. When the mother was asked if anyone in

the family had limitations in reading and spelling, she stated that her husband had uneasiness in those abilities, but did not elaborate since she had minimal information about his skills. At school, the teachers had not warned the parents of any difficulties their child was facing till grade two. The teachers often informed the parents that Nour was a bright student, yet was unable to spell and read at grade level. The teachers justified her difficulties as the result of laziness and carelessness. They did not realize that there was a neurological cause behind Nour's difficulties. The teachers often gave the parents hope that Nour will improve if she worked harder, and put in more effort in her reading and spelling assignments. Yet, Nour did not seem to progress despite the extreme effort she has put. The mother maintained that her daughter was taught several times how to spell a word and used to even memorize the spelling, but would forget how to write it when she goes to school. This issue has affected Nour's self-esteem, and she started feeling dumb. Nour's mother stated that her daughter became frustrated, and she would give any excuse in order to stay home. The mother blamed herself for punishing Nour when she got low grades. She stated that her poor grades were due to a difficulty in reading the texts or questions, since Nour was able to answer the same questions when they were read to her orally at home. Finally in 2008, when Nour was in grade 6, her teachers at the same school referred her for a psycho-educational assessment, as Nour was several grade levels behind her peers in reading and spelling. The results of the report stated that Nour was diagnosed with dyslexia. However, the school did not provide her with training in a remedial program, since the school does not cater for special needs students and the teachers were not trained to provide such services. On the other hand, Nour was provided with few accommodations, namely extra time and assistance with reading the texts. Yet, Nour was still frustrated as the material was so condensed, and could not handle the pressure anymore. The mother asked the school to modify the material for Nour, but the teachers stated that they cannot overlook the other students while they set up modifications for a single student who was

diagnosed with dyslexia. In addition, the school said that this issue requires lots of extra work on behalf of the teachers, which was a difficult decision to implement. As such, Nour had to change her school. Nour changed her school in the academic year 2011-2012 to her current placement. The mother displayed a sense of guilt as she should have moved her daughter long time ago, but she had no idea about the schools that provide services for students with dyslexia. She stated that the current school modifies the material for Nour and provides her with all the needed accommodations. The mother emphasized that even though the new school did not provide Nour with an intervention program to remediate her difficulties, she is glad that Nour is much more comfortable and enthusiastic about her education, because her teachers display warmth and care for the students. The mother revealed that there are speculations that her son might have dyslexia, as he started showing difficulties in reading and spelling. She stated that she will send him for a psycho-educational assessment and do the needed intervention so that he does not face his sister's experience.

### **Informal Interview with Nour's English Teacher**

An informal and semi-structured interview was conducted with Nour's English teacher at her current school to gather information about Nour's performance in spelling and reading, and if she receives any accommodation or modification in those areas. Nour's English teacher is a professional special educator. She stated that Nour does not receive training in a remedial reading and spelling program; yet, a plan was devised to provide her with the necessary accommodations and modifications. The teacher acknowledged that Nour is an intelligent student. She added that Nour usually gives original answers when questions are either read to her or discussed in class. The teacher illustrated that when Nour's peers or teacher read the information, her answers are always of higher order thinking skills when compared to her classmates. On the other hand, the teacher stated that Nour gets nervous and anxious when she is asked to read before her peers, where she constantly complained of stomach headaches or

headaches during the literature sessions, that usually included reading tasks. The teacher added that Nour has difficulty reading simple words, and she often repeats the same words when reading sentences. The teacher revealed that Nour also misses words when reading; but she would frequently realize her mistake and go back to re-read the sentence, but often in bashful way. The teacher affirmed that Nour reads slowly when she is asked to read aloud. She also pauses frequently and overlooks many grammatical aspects as she tries to read the other words. The teacher emphasized that Nour puts in effort in class to read and spell, but in vain. She explained that Nour reads and reads, however with minimal comprehension. The teacher also elaborated on Nour's difficulties in spelling, where she stressed that repetition of words would also take place in writing tasks, and sometimes Nour misses words at all. The teacher declared that Nour often spells phonetically and always mispronounces long words. The teacher emphasized that Nour has brilliant ideas and a very good style in writing essays, but her difficulty is in her poor spelling, an issue which makes reading them a difficult task for the teacher. For that reason, the teacher usually asked Nour to read her essays after class so she would get the full meaning. On the other hand, the teacher stated that Nour likes drawing and her pictures portray creativity. Hence, when Nour was asked to submit a reflection paper or a book report, the teacher usually asked her to present her projects in a different mode; such as in drawings or skits, and then Nour would discuss her topics orally in class.

### **Classroom Observation**

During the baseline stage, Nour was observed for 15 minutes, five times a week, for one week. The observation took place at different times of the day in order to find out Nour's performance in spelling and reading tasks. The main setting where the observation took place was in Nour's classroom during the English sessions. A checklist for intermediate grades was used to aid the researcher in observing Nour's decoding and encoding skills. The Intermediate-Grade Checklist for Teacher Observation of a Child's Reading Skills was utilized to observe

and record Nour's ability in phonic and morphemic analysis, in addition to her ability in using context clues to read unknown words (Miller, 1993). With respect to Nour's ability in analyzing phonemes, Nour was not able to efficiently utilize all the consonant components which are learned in the early grades to read unfamiliar words. Moreover, she has presented extreme difficulty in identifying the correct vowel to read unfamiliar words, while the sounds and rules are usually mastered in the primary grades. Nour usually hesitated in reading a difficult word or she would skip it and read the next word. When given a word orally, Nour would take time to blend the sequence of phonemes to identify it. She seemed unsure of her abilities. Nour lacked the ability to use an appropriate technique in identifying words. She obviously had difficulties in applying and generalizing the phonic analysis rules which are introduced in the early stages of learning. Nour showed inconsistency in reading unknown words in isolation, in addition to substance reading (Miller, 1993).

With respect to morphemic analysis, Nour had difficulty in adding all of the suffixes to a base word, which are introduced in early grades of literacy. She had difficulty adding the correct form of suffixes, such as "ish, able, ment, less, and ible". Similarly, Nour had difficulty adding the entire prefixes to base words; such as, "anti, semi, dis". On the other hand, Nour was able to add the suffixes "under and sub" to base words. Nour had severe difficulty in appropriately dividing multi-syllable words to syllables. She seemed to lack knowledge in syllables. When she was asked to find the syllable in words, she confused the task with stating the sounds. Nour had also trouble in stating the correct number of syllables and in dividing the words properly, even when she was explicitly told what a syllable is and given examples on that. As such, Nour stated that Nour's name is made up of two syllables, "n- our". In addition, Nour had difficulty understanding and using the correct techniques of adding a suffix when the spelling of a word is changed, a skill which is introduced in the early stages of learning (Miller, 1993).

As for Nour's semantic analysis and her familiarity with vocabulary words to aid her in reading, she usually replaced words for unfamiliar ones that are semantically appropriate when she was reading aloud or silently. Nour was sometimes able to articulate and identify words properly while reading in context. These words might have been difficult to pronounce if they were presented in isolation. Nour had difficulty omitting words appropriately from a cloze activity that was created for grades four to six reading levels. Nour had difficulty understanding what homonyms are, where she would write the same spelling for words that sound alike, as in "see and sea" (Miller, 1993).

As for Nour's oral reading skills, Nour seemed anxious and nervous while reading aloud before her peers. At times, she lacked ability in using good expression and paying attention to punctuation marks as she read loudly. Nour showed inconsistency in reading group of words. She was able to read units of words only when the words presented were of lower difficulty.

### **Nour's Areas of Difficulty**

Nour was sent for a psych-educational evaluation in 11 May 2012, immediately before starting the intervention. The reason for the assessment was to find out Nour's performance in PA, reading, and spelling in order to provide a basis to measure her progress at the end of the LiPS intervention. During this assessment, Test of Nonverbal Intelligence, 4<sup>th</sup> Edition (TONI-4), Woodcock-Johnson (WJ III) Tests of Cognitive Abilities, and Woodcock-Johnson (WJ III) Tests of Achievement were administered. Nour's performance in TONI-4 was in the average range, Age Equivalent: 14-6, Deviation Quotient: 102. As regarding phonemic awareness, the researcher focused on the measure of Sound Awareness. Nour's standard score in Sound Awareness skills was 83, equivalent to grade 4.2. She falls within the low average range. As regarding reading, the researcher focused on the measures of Letter-Word Identification and

Word Attack. Nour's standard score in Letter-Word Identification skills was 86, equivalent to grade 4.9. She falls within the low average range. Nour's standard score in Word Attack skills was 76, equivalent to grade 2.4. Thus, her ability to pronounce nonwords was very limited. As for spelling, the researcher focused on the measure of Spelling subset of the WJIII to identify Nour's abilities. Nour's standard score in the Spelling subset was 76, equivalent to grade 3.4. She falls in the very low average range.

In the above mentioned results, there was a general agreement that Nour has difficulties in her phonemic awareness, reading, and spelling skills, given the discrepancy between her IQ and the scores on PA, the reading, and spelling subsets. Moreover, Nour falls 5 grade levels behind her grade in Sound Awareness, 4 grade levels in letter-Word Identification, 7 grade levels in Word Attack skills, and 6 grade levels in Spelling.

### **Nour's Progress Post the Intervention**

Nour was re-assessed two days after discontinuing the intervention to find out if Lindamood Phoneme Sequencing program (LiPS) to a bilingual student with dyslexia helps increase PA, spelling, and reading, and if those skills improve at the same rate. Nour was re-assessed in July 2012, after six weeks of intensive intervention. Parallel tests to the ones administered in the baseline stage were carried out so as to measure Nour's progress pre and post the intervention. Nour's performance was measured up to age peers by means of standard score range. Her results can be generalized to parallel, non-test, tasks related to her age level.

The table below illustrates Nour's scores on the tests administered after the intervention was done.

**Table 1**

**Table of Scores- Post-test (Woodcock-Johnson III Normative Tests of Achievement**

Phonemic Awareness, Reading, and Spelling	Post-tests		
	AE	GE	SS(68% Band)
Letter-Word Identification	12-1	6.7	91
Spelling	9-8	4.3	79
Word Attack	12-3	6.8	96
Sound Awareness	14-3	8.8	98

*\*Significant improvement of at least 0.2 GE*

### **The Post-Assessment Results**

As presented in the above table of scores, Nour has progressed in all of the four areas in a period of six weeks, yet with a discrepancy in the improvement between them. Nour showed important gains in phonological awareness as signified in the progress she displayed in Sound Awareness. Nour has progressed 4.6 grade levels in Sound Awareness. Her standard score in PA is 98. Nour has also portrayed a distinguished progress in reading. Her standard score in Word Attack is 96. Nour has progressed 4.4 grade levels in six weeks. Also in reading, Nour's standard score in Letter-Word Identification is 91. She has progressed 1.8 grade levels during a period of six weeks. As for spelling, Nour has also displayed an improvement. Her standard score is 79. Nour has progressed 0.9 grade level in six weeks. Nonetheless, her improvement in spelling is not as significant as her exceptional progress in PA and reading. Hence, as depicted in the post-assessment results, Lindamood Phoneme Sequencing program does improve PA, reading, and spelling abilities in this particular bilingual student with dyslexia, with important gains displayed PA, followed by reading. Spelling was also improved, yet not in the same intensity as the former two skills.

**Table 2**  
Progress Report of Phonemic Awareness, Reading, and Spelling

Phonemic Awareness, Reading, and Spelling Subtests	Pre-tests	Post-tests	Progress
	SS	SSA	GE improvement
Letter-Word Identification	86	91	+5 (1.8 grade level improvement)
Spelling	76	79	+3 (0.9 grade level improvement)
Word Attack	76	96	+20 (4.4 grade level improvement)
Sound Awareness	83	98	+15 (4.6 grade level improvement)

\*Significant improvement of at least 0.2 GE

### **Parent's and Teacher's Feedback**

After the re-assessment took place, a meeting was held with Nour's mother in order to notify her with Nour's progress and ask her if she noticed improvement in Nour's reading and spelling skills. The researcher provided the mother with detailed information on Nour's performance during the intervention phase, in addition to details about the post-assessment's results. The mother was very emotional and she stated that "miracles" have happened in a period of six weeks. The mother informed the researcher that she has sensed a difference in Nour's attitude towards reading and spelling since her remedial training has started, where Nour started to get a book to read at home. The mother declared that she does not have detailed information about Nour's improvement in the classroom, but she has noticed less spelling mistakes in Nour's tests. Most importantly, the mother emphasized that Nour appeared more confident and happy about her progress in reading and spelling.

A meeting was also held with Nour's English teacher to get feedback on Nour's improvement since the intervention took place. The teacher stated that she noticed a complete difference in Nour's attitude towards reading and spelling. She displayed her delight as Nour started to read voluntarily before the class. The teacher declared that Nour's reading has greatly improved in terms of accuracy, where she was doing fewer mistakes when reading aloud. The

teacher stated that Nour was keen not to make any error, and if so, she would try again and again till she reads the words correctly. The teacher added that sometimes Nour focuses a lot on decoding words accurately that she fails to read the sentences with expression. As such, Nour would read the same sentence again in order to read it with expression. The teacher was amazed in Nour's ability to consciously realize her mistakes and correct them in reading. Yet, the teacher stated that Nour's decoding is somehow slow. As for spelling, the teacher stated that Nour has improved, yet still exhibited difficulties in writing words. For example, Nour would compare all the vowel digraphs which make the same sounds to a word in order to see which one makes more sense. For instance, for the word "spleen", Nour would try writing it as "splene", "splean", and "splien", which are all phonetically correct, till she finally writes it correctly as "spleen." Nevertheless, the teacher displayed her astonishment as Nour never had this ability in correcting her spelling and reading mistakes. The teacher accentuated that Nour's self-confidence has majorly improved since the intervention started.

### **Follow-Up Classroom Observation**

Nour was also observed in class to compare the previous encounter in the baseline phase to the current one in the follow-up phase. This issue of increased confidence was corroborated when Nour was observed in class. The researcher noticed a drastic improvement in Nour's confidence in her abilities, as previously revealed by her mother and English teacher. Nour had a beaming smile on her face throughout the observation periods. She worked enthusiastically and raised her finger voluntarily to read before her classmates. Nour would decode each sound in novel complex words till she reads the word correctly. Yet, her reading was somehow slow as revealed by her teacher. Even though Nour was not as quick as regular readers, she has shown a great improvement as compared to the first encounter, in terms of accuracy and perseverance, where she used to guess words or give up when she gets across difficult ones. As for spelling, Nour would analyze the sounds before she writes words. She

sometimes had difficulties writing the correct spelling of complex words. All in all, after receiving the intervention, Nour displayed an increased progress in her reading and spelling abilities, and keenness to apply the learnt sounds and rules accurately in her reading and spelling tasks.

This chapter has provided the intervention which consisted of the Lindamood Phoneme Sequencing program (LiPS). It has presented data on the student's areas of difficulty in the baseline stage, before receiving training in the LiPS program. It has also offered data on the student's progress post the intervention. The results of the data analysis were collected mainly via a psych-educational assessment. The chapter also included feedback from the parents, English teacher, and the classroom observation.

## **Chapter Five**

## **Discussion**

This chapter discusses the outcomes acquired from this case study and relates them to prior research and findings. The limitations of the study and further recommendations are also presented.

This study intended to examine the effectiveness Lindamood Phoneme Sequencing program (LiPS) in remediating specific skills in a bilingual student with dyslexia. The first aim of this study was to observe if this intervention improved PA, spelling, and reading skills in this particular bilingual student. The second aim was to identify the observable changes during the intervention period; mainly to find out if those skills improved at the same rate. Possible explanations for the changes were provided. The researcher hypothesized that there would be important gains, at least of one standard deviation, in Nour's scores on PA, reading, and spelling in the psycho-educational assessment after the intervention ends. Furthermore, it was hypothesized that there would be a slight more improvement in the student's PA and reading relative to spelling standard scores post intervention. The subsequent section discusses the results of this study and relates them to prior research.

### **Discussion of Results**

#### **Woodcock-Johnson (WJ III) Tests of Achievement Results**

The data gathered from the subtests completed during the pre and post intervention showed a general improvement in the three skills; albeit with uneven progress. According to Nour's results in the first psycho-educational assessment conducted during the baseline stage, her standard score in Sound Awareness, which measures her phonemic awareness abilities, was 83, equivalent to grade 4.2. Nour has shown important gains in the re-assessment following the

intervention. Her standard score is 98. Thus, the difference between her first and the second one is 15 points, which is equivalent to 1 standard deviation. In addition, Nour's standard score corresponds to grade 8.8, implying that she improved 4.6 grade levels. Hence, in a six weeks period, Nour has improved one standard deviation in Sound Awareness and was able to almost reach her grade level. As for reading, it was assessed by two measures: Word Attack and Letter-Word Identification. Nour has shown an important, yet uneven progress in these areas. Nour's standard score in the pre-intervention report in Word Attack, which measures her ability to decode nonwords, was 76, and equivalent to grade 2.4. She has shown a notable improvement in phonics where her standard score in the post-intervention assessment is 96 and her grade equivalence is 6.8. The difference between her first and second standard scores is 20 points, which is equivalent to more than one standard deviation. Her standard score is in the average range. In addition, Nour has shot up 4.4 grade levels in a period of six weeks. As for Letter-Word Identification, which assesses her repertoire of sights words and requires that Nour recognizes and decode single letters and isolated words, her standard score in the pre-intervention assessment was 86 and equivalent to grade 4.9. Nour's standard score in the post-intervention report is 91. Nour has improved 5 points, which is less than one standard deviation. Yet, her standard score is 91, i.e., Nour lies in the average range in this aspect of reading. Her score is equivalent to grade 6.7, which means that Nour has progressed 1.9 grade levels in six weeks. Thus, Nour's scores in the reading subsets show that she has remarkably improved in reading; yet, her improvement in decoding nonwords (Word Attack) has progressed more than her ability to read single letters and isolated words (Letter-Word Identification) after receiving intervention in the LiPS program. As for spelling, Nour has shown a recognizable improvement between the two assessments, but not as important as phonemic awareness and reading. Nour's standard score in the pre-intervention stage was 76, equivalent to grade 3.4. Her standard score in the post-intervention is 79 and equivalent to

grade 4.3. Nour has improved 3 points in her standard scores, and has made 0.9 grade level improvement in a six weeks period. Even though Nour's spelling scores still lie in the below average range, her scores show that intervention using the LiPS program expeditiously improve spelling skills in a very short period.

### **Conclusion**

In sum, according to the results presented in the post-assessment, Nour has shown important gains in all the targeted skills, most remarkably in Sound Awareness. This was also reflected in her progress in the Word-Attack subset under the reading cluster. Nour's improvement in PA (as measured in the Sound Awareness test) has considerably improved her ability in decoding nonwords (Word Attack test). Also under the reading cluster, Nour has also shown an improvement in Letter-Word Identification, but her ability in recognizing single letters and isolated words has not improved at the same rate as in reading nonwords; which are purely related to recognizing sounds. As for spelling, Nour's ability to recognize the accurate spelling of dictated words has improved; yet she still needs further training in this area. Nour might have needed more time in order to fully master this skill and show confidence in her ability. One possible explanation for the difference in the scoring is that LiPS stimulates phonemic awareness and focuses greatly on recognizing and identifying phonemes. Lots of sessions were spent on articulating and analyzing sounds in order to build a solid foundation for the subsequent stages for tracking them in the reading and spelling of words.

All in all, the data gathered using the post-assessment results confirm the hypothesis made by the researcher, where intervention using the LiPS program would improve PA, reading, and spelling in this particular bilingual student. It has also confirmed the assumption that PA and reading improve at a faster rate than spelling.

Limited studies have been conducted to identify the rate of improvement of PA, reading, and spelling after receiving intervention using the LiPS program. The majority of the

studies aimed at comparing the effectiveness of LiPS to other intervention programs that focus on improving reading and spelling skills.

Turch (1994) noted a difference in progress among PA, reading, and spelling in his study that included a pre and post assessment from a sample of 281 clients. The clients ranged in age from school-age to adulthood. The trainees received 80 hours of intensive training in the ADD program (the former name of LiPS). The clients were observed over a two-year time. All participants had a deficit in PA, in addition to difficulty in decoding, encoding, or written language. The subjects were assessed using standardized batteries before the instruction and once more at the ending of the training to measure the progress in PA, sound/symbol association, Word Attack, Word Identification, Spelling, Decoding Speed and accuracy. The majority of the participants were present at the clinic five days per week to receive the intervention. The intervention took place for four hours on a daily basis, and lasted for four weeks. The remediation was applied as outlined in the LiPS manual, following its exact scope and sequence. The scores in the post assessment show highly significant increase on the entire variables. Very significant improvement was manifested on the measures of phonological awareness, sound/symbol connections, word identification, spelling, and decoding in context. The student's age and vocabulary results were co-varied of every dependent variable to establish their potential influence. The participants on the whole made major achievement in phonological awareness. Similarly, the results of all the participants progressed on the sound-symbol examination. The subjects have as well advanced in their capability to apply their awareness of sound-symbol relations to practice decoding, as evaluated by the subset of Woodcock Word Attack. The majority of the participants showed gain from pre- to- post testing in reading accuracy, but not fluency; speed. These outcomes signify a powerful effectiveness of the LiPS program on decoding, as reading fluency is not a feature in the Woodcock. On the other hand, the scores indicate that spelling is harder to change. According

to the post assessment, the standard progress in spelling tended to be less than the improvement on the reading subset. Spelling was the primary variable where a “loss” column was included. Five participants recorded loss from the pre- to- post assessment in spelling; in the 6 to 12 group. In one student, the failure was 1 point. For three participants, the failure was 2 standard scores. For the final student, the loss has been 6 points.

The outcomes of this study reveal that school age students as well as adults are capable of being trained in phonological awareness. Furthermore, such an intervention culminate significant improvement in the decoding of words, word identification, spelling, and reading in context. Spelling was the only skill where little failure was recorded.

Nour’s skills have drastically improved in the post intervention, even though she had a history of reading and spelling failure, and despite of her dyslexia on her father’s side. Previous research concurs that difficulty in phonemic awareness is genetically inherited. Nevertheless, Nour’s phonological awareness was able to develop by means of an appropriate intervention; mainly the LiPS program. This finding was maintained by Lindamood & Lindamood (1997), who found that even though genetic disparity is present in human beings, these sensory-cognitive areas can be accessed and developed, either for preventive purposes or remedial ones. The authors concluded that specific instructional methods expand the sensory-cognitive functions in order to show the conscious stage of sensory feedback, as well as its assimilation. This ought to be experientially obtained by means of Socratic questioning, which should act in response to the individuals’ answers in order to meet them at their processing stage. This allows children and adults to be jointly stimulated through small pace of reasoning to realize concepts growth of their sensory-cognitive functions. Furthermore, the conceptual base they offer allows individuals to experience accomplishment in their learning to read no matter what reading technique is utilized. Accordingly, this would aid to dispel the argument over reading techniques and give notice and endeavor to the procedure of reading. The authors state that

people differ in their genetic inclination regarding these procedures; however the majority acquires them so as to be skilled and independent readers. Therefore, even if phonological awareness is genetically transmitted, it can be developed and improved by a proper intervention (Lindamood & Lindamood, 1997).

As depicted in the post-assessment results of Nour, spelling seems to be remediated at a slower pace than decoding and PA. Phonological awareness training alone did not appear to be as effective for spelling as it is for reading (Birsh, 2005, p. 269).

According to The International Dyslexia Association (2008), spelling skills are difficult for a large number of students. Unfortunately, not many research studies have been carried out on spelling as in reading or other academic skills to understand the nature of spelling difficulty. A lesser amount of information is known about spelling capability in the population on the whole than is known on reading achievement.

Moats (2006) agrees that a lot of students have difficulty in spelling; however, the number of students is still unknown, or according to what standards they are compared, because the American state accountability assessments hardly ever consist of a direct measure on spelling ability.

Uhry & Clark (2005) state that spelling is inclined to be a weakness for students with dyslexia. According to the authors, although decoding has been remediated effectively, encoding difficulties are likely to endure throughout adulthood.

Birsh (2005) indicated that spelling teaching is often treated like a byproduct of reading in various classrooms. There is a widely believed assumption that if individuals learn to decode, subsequently they become skilled at spelling. Hence, spelling teaching is given minimal significance and notice during classroom instruction. Perters & Treiman maintain that spelling is often reduced to rote memorization of lists of words with minimal or even no teaching (as cited in Birsh, 2005, p. 257). Goodman stated that the philosophy that existed in

some schools relied on the foundation that if individuals are engrossed in print and given chance to write, then they will be able to spell words with no official and planned training (as cited in Birsh, 2005, p.257). Venezky pointed out that it was not until the 20<sup>th</sup> century that encoding was regarded as the basis of decoding (as cited in Birsh, 2005, p. 257). Adams asserts that spelling training improves decoding skills through the reinforcement of sound-letter association (as cited in Birsh, 2005, p. 257). Firth, Johnson, & Myklebust stated that spelling is indeed a difficult process. It is more difficult and complex to learn spelling than decoding (as cited in Birsh, 2005, p. 257). Frith, Frith, Fulk, & Stormont-Spurgin made a distinction between spelling and reading in that reading involves identification of words, while spelling needs total and precise recall of letter patterns, in addition to words (as cited in Birsh, 2005, p. 258).

Birsh (2005) points out that spelling has its individual distinguishing features and ought to be explicitly trained in a sequential and structured manner. The ability to decode words does not assure that an individual can encode words accurately. If this was the case, then spelling progress would not be delayed than decoding progress. Likewise, we would not encounter students that can decode properly, but encode poorly.

The NRP (National Reading Panel) removed spelling from the list of five essential elements of a complete reading lesson. The list at present consists of “phonological awareness, phonics, fluency, vocabulary, and comprehension” (Moats, 2006, p. 9). The NRP indirectly implied that spelling has to grow in return to correct and proper reading instruction. Several researchers in Houston that tracked students from grade one to grade four discovered that spelling attainment can drop, whereas around the 50<sup>th</sup> percentile of reading comprehension holds stable. Mehta et al. carried out an extensive longitudinal research study of literacy accomplishment. The results also concur that students generally were apt to be a lot superior on reading comprehension than on spelling. In addition, one ought not to presume that

improvement in reading will automatically cause development in spelling (as cited in Moats, 2006, p. 9).

Some educators have argued that spelling instruction is unnecessary since the advent of word processing and spell checkers (Moats, 2006). It is correct that spell checkers function practically well for individuals who are able to spell well; however, it is insufficient to utilize a spell checker for basic spelling skills as they do not catch the entire mistakes. Extremely inadequate spellers are not able to make the close estimates of the aimed words so that the spell checker proposes the correct word. In reality, a study described that only 30 to 80% of misspellings are caught by spell checkers; partially as they fail to spot mistakes as homonyms. The study also reported that spell checkers recognized aimed words from the spelling mistakes of individuals with learning difficulties just 53% of the occasions (Moats, 2006).

Henry stated that learners can benefit from knowledge about the origins of word in order to improve their spelling. Learners come to realize why a number of words are written in unpredicted modes as they get information and awareness on word origins. Moreover, mainly they will be capable to decide the correct encodings for these words (as cited in Birsh, 2005, p. 269). For example, Greek words that include /f/ are written by /ph/. Learners will gain knowledge that will aid them to spell words; as “chlorophyll and photosynthesis”. Learners will as well make notes of words that are of Greek origin and include /k/ in addition to those including /i/ are frequently spelled by /y/ (as cited in Birsh, 2005, p. 269).

Successful and efficient lesson planning contains training methods that give chances for students in order to increase mutually; phonological and orthographic awareness (Birsh, 2005).

Giving students structured training in phonics that includes training in phonic awareness is vital; however, this type of training alone does not determine that learners will be perfect spellers. Awareness and understanding of phonemic awareness as well as phonics are necessary foundation for correct encoding in English (Spear-Swerling, 2005). Leipzig (2000)

points out to two means of a spelling techniques used by many teachers. The first one is a traditional form of spelling instruction, which is drill and practice. In this type of instruction, the moment one spelling list is experienced and tested, a new list is added. "Word Study" is another kind of spelling training. It is not based on the memorization of introduced words. A word study plan is a unified approach that targets word identification, spelling, vocabulary, and phonics. This approach offers learners with chances to examine and comprehend patterns in a word.

Similar to other features of dyslexia and decoding success, spelling skill is also affected by inherited characteristics. A number of us are naturally born better spellers compared to others. However, with high-quality instruction as mentioned before, as well with the provision of the needed accommodations, poor spellers can be aided (The International Dyslexia Association, 2008).

The English spelling cannot be regarded as unpredictable or irregular. Spelling is able to be taught as a structure that is logical. Almost 50% of words in the English language are phonetically based (sound-letter relationship); such as coy, fitch, clap. An added 37% of the other regular words are approximately conventional. Basically 4% of words in the English language are actually irregular and possibly ought to be educated by whole word techniques, for example tracing, as well as stating the letters as the word is learned by rote memory (The International Dyslexia Association, 2008).

### **Limitations**

Even though the study was found to be effective and Nour's PA, reading, and spelling increased, there were few drawbacks. First, the research study was implemented on a single student; thus, the generalization that can be made from it is limited. Second, the outcomes were measured directly after the intervention ended. Long-term follow up is essential in order to determine if the improvement will be maintained overtime.

## **Implications**

Although a variety of studies have found LiPS to be effective in improving PA, reading, and spelling, the current study adds proof to the effectiveness of LiPS in improving PA, reading, and spelling in bilingual individuals with dyslexia. Additionally, the mother and English teacher's positive feedback imply that Nour's skills and confidence in her reading and spelling abilities have improved, since Nour started voluntarily getting a book to read at home, and willingly reading before her peers in class. In addition, she tended to make fewer spelling mistakes in her homework and class work. Thus, LiPS does not only teach students the targeted skills, but it also provides them with opportunities to apply what was taught in class. Hence, the improvement in Nour's attitude towards reading and improvement in reading and spelling may be generalized to other settings. Nour was willingly attending the LiPS sessions, which adds proof to her positive change in attitude towards reading and spelling. This intervention is better applied on a one-on-one basis, as it allowed the researcher to monitor Nour's progress, though according to the authors, the intervention could be applied on a small group remedially, and to a whole class developmentally. The overall time used to remediate Nour's skills is noteworthy, since it was approximately equal to getting trained in school two times a week, for seven months.

## **Recommendations for Future Research**

Since reading and spelling deficits produce lifelong trouble for individuals with dyslexia, it is essential for researchers to find ways in order to remediate these skills fully, without a discrepancy between PA, reading, and spelling. Future studies should try to identify the appropriate time that ought to be given to spelling in order for the intervention to be even more effective. Possibly future studies can extend the time given to tracking simple and complex syllables. Moreover, further studies have to be conducted so as to address the matter of maintenance in PA, reading, spelling, and its generalization by applying the program on a

larger sample. Prospect research studies ought to carry out continuous post tests after discontinuing the intervention in order to observe the long term effects of the LiPS intervention on bilingual students. Moats provides principles for spelling instruction in her book Spelling Development, Disability, and Instruction (as cited in Uhry & Clark, 2005, p. 192). She states that students must be given instruction in a systematic as well as in a direct manner. Initially, the teacher has to model performance, followed by giving students chances to practice while giving them instant feedback. Moats recommends the trainers to exaggerate phonemes by presenting words in syllable-by-syllable manner. She emphasizes that the training be multisensory. Furthermore, the phonemic aspects of words are supposed to be the focal point in the teaching of spelling, and the teaching has to be organized and sequential. The teacher ought to make the systematic aspects of language clear to students, along with aiding them to notice these patterns, and also relating novel learned material to previous ones (as cited in Uhry & Clark, 2005, p. 192). Traditional ways of spelling instruction that mainly engage students in copying words or memorizing them, or even the statement that spelling seems to develop throughout writing practices, does not offer individuals with the needed awareness about the language construction for spelling (Birsh, 2005).

Birsh (2005) states that spelling starts with the student's recognition that verbal words are comprised of phonemes and these phonemes are signified in print via letters. To symbolize phonemes in print correctly, students ought to be capable to articulate them properly and differentiate between them clearly. In addition to connecting sounds to their symbols, spelling proficiency requires an understanding of letter patterns. Birsh (2005) affirms that individuals should be properly trained in the patterns and in the English orthography rules, which include the following: training in phonemic awareness, sequential, systematic, and multisensory training in phonics, explicit training in patterns, and rules of the English language, a multisensory method to learn irregular words, and chances to practice the words in written

tasks, such as personal writing. The following methods are some of the research-based techniques used to learn and master the spelling of words: Fernald Method, Firzgerald Method, The Simultaneous Oral Spelling (SOS), and Cover-and-Write Method (Polloway, 2005, p. 314).

The Fernald Method (as cited in Polloway, 2005, p. 314-315) is a classic model of a multisensory approach for teaching the spelling of new words. The student follows six steps when applying the strategy. The learner first writes a copy of the word using any of the following modes: crayon, pencil, or magic marker. She/he will state the word as she/he writes it. The student would then make sure that the model is correct. In the third step, the learner would trace over the word with the index finger and state the word simultaneously. Step 3 is repeated five times. Next, she/he would reproduce the word three times accurately. In the final step, the student would write the word correctly for three times from her/his memory.

The student follows 5 steps in Firzgerald Method technique (as cited in Polloway, 2005, p. 314). She/he would initially look attentively at the word. Then the student would state the word, and with the eyes closed, she/he will visualize it. After that, the word will be covered and the student has to write it down from memory. Afterward, the student would confirm the spelling of the written word. If the word is spelled wrongly, the student does again the entire steps.

In the Simultaneous Oral Spelling (SOS) approach, the student picks a regular word and articulates it. Then she/he would say the word again after the trainer. The student will be asked to state the sounds of the word and the name of the letters that represent the sounds. In the final step, the student writes the word down, and states the letters as she/he is writing them (as cited in Polloway, 2005, p. 314).

In Cover-and-Write Method (as cited in Polloway, 2005, p. 314), the student would first look at the word and pronounce it. Then, she/he would write it twice. After that, the word will

be covered, and the student will be asked to write it one time, and then confirm the accuracy of the work. This step is repeated once more. Afterward, the student will be asked to write the word three times, then cover it and write it down one time. Finally, this step is followed by checking the work.

The International dyslexia Association (2008) stresses that significant accommodation with task modifications should be incorporated in the program for students with dyslexia. The accommodations contain the following: scoring printed words principally on content, writing accurate spellings over wrong ones, in addition to restraining rewrites to a rational quantity, encouraging learners to say aloud their ideas and thoughts prior to writing them, and providing them with the spellings of main words related to the content to apply in their writing.

The results of the present study lead to several conclusions. First, Nour showed an increase in her PA, reading, and spelling skills from pre to post stages, which were documented using the Woodcock Johnson III assessment battery. Although Nour exhibited an increase in those skills, the progress made in spelling was not one standard deviation, as the researcher assumed. Secondly, positive changes were documented using the observation scale; yet Nour still exhibited difficulties in spelling. Reading fluency was also a problem for Nour; but it should be noted that LiPS works on reading accuracy, and reading fluency was not targeted in this study. The researcher aimed that Nour becomes accurate in her reading before speed is reached. Thirdly, Nour has shown an increase in self-confidence post the intervention, which was also confirmed by the feedback obtained from Nour's teacher and mother.

## References

- Adams, M. J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, MA: The MIT Press.
- Aylward, E. H., Richards, T. L., Berninger, V. W., Nagy, W. E., Field, K. M., Grimme, A. C., . . . Cramer, S.C. (2003). Instructional treatment associated with changes in brain activation in children with dyslexia. *Neurology*, 61, 212-219.
- Blachman, B. A., Schatschneider, C., Fletcher, J. M., & Clonan, S. M. (2003). Early reading intervention: A classroom prevention study and a remediation study. In B. R. Foorman (Ed.), *Preventing and remediating reading difficulties: Bringing science to scale* (pp. 253-271). Baltimore: York Press.
- Bradley, L., & Bryant, P. E. (1983). Categorizing sounds and learning to read- a causal connection. *Nature*, 301, 419-421.
- Birsh, J. R. (2005). *Multisensory teaching of basic language skills* (2<sup>nd</sup> ed.). Baltimore, Maryland: Paul H. Brookers.
- Bishop, D. V. M., & Snowling, M. J. (2004). Developmental dyslexia and specific language impairment: Same or different? *Psychological Bulletin*, 130(6), 858-886.
- Brown, L., Sherbenou, R.J., & Johnsen, S. K. (2010). *Test of nonverbal intelligence* (4<sup>th</sup> ed). Austin, Texas: Pro-Ed.
- Darch, C. (2002). The strategic spelling skills of students with learning disabilities: The results of two studies. *Journal of Instructional Psychology*, 27, 15-26.
- Duff, F. J., & Clarke, P. J. (2011). Practitioner review: Reading disorders. *Journal of Child Psychology and Psychiatry*, 52(1), 3-12.
- Elkonin, D. B. (1973). Reading in the USSR. In J. Downing (Ed.), *Comparative reading* (p. 551-579). New York: Macmillan.
- Ehri, L. C., Nunes, S. R., Willows, D. M., Schuster, B. V., Yaghoub-Zadeh, Z., & Shanahan, T. (2001). Phonemic awareness instruction helps children learn to read: Evidence from the national reading panel's meta-analysis. *Reading Research Quarterly*, 36(3), 250-287.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). *How to design and evaluate research in education*. New York, NY: McGraw-Hill.
- Gough, P., & Tunmer, W.E. (1986). Decoding, reading and reading disability. *Remedial and Special Education*, 7(6), 10.
- Harwell, J. M. (2001). *Learning disability handbook* (2<sup>nd</sup> ed.). San Fransisco, CA: Jossey-Bass.
- Hinshelwood, J. (1917). *Congenital word blindness*. London: H. K. Lewis.

- Hoover, W. A. (1994). *The simple view of reading: Analyses based on a monolingual sample*. Alvor-Algarve, Portugal: NATO Advanced Study Institute.
- Hudson, R. F., High, L., & Al Otaiba, S. (2007). Dyslexia and the brain: What does current research tell us? *International Reading Association*, 60(6), 506-512.
- Joly-Pottuz, B., Mercier, M., Leynaud, A., & Habib, M. (2008). Combined auditory and articulatory training improves phonological deficit in children with dyslexia. *Psychology Press*, 18(4), 402-429.
- Kantrowitz, B., Underwood, A., & Wingert, P. (1999). Dyslexia and the new science of reading. *Newsweek*, 134(21), 1-11.
- Leipzig, D. H. (2000). The knowledge base for word study: What teachers need to know. *Scientific Studies of Reading*, 11(2), 105-131.
- Liberman, I. Y. (1973). Segmentation of the spoken word and reading acquisition. *Bulletin of the Orton Society*, 23(65), 77.
- Lindamood, P., Bell, N., & Lindamood P. (1997). Sensory-cognitive factors in the controversy over reading instruction. *The Journal of Developmental and Learning Disorders*, 1(1), 143-182.
- Lindamood, P. C., & Lindamood, P. D. (1998). *The lindamood phoneme sequencing program for reading, spelling, and speech (lips)* (3<sup>rd</sup> ed.). Austin, Texas: Pro-Ed.
- Lyon, G.R., Shaywitz, S.E., & Shaywitz, B.A. (2003). Defining dyslexia, comorbidity, teachers' knowledge of language and reading: A definition of dyslexia. *Annals of Dyslexia*, 53, 1-14.
- Maclean, M., Brayant, P. E., & Bradley, L. (1987). Rhymes, nursery rhymes, and reading in early childhood. *Merrill-Palmer Quarterly*, 33(255), 81.
- Mather, N., Wendling, B. J., & Woodcock, R. W. (2001). *Essentials of wj iii tests of achievement*. Canada: John Wiley & Sons.
- McIntyre, L., Protz, S., & McQuarrie, L. (2008). Exploring the potentials of lips instruction for beginning readers. *Developmental Disabilities Bulletin*, 36(1), 18-48.
- Merriam, S.B. (2001). *Qualitative research and case study application in education*. San Francisco, CA: Jossey-Bass Publishers.
- Miller, W. H. (1993). *Complete reading disabilities handbook: Ready-to-use techniques for teaching reading disabled*. West Nyack, NY: The Center for Applied Research in Education.
- Moats, L. (2006). How spelling supports reading. *Reading Rockets*, 29(4), 12-43.
- Orton, S. T. (1928). Specific reading disability-strephosymbolia. *The Journal of the American Medical Association*, 90(14), 1095-1099.

- Pokorni, J. L., Worthington, C. K., & Jamison, P. J. (2004). Phonological awareness intervention: Comparison of fast forward, earobics, and lips. *The journal of Educational Research*, 97(3), 147-156.
- Polloway, E. A., Patton, J. R., & Serna, L. (2005). *Strategies for teaching learners with special needs* (8<sup>th</sup> ed.). New Jersey, Ohio: Pearson-Merrill Prentice Hall.
- Pugh, K. R., Mencl, W. E., Shaywitz, B. A., Shaywitz, S. E., Fulbright, R. K., Constable, R. T., . . . Gore, J. C. (2000). The angular gyrus in developmental dyslexia: Task-specific differences in functional connectivity within posterior cortex. *Psychological Science*, 11(1), 51-56.
- Rayner, K., Foorman, B. R., Perfetti, C.A., Pesetsky, D., & Seidenberg, M.S. (2001). How psychological science informs the teaching of reading. *Psychological Science in the Public Interest*, 2(2), 31-74.
- Rumrill, P. D., & Cook, B. G. (2001). *Research in special education: Designs, methods, and applications*. Springfield, IL: Charles.C Thomas Publisher.
- Shaywitz, B. A., Pugh, K. G., Jenner, A. R., Fulbright, R. K., Fletcher, J. M., Gore, J. C., & Shaywitz, S. E. (2000). The neurobiology of reading and reading disability dyslexia. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *The handbook of reading research* (pp. 229-249). Mahwah, NJ: Lawrence Erlbaum Associates.
- Shaywitz, B. A., Shaywitz, S. E., Blachman, B. A., Pugh, K. R., Fullbright, R. K., Skudlarski, P., . . . Gore, J. C (2004). Development of left occipito temporal systems for skilled reading in children after a phonologically-based intervention. *Biological Psychiatry*, 55, 926-933.
- Spear-Swerling, L. (2005). Spelling and students with learning disabilities. *LD Online*. Retrieved from <http://www.ldonline.org/article/5587/>.
- The International Dyslexia Association.(2008). Spelling and dyslexia. *LD Online*. Retrieved from <http://www.ldonline.org/article/24882/>
- Thomas, R. M. (2003). *Blending qualitative & quantitative research methods in theses and dissertations*. Thousand Oaks, CA: Corwin Press.
- Tillman, T. C. R., & Burns, M. K. (2009). *Evaluating educational interventions: Single-case design for measuring response to intervention*. New York, NY: Guilford Publications.
- Turch, S. (1994). Stimulating basic reading processes using auditory discrimination in depth. *Annals of Dyslexia*, 44, 60-80.
- Torgesen, J. K., Wagner, R. K., Rashotte, C. A., Rose, E., Lindamood, P., Conway, T., & Garvan, C. (1999). Preventing reading failure in young children with phonological processing disabilities: Group and individual responses to instruction. *Journal of Educational Psychology*, 91(4), 579-593.
- Uhry, J. K., & Clark, D. B. (2005). *Dyslexia theory & practice of instruction* (3<sup>rd</sup> ed.). Baltimore, Maryland: York Press.

## **Appendix I**

### **CONSENT LETTER FOR PARENTS**

Dear Parent:

My name is Sarah Jurdì. I am pursuing my M.A. in special education at the Lebanese American University. I would like to work with your child to try and improve her reading and spelling skills using a research based intervention program which is Lindamood Phoneme Sequencing program (LiPS). LiPS is a remedial reading program which successfully stimulates phonemic awareness. Individuals become aware of the mouth actions which produce speech sounds. This awareness becomes the means of verifying sounds within words and enables them to become self-correcting in reading, spelling, and speech.

If you approve, your child will take part in this study for four sessions per week for a period of sixteen to eighteen weeks. Your child's participation in this project is completely voluntary. The information that is obtained during this research project will be kept strictly confidential and will not become a part of your child's school record. The results of this study may be used for a dissertation and presentation. Pseudonyms or codes will be substituted for the name of your child and the school. In the space at the bottom of this letter, please indicate whether you do or do not want your child to participate in this study. If you have any questions about this study please feel free to contact me.

Sincerely,

Sarah Jurdì

Email: sarnjurdì@hotmail.com

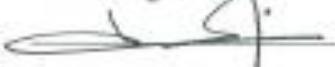
Mobile: 03-808 534

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Yes I agree to allow my child to participate in this project

No I don't agree to allow my child to participate in this project

Parent's signature:



## Appendix II

### Scan of Lindamood's various phonemes

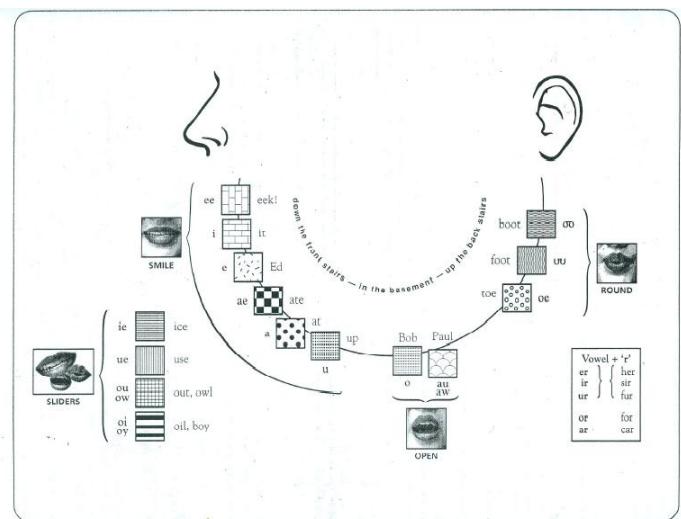


Figure 9.1. The LPS Program's Vowel Circle.

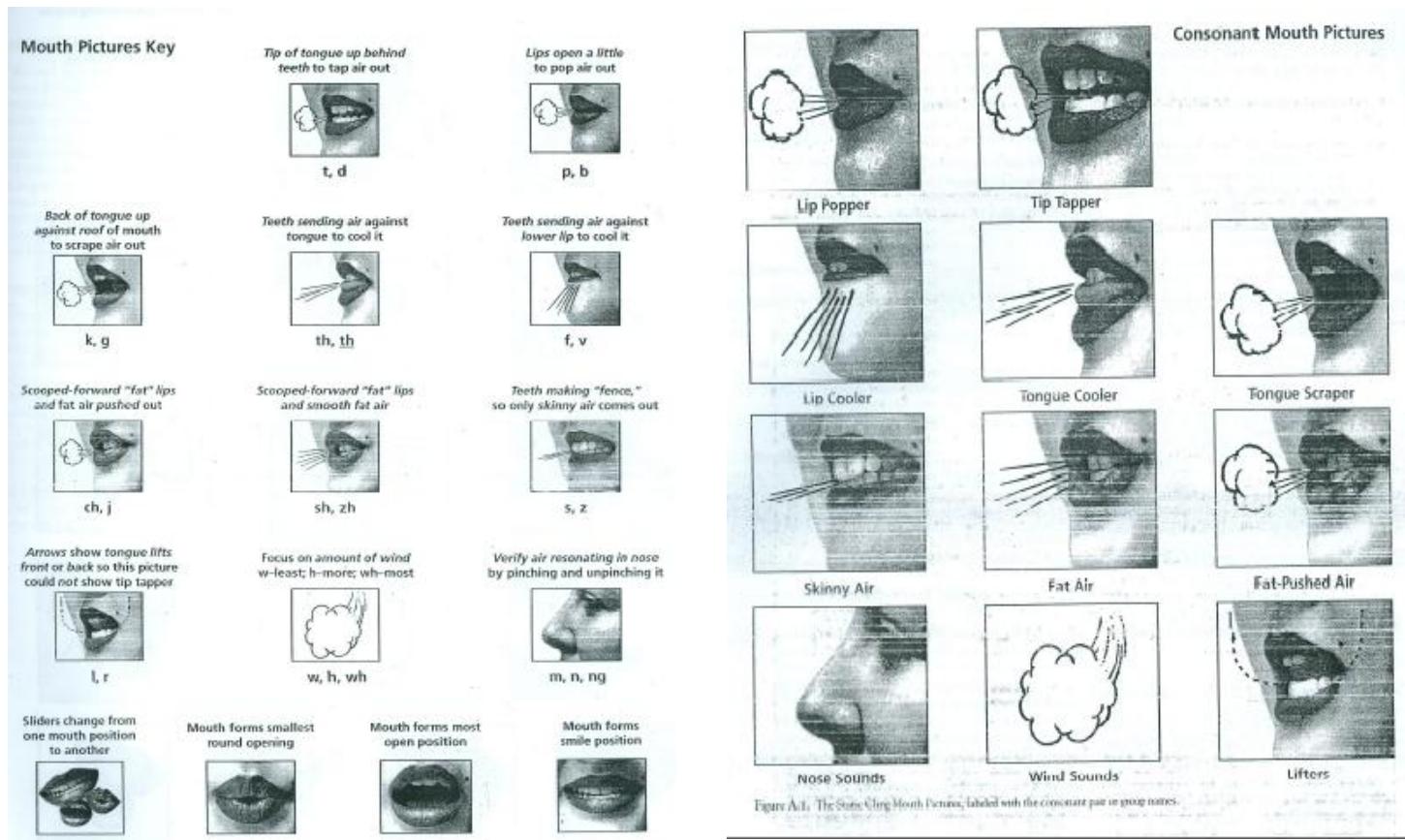


Figure A.1. The Sotac Qing Mouth Pictures, labeled with the consonant pair in gray names.