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Effectiveness of Phonological Intervention in Second/Foreign Language Reading: The Case of a Down Syndrome Girl

Zahra Naderifarjad*
PhD, Faran Mehr Danesh Higher Education Institute, Tehran, Iran.
Nourodin Yousofi
PhD, Razi University, Kermanshah, Iran.

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Abstract

An intervention study was conducted to investigate whether individuals with Down syndrome would benefit from teaching alphabetic skill and single word reading in foreign /second language despite their phonological, cognitive, memory, and intellectual disabilities. This study is a part of a longitudinal case study focusing on developing a program for reading English done at three stages which comprised teaching English alphabet, vocabulary, and reading. The study focused on a Persian speaking girl with Down syndrome who demonstrated phonological deficit prior to intervention. Data were collected by video recording, documentation, and keeping diaries. Assessments of progress were made at the beginning of a new session following the last teaching session and maintenance of gains was held three months after the last teaching session. The result showed significant gains in reading monosyllabic words. The findings demonstrated that Down syndrome individuals can learn basic reading skill in second / foreign language using "combined approach of phonics and reading" along with multisensory language learning approach (MSL).

Keywords: Down syndrome, Combined Phonic and Reading Approach, Multisensory Language Learning Approach.

* *Corresponding author: Faran Mehr Danesh, Karaj, Iran. Email address:* naderifarjad@yahoo.com

1. Introduction

Down Syndrome (DS) is a genetic abnormality, which usually results from the presence of an extra chromosome 21 (Hildyard, 2003). It is often associated with problems in phonological awareness which leads to constant challenges in learning to read and write (Cardoso-Martins & Frith, 2001; Roch & Jarrold, 2012**).** Phonological awareness is generally defined as the ability to explicitly manipulate speech sounds, and is usually measured by tasks that require the identification of syllables or letters within a word, rhyme recognition, spelling, or sound blending (Bryant & Bradley, 1985**).**

Individuals with Down Syndrome display good visual skills (Fidler, Most, & Guiberson, 2005), deficits in phonological awareness (Cossu, Rossini, & Marshall, 1993; Lemons & Fuchs, 2010a) and a profile of stronger word recognition than decoding skills (Burgoyne et al., 2012). This pattern of strengths and weaknesses has prompted some to support the use of the "sight word" approach in which reading involves accessing familiar words from memory (Ehri,1995); however, there is controversy about the aptness of this approach for individuals with Down Syndrome and a great deal of evidence supports the use of phonics for the teaching of reading (Cologon, Cupples, & Wyver, 2011; DCSF, 2009; Goetz et al., 2008; Lemons & Fuchs, 2010b). An obvious problem with the sight word approach is that it does not equip children with strategies for reading unfamiliar words (Goetz et al., 2008).

Although first language reading has been investigated in literature (Byrne, MacDonald, & Buckley, 2002; Goetz et al., 2008; Laws & Gunn, 2002), to the best of researchers' knowledge, second /foreign language reading has not been fully explored. This intervention study was conducted to investigate whether an individual with Down syndrome would benefit from 'Phonic' approach to reading instruction, which encompasses explicit training in phonological awareness.

2. Review of literature

2.1. Reading intervention in Down syndrome

Teaching Reading can be approached in various ways, with significant differences. The two main methods are sight word (whole word) and phonic(analytic). Reading instruction based on phonics highlights the importance of phonological awareness, word structure, and letter sound connections, while

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the sight word approach concentrates on meaningful whole, utilizing flashcards and visual tools for reinforcement.

Many educators believe that students with Down Syndrome are ‘‘visual learners (’’Fidler, Most, & Guiberson, 2005) who learn to read differently than their typically developing peers Namely, through a sight- word approach in which students are taught to recognize whole words based upon their visual appearance with no emphasis placed on learning letter–sound relationships. Support for sight- word instruction is provided by research demonstrating its effectiveness in increasing the number of words students with cognitive impairments can read (Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006; Browder & Xin, 1998, Singh and Singh 1986) ; however, there is controversy about the aptness of this approach for individuals with Down syndrome and a great deal of evidence supports the use of phonics approach which encompasses explicit training in phonological awareness for the teaching of reading.

Fuchs and lemon (2010a) did a review to better understand the role phonological awareness plays for children with Down syndrome. The purpose of their review was to provide a better understanding of the role phonological awareness plays for children with Down Syndrome as they learn to read and to provide guidance on whether phonics-based reading instruction is likely to benefit these students. They identified of 20 relevant studies, 16 of which examined relationships between reading and phonological awareness skills (Boudreau, 2002; Cardoso-Martins & Frith, 2001; Cardoso-Martins, Michalick, & Pollo, 2002; Cossu, Rossini, & Marshall, 1993; Cupples & Iacono, 2000; Fletcher& Buckley, 2002; Fowler et al., 1995; Gombert, 2002; Kay-Raining Bird, Cleave& , McConnell, 2000; Kennedy & Flynn, 2002; Laws & Gunn, 2002; Roch & Jarrold, 2008; Snowling, Hulme, & Mercer, 2002; Verucci, Menghini, & Vicari, 2006) . Researchers in the four additional studies taught Phonological awareness skills to children with Down syndrome (Cupples & Iacono, 2002; Goetz et al., 2008; Kennedy & Flynn, 2003; van Bysterveldt, Gillon, & Moran, 2006). Statistically significant relationships between phonological awareness and reading performance of individuals with Down syndrome were found in all of the studies in which this issue was examined. Results from a review of 20 studies indicate that children with Down syndrome rely on phonological awareness skills in learning to read and suggest that phonics-based reading instruction may be beneficial for at least some of these children.

Cupples and Iacono (2002) compared two types of reading instruction, phonic(analytic) method which included a Phonological awareness component and whole-word (sight word) instruction which did not. In analytic (phonic) method, students learned to identify initial sounds in words and to blend

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onsets and rimes to make words. In the whole-word condition, students learned new words by matching them to pictures and their spoken form. Participants were seven English-speaking children with Down syndrome aged 8;6 (years; months) to 11;1, who demonstrated little or no nonword-reading ability prior to intervention. The children received weekly instruction (for six weeks) in reading aloud 30 regularly spelt monosyllables using an `analytic' approach, in which words were learned by combining onsets with rimes (four children), or a `whole-word' approach (three children). Participants' oral reading was assessed pre- and post-intervention using a reading test comprising the 30 trained words and 30 untrained (generalization) words. Most children (six out of seven) read more training words correctly after intervention than before, with significant improvement shown by four children (two trained analytically, and two trained with whole words). More importantly, reading of generalization words improved significantly in only three children, all of whom had received analytic training. It was concluded that children with DS benefit from an analytic approach to reading instruction, even though their auditory-verbal memory (assessed using digit span) is poor.

While controversy still exists regarding the polarization of these two reading methods, many researchers believed that single approach to reading doesn’t respond. Colozzo (2016) and his colleagues describe an early intervention literacy program that used a combined (hybrid) approach to reading instruction combining whole-word (i.e., visual) and analytic (i.e., phonic or sound-based) reading strategies.

Snowling and Baylis (2011) reported the evaluation of a 10-week phonologically-based literacy programme involving 10 children with Down syndrome (DS). At the outset, each child relied on a whole word method of reading with no apparent use of decoding strategies. The reading and phonological skills of the children were assessed twice prior to undertaking the training (baseline), at the end of training and after three months. The literacy programme targeted phonological skills at the onset–rime level, alphabet work, word analysis and whole word reading within the context of reading books. The results showed a significant improvement in word reading skill and alphabet knowledge for the group, with 4 children developing a decoding strategy for the reading of unfamiliar words

Morgan and his colleagues (2006) also stated that single approach doesn’t respond and suggested "The Four Resources Model". The model describes a repertoire of literacy practices grouped into four main domains that represent resources learners can draw on to engage in texts. The first domain, code-

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breaker, foregrounds developing learners' understandings of letter–sound relationships, syntax, grammar, spelling, and conventions of texts. The second domain, text participant, emphasizes the roles of prior knowledge, relevance, and personal experience in constructing meaning from texts. Text user practices focus on recognizing genres and understanding how texts change depending on audience, context, and purpose Finally, text analyst practices emphasize the ideological nature of texts and focus on reading, writing, viewing, and speaking critically.

There is a considerable and growing body of research and debates investigating first language reading development in individuals with Down syndrome. However, there appears to be a no study regarding foreign language reading. The following research question guided this study:

How does "phonological intervention program and phonics" will affect reading single English words?

2.2. Foreign/second language learning and Down syndrome

All the studies mentioned in previous section was done on first language learning. Research findings have proposed different strategies for learners of second/foreign language who are at disadvantage. Some of these strategies are stated below:

Research findings indicate multi-sensory language learning (MSL) approach for the students who have difficulty in learning a second /foreign language. The MSL strategies are evidence-based and can be applied to any language (Sparks, Schneider, & Ganschow, 2002) .They are supported by a variety of teaching resources to assist instructors in helping at-risk English language learners improve their English language skills(Elke Schneider & Evers, 2009)**.** Effective MSL instruction is based on seven principles that the instructor integrates into language instruction (Birsh, 2005). Based on these principles; First, language is taught in a multisensory fashion. Students are taught to use auditory, visual, and tactile-kinesthetic learning channels simultaneously. Second, the ELL instructor creates a learning environment that fosters metalinguistic aware-ness, i.e., explicit knowledge about the patterns of language. Third, the ELL instructor makes language patterns explicit by directly teaching the concepts. Fourth, the ELL instructor provides students with opportunities for over-learning through practice and frequent review so that the skill becomes automatic. Fifth, language concepts are taught in logical, sequential steps from simple to more complex tasks. Sixth, the instructor uses a cumulative approach by connecting what the

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students know with the new in- formation. Seventh, the ELL instructor assesses student learning with potential cross-linguistic challenges in mind and adapts instruction as needed (Schneider & Evers, 2009).

3. Method

This research is a case study which is qualitative in approach (Creswell, 2013). It tries to monitor foreign language reading of a girl with Down syndrome in progress. As it is mentioned , through case studies, researchers hope to gain in-depth understanding of situations for those involved in their naturalistic environment(Hancock, Algozzine, & Lim, 2021) Based on Yin (2003) classification, this study will have exploratory design at first phase to determine whether a DS case learn English alphabets and vocabulary or not. It will have descriptive design as well which attempt to present a complete description of a phenomenon within its context.

3.1. Participant

A girl with Down syndrome (Nasim) aged 20 participated in this study over a course of a year and a half. Her Parents provided a written consent for the use of their child's assessment data and pictures for the purposes of the present analyses. She was monolingual Persian speaking born in Tehran. She attended an exceptional school and received literacy instruction in Persian her first language. She could read and write in the first language; however; she didn't have any knowledge about the alphabets of second language despite her attendance at school based on the researcher 's pretest. She had the word recognition ability and print awareness in terms of where to start reading and which way to read. She didn't have any visual, hearing or motor disability based on clinical examination

3.2. Instruments

In order to assess her phonological awareness, Soleymani and Dastjerdi's Phonological Awareness Test(Soleymani & Dastjerdi, 2002) was used. Phonological awareness is measured by tasks that require the identification of syllables or letters within a word, rhyme recognition, spelling, or sound blending (Table1).

Validity and Reliability of the test have been confirmed by the developer of the test. Reliability is reported 0.84 to 0.96 for the subscales of the test. Validity of the test was estimated through calculating correlation coefficients between the test scores and other standard tests and the coefficients 0.56 and 0.60 were obtained. The result of the phonological test showed that Nasim had problem in mid letter

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recognition, blending but not segmenting (Table 1). To measure her intelligence, Wechsler test (2012) was taken in a clinic in Tehran. The Wechsler test is a comprehensive clinical tool used for assessing cognitive function. This instrument is used to help diagnosis low cognitive functioning or disability in teens and adults instead of using the more age-appropriate Wechsler, which may be too difficult for this population group. This IQ test consists of a number of tasks measuring various measures of intelligence including short-term memory, analytical thinking, mathematical ability and spatial recognition (Wechsler, 2012). Nasim's verbal comprehension was less than %62, Perceptual reasoning less than %63, Working memory less than %57 and Processing speed less than %54. Thus, this person is classified as intellectually disabled person since lower than 69 is considered as intellectually disabled child (Table 2)

Table 1, Phonological Awareness Test

Phonological awareness subtests	**Score**	**Total**
Syllable segmentation	9	10
Phoneme segmentation	8	10
Onset recognition	7	10
Rhyme recognition	6	10
Blending	8	10
First phoneme recognition	8	10
Last phoneme recognition	7	10
Omission of first phoneme	0	10
Omission of last phoneme	2	10
Omission of middle phoneme	1	10

Table 2, Wechsler test

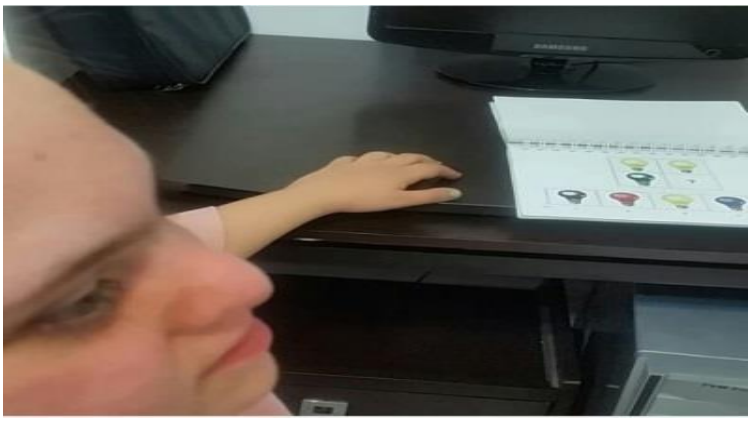
Sub tests	**IQ range**
Verbal comprehension index (VCI)	≤ %62
Perceptual reasoning Index (PRI)	≤ %63
Working memory index (WMI)	≤ %57
Processing speed index (PSI)	≤ %56
Total range	≤%54

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The Draw-a-Person tests (1926) is another cognitive test which was used to evaluate Nasim's mental age. Her mental age was 6 years old which is different from chronological age which was 20. Her mental age was 6 years old which is different from chronological age. To illustrate this, if a mental age of a student is 6, she/he would not have the ability to comprehend and reason like a 13-year-old, so materials aimed at a 13- year- old would have very little meaning for him/her.

Picture 1, Nasim's Wechsler Test



3.3 Material

Considering her mental age (six years old) based on" Draw-a-Person tests", *American First Friend* 1 published by Oxford University Press was chosen. It is a phonemic program designed to develop letter recognition skill and letter formation. This book comprised of 10 units focusing on learning alphabets and vocabularies. Other material used along with the book were flashcards, Persian and English magnet alphabets and a magnet board. (Pictures 2 & 3).

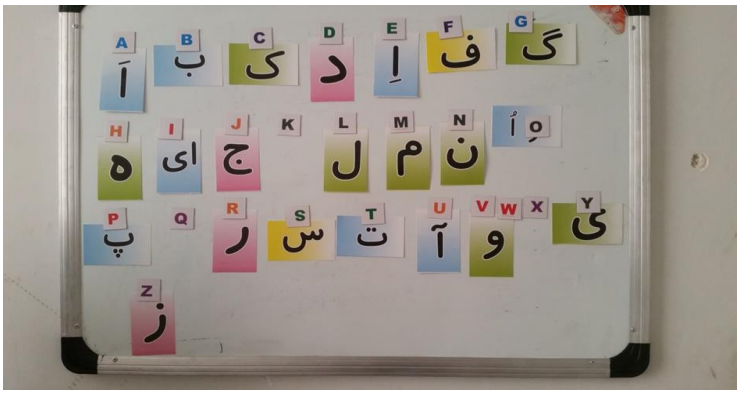
Figure 2, Flash cards



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Picture 3, Magnet persian and English Alphabets



1.4 Procedure

This article is a part of longitudinal case study (Doctoral dissertation) spanning about a year and half. The first stage of the study consisted two strands of alphabet and vocabulary .The alphabet strand was 30 minutes each session for 50 sessions done by the first researcher. Each session included:

1. Listening to phonemes in words
2. Associating these phonemes with the letters representing them
3. Saying phonemes
4. Writing letters to represent phonemes
5. Learning words that start with a phoneme.

The vocabulary strand aimed to teach new vocabulary and promote appropriate and accurate use of new words in expressive and receptive language. Vocab Training stimuli comprised 100 words which she could perceive. These words were pictorial names of 9 semantic categories of fruits, animals, body parts, tools, clothes, toys, and food, size, imperatives based on the American first friend book (Table 3). The purpose of teaching vocabulary was to develop necessary input for meaningful reading.

Table 3, List of taught vocabulary

Car, ball, Teddy bear, toy box, doll, jump rope, queen, violin
Jacket, skirt, cap, shoes, t shirt, pants, hat, gift,
Sit down, stand up, open, close, go out, come in, walk, jump, run, kick quiet,

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Pig, duck, bear, chicken, goat, horse, cow, elephant, dog, lion, ant, octopus, penguin, frog, insect, monkey, fox
Nose, mouth, hand, leg, face, eye, ear, neck
Red, green, pink, gray, yellow, white, black, blue
Table, chair, widow, door, home, crayon, pencil, table, bag
Sun, moon, rainbow, igloo,
Mom, dad, grandma, grandpa, sister, brother,
Tomato, sandwich, donut, water, banana, tea, mango, cookie, orange,
Big, long, short, small, thick, thin

Reading assessment of first phase of the study sessions, she was presented with a list of the stimulus items printed on a card and was encouraged to read as many of those words as she could. Assessments of progress were made at the beginning of a new session following the last teaching session and maintenance of gains was held three months after the last teaching session**.**

The second stage of the study was designed based on the result of first phase which showed pure phonic method doesn't respond in Down syndrome due to cognitive and memory deficiencies The reading intervention program of second stage was an adaptation of Reading Intervention based on " phonological linkage hypothesis "developed by Hatcher, Hulme, & Ellis (Hatcher, Hulme, & Ellis, 1994)which was a combined approach that teaches reading and phonics together. The program has successfully ameliorated the reading difficulties of children who are struggling with reading in first language(Hatcher et al., 1994) . This study used this approach but also added a number of activities to make it more suitable for use on individuals with which were observed at first stage. Accordingly; multisensory language learning approach (MSL) was incorporated to the program. Multi-sensory approach is set of strategies which are used to teach cognitively disabled.

Based on MSL strategies, teaching was in multisensory fashion; i.e., she was taught to use auditory, visual, and tactile-kinesthetic learning channels simultaneously (Elke Schneider & Evers, 2009). At the beginning of each session, she was asked to lay out magnetic letters of the alphabet in correct order on a little magnetic board. She named all the letters by name and then named them again by sound. The Persian equivalents of sounds were stuck below each letter (Picture 4). The theoretical rationale for this was based on idea of using first language when teaching second language to intellectually disabled individuals based on MSL. Linking the L1 to the L2 provides explicit

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metalinguistic awareness to benefit English language learner performance in the new language (Nijakowska, 2008; Schneider & Crombie, 2003; Sparks, Schneider, & Ganschow, 2002). Learners who have difficulties acquiring an L2 need explicit instruction in how to make cross-linguistic comparisons. Using Persian equivalent of the sounds of alphabet provided a visual support for Nasim to overcome her weak working memory and auditory processing. (Picture 4); In making words whenever she forgot the sound, she was referred to those equivalents as mnemonics.

Picture 4, using Persian equivalent as mnemonic



After learning the letters and corresponding sounds, she was made to make the mono syllabic regular words using tactile, kinesthetic and visual senses (Picture 5). Based on MSL strategies Language concepts were taught in logical, sequential steps from simple to more complex tasks.

Picture 5, Making words with magnet letter based on sounds



She was presented with the word in printed form and her attention was directed to the most important phonemes of the word not irregularities. If there was silent letter, she was told not to read them. She was asked to identify initial sounds in words and engage in sound blending activities, letter sound

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identification, and phoneme segmentation. Corrective feedback and assistance were provided until she demonstrated the correct response.

In order to evaluate the effects of the literacy program, the performance of her on reading and reading-related phonological tasks was tested every session. To assess maintenance of gains, the performance was examined three months after the intervention finished.

3.4. Data collection and analysis

In addition to filming all sessions, the researcher also kept diaries and collected documents (assignments) for data collection. The collection of data by filming of the sessions provided the opportunity to analyze the sessions in details. This study prioritized qualitative approach for data collection and analysis. As in any other qualitative study the data collection and analysis occurred concurrently.

In case study research, making sense of information collected from multiple sources is a recursive process in which the researcher interacts with the information throughout the investigative process. In other words, unlike some forms of research in which the data are examined only at the end of the information collection period, case study research involves ongoing examination and interpretation of the data in order to reach tentative conclusions and to refine the research questions (Hancock et al., 2021).

Yin (2003) briefly describes five techniques for analysis: pattern matching, linking data to propositions, explanation building, time-series analysis, logic models, and cross-case synthesis. Regarding Yin classification, this study used to link data to propositions. Yin (2003) notes that one important practice during the analysis phase of any case study is the return to the propositions (if used); there are several reasons for this. First, this practice leads to a focused analysis when the temptation is to analyze data that are outside the scope of the research questions. Second, exploring rival propositions is an attempt to provide an alternate explanation of a phenomenon. Third, by engaging in this iterative process the confidence in the findings is increased as the number of propositions and rival propositions are addressed and accepted or rejected.

Language Related Episodes (LREs) was used as a unit of analysis. In qualitative research design, a language related episodes refers to a specific event or situations that involves the use of language as primary focus of analysis. This episode can be observed, recorded and analyzed to gain insight into how language is used, interpreted and understood by individuals.

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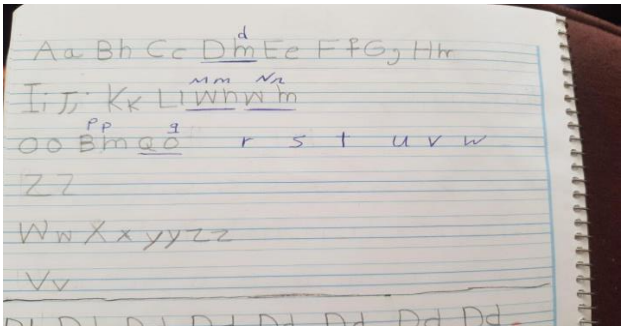
A language-related episode is actually any part of a dialogue where students talk about the language they are producing, question their language use, or correct themselves or others (Swain, 2001). LREs are used in classroom research to identify the degree to which language learners address recently learnt or problematic features of the target language. Research has shown that LREs represent language learning in progress and therefore are the site of language learning. This study used LREs as a part of its methodology to investigate collaborative learning and to keep record of moment-by-moment mediation.

In this study, data analysis comprised a qualitative component which consisted of an in-depth analysis of the data transcripts. As it was mentioned before, in case study research, making sense of information collected from multiple sources is a recursive process in which the researcher interacts with the information throughout the investigative process. In other words, unlike some forms of research in which the data are examined only at the end of the information collection period, case study research involves ongoing examination and interpretation of the data in order to reach tentative conclusions and to refine the research questions. As Algozzine (2006) states case study researchers stick to several guidelines as they simultaneously summarize and interpret information gathered when doing case study research.

4. Result

The first phase of the study comprised teaching alphabets as explained in the method section. In each session 2 or 3 letters were taught. New vocabularies were also taught for having meaningful language context. To assess her reading ability, she was encouraged to read a list of the stimulus items printed on flash cards. (Picture 6)

Picture 6, Nasim ‘s dictation test



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Picture 7, Nasim ‘s Test of reading



The results of the test indicated that she did not gain any reading ability but only alphabetic knowledge. (pictures 6& 7). The result showed that she recognized alphabets; she could say the sounds and do segmenting but not blending and reading. She could say "g" sounds "گ" but she couldn’t apply that for reading words. In fact, letters and their sounds were not perceived as the building blocks of words. They were simply perceived as letters. This can be due to cognitive, phonological and memory deficits of DS students. To illustrate this fact some interactions are presented:

Interaction 1

Teacher: What sound does "d" have?
Nasim: cat
Teacher: D sounds "د"
Teacher: Like what?
Nasim: Bird

She was asked: "what sound does "D" have?" She answered "cat". The teacher herself helped her and said: "No it sounds (د) in Persian". Then the teacher again asked her to say a word in English that starts with" d" sounds which she couldn’t say and replied "bird".

Interaction 2

T; Read this flash card

T: What sound does "h" have?
N: Baghal kardan (Persian equivalent of hug)

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Interaction 3

T: Read this flash card

N: cow

T: very good

T: which sound has c?

N: dog

N: it sounds k

The following two interactions show her inability in blending. When she was asked: "What sounds (B ب) and (E) have together? She replied chicken; Nasim's failure to do synthesis or blending is maybe due to her weakness in memory and her cognitive disability. The cognitive profile of individuals with DS is characterized by impairment of language, verbal short-term memory and working memory (Verucci, Menghini, & Vicari, 2006) .

Interaction 4

T: Read this word "bear "

T: What are "B" and "E" together?

N: Chicken

T: No be

N: Ahaaaa "bear"

Interaction 5

T: Read this word "pig"

N: P and g and I

T: what sounds P and I have together?

N: silence

T: The teacher helps pi

N: ahha pig

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Totally, the first phase of the study showed she was able to segment unfamiliar words but she couldn't read them and the idea of sound and letter link was abstract for her. The second phase of study was developed based on the results of first phase.

In second phase of study the "combined phonic and reading" method suggested by Hatcher (Hatcher et al., 1994) and also MSL strategies were used. Based on "combined reading and phonic method" intervention included strategies that focus on the sounds that make up words (Cupples & Iacono, 2002). The program placed an emphasis on phonological skills at the phoneme level including segmentation, blending exercises and letter sound skill in words

Analyzing the recorded films showed that Nasim got knowledge of sound–symbol relationships and was beginning to apply this knowledge in her reading. The following interactions show Nasim had gained sound- letter relationships and could make and read regular words with the help of the teacher. Interactions of second phase show that Nasim has gained phonemic segmentation.

Interaction 6 shows in making the word "yellow" she paid attention to the most prominent phonemes in the word (Y L O) in spite of teacher's emphasis about the vowel" e " she couldn't place in in proper place. This findings was true about the other words she made "car" as "cr" , "hen" as "hn" , "Black" as "blk" , " ball" as " bl" , hand as "hnd". This is consistent with her test of phonological awareness in Persian which showed her ability in mid-vowel recognition.

Interaction 6

T. Make the word yellow

N: Y l o

T: Where is e Nasim?

T: It has two l

T: It has w at the end

Interaction 7

T: make the word hen

N: Hn

T: where is e Nasim

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Interaction 8

T: Make the word car

N: Cr

T: Where is a?

Nasim could read taught words using a structured intervention program in which the focus was on learning to pronounce words analytically using sounds and spelling; however, there was still a problem in making words with irregular orthography ; since English derives from many languages (e.g., German, French, Latin, Greek), its orthographic system is not based on a simple ‘‘one-letter one-sound basis’’ but rather requires appropriate application of multiple spellings for a sound and multiple pronunciations for a print pattern (Elke Schneider & Evers, 2009) . Her problem is evident in the following interactions:

Interaction 9

T: make pink

N: Pe

T: no

N: Py

T: No

N: Pinc

N: Pink

Interaction 10

T: Make white

N: W

N: Wy

T; no

N: Wit

T: We also put h after w and we don’t read that. It has also silent "e" at the end.

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In order to know whether this gains in reading and in phonological awareness brought about by the current program has been generalized and consolidated, 3 months after intervention regular words and irregular reading test was administered which showed promising gain. To put it another way, she could read all the words given to her on flashcards.

5. Discussion

This case study was done to discover whether Down syndrome individuals can develop basic reading in second or foreign language using phonological training intervention.

The results of the study confirmed the findings of other studies that the cognitive profile of individuals with Down syndrome is characterized by impairment of language, verbal short-term memory and working memory(Verucci, Menghini, & Vicari, 2006) . These individuals have very poor short-term auditory memories and some are therefore simply not able to remember and repeat the sentences they are learning if they only hear them (Cupples &Ianco, 2002).

These findings corroborate those other studies, which show it is possible to improve phoneme awareness in individual with Down syndrome (van Bysterveldt et al., 2006). A number of studies have demonstrated that individuals with Down syndrome benefit from reading instruction which targets phonological awareness and reading skills (Cologon , Cupples, & Wyver, 2011; Goetz et al., 2008; Lemons & Fuchs, 2010b).

The results coincide with research findings indicating that children with Down syndrome can benefit from systematic reading instruction using a hybrid approach that incorporates both visual and word analytic strategies (Al Otaiba & Hosp, 2004; Baylis & Snowling, 2012; Burgoyne et al.2 ;Goetz et al., 2008; Lemons & Fuchs, 2010a; Colozzo et al.,2016).

This study highlighted the significant role of multi-sensory language learning approach (Schneider, & Ganschow, 2002). Based on those principles; teaching was in a multisensory fashion in this research. She was asked to make words using magnet letters using tactile –kinesthetic channel to overcome her weakness in working memory and auditory processing. Among other techniques of MSL were using Persian equivalent of alphabets and mnemonics as visual support to overcome her deficits in auditory processing and working memory. (Picture 1 & 2)

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6. Conclusion

Individuals with Down syndrome can successfully learn to read through structured and instruction that leverages their strengths while addressing their challenges. Both phonics and whole-word learning have roles in teaching reading to children with Down syndrome. Phonics provides essential skills for decoding and independent reading but may require additional support due to challenges in phonological awareness. Whole-word learning, on the other hand, leverages strong visual memory capabilities but should be complemented by phonics instruction as children progress. Ultimately, a balanced approach that incorporates both methods along may yield the best outcomes, allowing educators to tailor instruction based on individual strengths and needs. According to the study, an effective intervention should also take into account the following points:

First, Down students suffer weakness in auditory processing; this means that they generally do not remember or model the speech of others in an efficient manner. Linking auditory and visual information enables individuals to use visual strengths to assist with reducing the risk of overloading auditory memory. Memory aids such as organizers and mnemonic devices, as well as frequent review and repetition, can also lead to increased success for students with special needs.

Second, a considerable body of research demonstrates that individuals with Down syndrome (amongst others) generally have much greater receptive than expressive language skills (Martin etal,2009), meaning that a child with Down syndrome is likely to understand far more than what s/he can say. It is important for teachers to seek to provide alternative modes of participation and responses and not to assume that spoken (oral) language is indicative of understanding – and for teachers to be supported in doing so. Dynamic assessment can yield detailed information about an individual's level of functioning that is not attainable through traditional assessment (Poehner & Lantolf, 2005). In this study taught provoking questions and guided discovery were used to assess the real knowledge of the participant during the interaction with tutor inspired by Ebadi and his colleagues (2018 ,2014).

The findings make children/language learners and their parents more familiar with the factors that can influence successful reading in second language. The individuals with Down syndrome have a specific developmental profile of strengths, weaknesses and needs on which early intervention, education and should be based not only in language learning but also in all aspects of learning; hence, by knowing individuals' abilities and disabilities, teachers, teacher trainers, task designers, and teacher training programs can find ways of preparing students for achieving higher levels learning.

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There are possible orientations which can be considered for future research. First, there is a need for investigating other skills of foreign language learning rather than reading. Since the participant of this study was a young adult, other researchers are recommended replicate the same study with individuals of different age groups. The results of the study suggest the application of dynamic assessment in foreign language reading instruction. Another area to be considered for further research can be incorporating computers and touch-typing programs which facilitate learning by providing auditory and visual feedback.

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