The Contribution of a Morphological and Phonological Intervention Program in Arabic for Typical, Poor and Dyslexic (suspicion of dyslexia) Readers in Kindergarten, with a Follow-up in First Grade

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The Contribution of a Morphological and Phonological Intervention Program in Arabic for Typical, Poor and Dyslexic (suspicion of dyslexia) Readers in Kindergarten, with a Follow-up in First Grade

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**Table of Contents**

[Abstract IV](#_Toc166140659)

[List of Tables VI](#_Toc166140660)

[List of Figures VII](#_Toc166140661)

[Introduction 1](#_Toc166140662)

[Theoretical Background 2](#_Toc166140663)

[Contribution of Morphology to Reading in all the Languages in General and in the Arabic Language in Particular 2](#_Toc166140664)

[Importance of Morphological Interventions among Kindergarteners 4](#_Toc166140665)

[Phonological Awareness and Reading in all the Languages in General and in the Arabic Language in Particular 9](#_Toc166140666)

[Simple Views of Reading and Writing 11](#_Toc166140667)

[Dyslexia 12](#_Toc166140668)

[Dyslexia in Kindergarten 17](#_Toc166140669)

[The Arabic Language and its Complexities 18](#_Toc166140670)

[Relationship between Phonological and Morphological Awareness and Reading and Writing in Arabic 24](#_Toc166140671)

[Research Evidence of the Importance of Reading Interventions in Preschool 25](#_Toc166140672)

[Contribution of a Morphological-Phonological Intervention to Improving Reading in First Grade 29](#_Toc166140673)

[Current Reasearch 30](#_Toc166140674)

[Research Question 30](#_Toc166140675)

[Research Hypotheses 30](#_Toc166140676)

[Method 32](#_Toc166140677)

[Participants 32](#_Toc166140678)

[Research Tools 33](#_Toc166140679)

[Screening Tests for Classification of children into Typical, Poor, or Dyslexic Readers 33](#_Toc166140680)

[Pre-post tests 36](#_Toc166140681)

[Morphological and Phonological Intervention Program 37](#_Toc166140682)

[Post-intervention Reading Assessment Test 42](#_Toc166140683)

[The Research Procedure 43](#_Toc166140684)

[Data Collection 43](#_Toc166140685)

[Data Analysis 44](#_Toc166140686)

[Results 46](#_Toc166140687)

[Morphological Awareness 46](#_Toc166140688)

[Phonological Awareness 48](#_Toc166140689)

[Reading 51](#_Toc166140690)

[Discussion 53](#_Toc166140691)

[Phonological Awareness 53](#_Toc166140692)

[Morphological Awareness 56](#_Toc166140693)

[Conclusions 61](#_Toc166140694)

[Importance of the Research 62](#_Toc166140695)

[Implications of Different Findings 62](#_Toc166140696)

[Limitations of this Research 63](#_Toc166140697)

[References 64](#_Toc166140698)

[Appendices 74](#_Toc166140699)

[Appendix 1. Parent`s questionnaire) screening) 74](#_Toc166140700)

[Appendix 2. Auditory Process Test (screening) 76](#_Toc166140701)

[Appendix 3. Phonological Test (screening) 77](#_Toc166140702)

[Appendix 4. Morphological Test (screening) 78](#_Toc166140703)

[Appendix 5. Rapid Automatized Naming (screening) 79](#_Toc166140704)

[Appendix 6. Basic Cognitive Skills Raven’s Colored Progressive Matrices (screening) 80](#_Toc166140705)

[Appendix 7. Pre-Post-Test, phonological awareness 81](#_Toc166140706)

[Appendix 8. Pre-Post-Test which assesses morphological awareness 82](#_Toc166140707)

[Appendix 9. Morphological and Phonological Intervention Program 83](#_Toc166140708)

[Appendix 10. Reading Assessment Test 89](#_Toc166140709)

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Heba Magadala

# Abstract

The current study examines the effect of a morphological and phonological intervention program among 189 kindergarten children of approximately 6 years old, for a period of approximately four continuous months. The children are from a city in the center of the country with a similar socio-economic status, and of course after receiving of approval from the Ministry of Education and the parents. The children went through screening tests prior tothe program, that test basic reading skills and according to the results, the children were classified as typical, poor readers and those suspected of being dyslexic.

Afterwards, the children were tested before the program and after it, and also did a follow up test in grade one, in order to check the progress of the children in the program and to compare it to children who did not participate in an intervention program. And in addition to this, to compare the different types of children - which type made more progress. Of course, each group of children were divided into an intervention group and a control group. And in grade one, the pupils did a reading test. In analyzing variation intra and between subjects, we see that in morphology, the intervention program did affect the pupils and they achieved higher scores than those who did not participate in the program and the effect is regardless of which group the pupil belongs to. In contrast, in phonology, the pupils who participated in the program progressed more than those who did not participate in the program, but depending on the type of child. In other words, if he was a poor reader or was suspected of being dyslexic, he progressed more than a typical reader. And in the reading test, the children who participated in an intervention program, achieved higher scores than those who did not participate in a program. When a comparison was made between the three groups that went through the program.

(Typical, poor readers and those suspected of being dyslexic). It seems that the typical children achieved higher scores in the reading test.

# List of Tables

[Table 1: Means and SD of morphological awareness according to reading group, intervention, and time. 47](#_Toc166058383)

[Table 2: Means and SD of phonological awareness according to reading group, intervention, and time. 50](#_Toc166058384)

[Table 3: Means and SD of reading abilities according to reading group and intervention. 52](#_Toc166058385)

# List of Figures

[Figure 1: Means of morphological awareness according to reading group, intervention, and time. 48](#_Toc166058553)

[Figure 2: Means of phonological awareness according to reading group, intervention, and time. 50](#_Toc166058554)

[Figure 3: Means of reading abilities according to reading group and intervention. 52](#_Toc166058555)

# Introduction

The purpose of the present study is to show how phonological and morphological awareness in kindergarten improve acquisition of the reading process in first grade. Previous studies have shown that students who develop phonological awareness at a young age, before learning to read formally, make better progress in their acquisition of reading and comprehension skills (Ball, 1993). There are numerous studies that support the fact that morphological and phonological awareness explain differences between students during the process of learning to read. Children with typical reading development utilize their morphological awareness in reading, while dyslexics experience difficulty in applying it, making it difficult for the latter to acquire reading and writing skills (Abu-Rabia et al., 2003).

There are few studies in the field that relate specifically to Arabic readers. The proposed study, which will be carried out among kindergarteners, including typical, poor and dyslexic readers, will help address the need for more research on early literacy learning in Arabic. It will focus on an intervention program that will include phonological and morphological practice and training using various demonstrative aids, such as music. The children will be assessed again at the end of the first trimester in first grade, a year after implementation of the program, in order to examine its impact. The main question that the study will address is whether the program will raise the children’s phonological and morphological awareness, and in turn will facilitate the acquisition of a higher level of reading.

# Theoretical Background

## Contribution of Morphology to Reading in all the Languages in General and in the Arabic Language in Particular

Morphology is the ability to form an association between the components of a word (the root, fixed structure), and identify the letters that form the basis of the word. The individual unit of a word that indicates sound and meaning is known as a morpheme (Moskowitz, 2002). The morphological structure of a word plays a central role in the organization of the lexicon (a set of words that provides vocabulary and knowledge), which serves to facilitate the reader’s understanding of the language and logically discern the meanings of new words (Ravid, 2004). Automatic reading is a process whereby the reader divides words into morphemes and uses these units as an aid for understanding the meaning of the word from the lexicon (the vocabulary stored in memory). Morphological awareness also enables the reader to compare familiar words with new words. Morphological-phonological awareness develops before school age.

The Arabic language, like most of the Semitic languages, is rich with morphology. Plenty of information is being transmitted through morphemes with prepositions, subordinating conjunction, adverbs (person, gender, number and time), inflection of nouns, roots, verbal stem and patterns (Taha, 2009; Frost, 1990). Morphological awareness is important for acquiring reading skills and contributes greatly to enrichment of the vocabulary and to the development of proper writing and reading comprehension abilities. The nature of the connection between morphology and reading is part of the explanation of children’s ability to analyze words and their morphological components to produce meaning (Saiegh-Haddad & Geva, 2008).

Numerous researchers have found that language morphology plays an essential role in reading and spelling (Abu-Rabia, 2001; Prunet et al., 2008). Béland and Mimouni (2001) consider Arabic to be a highly morphological language, which greatly influences readers’ reading strategy. Prunet et al. (2008) claim that Arabic and all other Semitic languages are addressed through the root morpheme, since the root of the word is an autonomous semantic entity. The reader’s lexicon is thus a root and morpheme lexicon/ In other word. Most lexemes in Arabic, including verbs and nouns, are structured from root and pattern morphemes. Roots are generally made up of three or four consonants. Root morphemes represent the general meaning of a word. Pattern morphemes provide accurate lexical meaning and syntactic information and determine person, number, gender and tense (Qaddur, 1996). All verbs and most nouns are made up of non-linear structures of root and pattern, which together constitute the lexical status of a word. The root and pattern are in fact an abstract of the morphological essence of a word, and only combining them together produces a word (Berent & Shimron, 2003; Ravid, 2003; 2006; Shimron, 2003). Boudelaa and his colleagues (Boudelaa, 2014; Boudelaa & Marslen Wilson, 2005) well-described Arabic morphology and its complexity in a series of important studies. Dyslexic readers, as opposed to typical readers, experience considerable difficulty in understanding morphemes and performing morphological tasks Especially in the Arabic language. Abu-Rabia (2007) examined the role of morphology and short vowels in reading Arabic among dyslexic and typical readers in the third, sixth, ninth, and eleventh grades, using Raven’s Matrices, word reading, a working memory test, spelling, and reading comprehension. The results indicated that the morphology knowledge of typical readers contributed to the reading of more words than that of the dyslexic readers, and that for typical readers, this skill developed over time between the third and sixth grades. the fluid nature of Arabic morphological infixation may place heavier demands on phonological awareness and visual discrimination than does derivational morphology in English, which has largely static morphological units (e.g., re + heat + ed = reheated). Similarly, the transition from vowelized to non-vowelized text around grade 3, may place additional demands on phonological awareness. Due to the linguistic differences between English and Arabic, the pathways of phonological awareness and morphological awareness development in Arabic and in English are not identical.

Taha and Saiegh-Haddad (2016) implemented two intervention programs for children with reading difficulties and children proficient in reading in the second, fourth, and sixth grades. One was a phonological program and the other was a morphological program. The children were divided into a morphological intervention group, a phonological intervention group, and a control group. The study compared between the two intervention groups, as well as between each intervention group and the control group. Morphological and phonological awareness as well as pronunciation skills were tested before and after the intervention. The children in both intervention groups demonstrated an improvement in pronunciation skills compared to the children in the control group. The morphological intervention program was found to support poor readers more than skilled readers.

A recent study by Wattad and Abu-Rabia (2020) examined a developmental model of lexicon construction and organization among readers whose first language is Arabic, and compared between typical and dyslexic readers in the sixth, ninth, and tenth grades. The researchers tested groups of students of the same age as well as typical readers who were a year or two youngers than the dyslexic students. The lexical structure of the root morpheme was tested using an initial paradigm, where the researchers examined the impact of auditory repetition on word recognition. The dyslexics were found, inter alia, to have a morphological impairment at the lexical processing stage, which also caused a mix-up in the lexicon, leading to a failure to recognize words. Dyslexics organize their lexicon differently from typical readers.

## Importance of Morphological Interventions among Kindergarteners

Previous studies in this field focused primarily on the role of phonological instruction such as voicing the words and locating the parts in them and locating words that have the same pattern. However, multiple studies indicated that morphological instruction improves reading and is considered effective for children in general, and for children exhibiting reading, learning, speech, and language disabilities in particular (Goodwin et al., 2010). Goodwin’s (2010) research presented 17 studies in English language, that examined how morphological interventions affect literacy outcomes, with particular focus on children who tend to struggle with literacy achievements, including reading comprehension, decoding, fluency, spelling, and vocabulary.

Morphological instruction aims to improve morphological awareness of the morphemic structure of words and children’s ability to affect and manipulate that structure (Carlisle, 1995, p. 194). Morphological awareness with reference to words with the suffix -ing (for example, jump + s or jump + ing, etc.) facilitates the process of decoding and meaning acquisition (Carlisle, 2003). Knowing the meaning of the units and how they relate to grammar and spelling also improves language outcomes and the use of complex spelling patterns: for example, the words *peeled* - which includes two morphemes - peel + *ed* - and *field*, which is one morpheme, sound the same but are spelled differently (Nunes et al., 2006). Theoretically, improving morphological awareness may carry particular importance for poor readers and spellers.

Elbro and Arnbak (1996) found that students with dyslexia read more accurately and quickly when presented with a morpheme-by-morpheme text rather than a syllable-by-syllable text, whereas the control group students exhibited no such differences. It can therefore be concluded that morphological instruction may be particularly important for students with dyslexia.

Explicit morphological instruction and intervention are required for dense morphological forms and texts, particularly among children with reading disabilities, which develops awareness of the morphemic structure of words that contributes to reading comprehension; (Vaknin-Nusbaum, [2021](https://onlinelibrary-wiley-com.ezproxy.haifa.ac.il/doi/full/10.1002/dys.1761#dys1761-bib-8008))

Morphological interventions differ according to the instruction goals as they relate to other aspects of language, such as decoding, comprehension, grammar, spelling, morphological teaching strategies including affix and root word instruction, identifying the affix and root words, building words from morphemes, linking morphemes to grammar, and teaching morphological rules. In such instruction, word mapping was used to separate the morphemes within a word and to relate morphemes to those with similar meanings or word components (Harris et al., 2009). Morphological instruction differed as did the size of the instruction groups, which ranged from individual instruction to instruction in large groups. Many studies indicated that groups defined as students with learning disabilities who received morphological instruction demonstrated higher improvement in reading, spelling, and vocabulary outcomes. Analysis of the morphological structure of complex unfamiliar words for the purpose of interpreting their meaning appears to further aid students in reading words that they have not previously learned. In conclusion, since morphological instruction appears to improve reading, spelling, vocabulary, and reading comprehension, classroom instruction may be significantly more effective if it integrates morphological instruction as part of the teaching syllabus.

An additional study (Mahfoudhi et al., 2010) assessed morphological and phonological awareness in comprehension in two groups: A group of children with learning disabilities and a mainstream control group comprised of children of the same age and reading level. The researchers assessed fluency, reading comprehension fluency, and morphological abilities in both groups, as well as their nonverbal abilities, using the WISC-R. The children were in third to sixth grades and came from six different same-sex state schools in Kuwait – four boys’ schools and two girls’ schools. The children’s first language was Arabic. The children exhibited similar overall verbal abilities. The children with learning disabilities were sampled from special schools. These children had a normal IQ (85 and above). However, they experienced difficulties with basic literacy, reading fluency, coding, and writing or arithmetic, and learned by special teaching methods adapted to their needs.

The study compared the children defined as having learning disabilities and the mainstream children for testing the impact of phonological and morphological abilities in reading comprehension in both groups. The researchers assessed the dependent variable –comprehension – using the Woodcock-Johnson (2009) test. The independent variables, namely phonological and morphological awareness, were assessed as follows: of the 60 exercises that tested the phonological awareness variable, 30 asked the children to repeat the same word without added components (beginning, middle, or end). Each section contained ten exercises, and there were 30 exercises that required a suffix for changing the word’s meaning. For the morphological awareness test, there were 50 exercises in which the children were asked to identify the morphemes and their structure. The researchers performed a regression to examine the level of explained variability (of the reading level) using the research study variables (phonological and morphological awareness).

The results indicated that the level of morphological and phonological awareness explained the differences in the levels of reading comprehension in the mainstream group. Morphological awareness explained the diversity more than the phonological awareness. In contradistinction, the impact of morphological and phonological awareness on reading comprehension could not be predicted for the group with learning disabilities. It is possible that the explanation for this finding lies in the fact that these students were unable to perform morphological or phonological tasks correctly or that they required facilitation from the teacher .in conclusion, comprehension ability in the mainstream group was predicted through morphological ability more than phonological ability, whereas fluency in reading comprehension among the students with learning disability could not be predicted by morphological awareness.

The probable major role of morphological awareness skills required in reading comprehension in Arabic texts, extends that morphological density plays a vital role in reading comprehension of Arabic as a Semitic language. Second, it seems that low-morphological awareness to dense morphemes (especially among children with reading disabilities) may lead to poor performance in reading comprehension. This implies that children's morphological awareness might be used as a diagnostic tool for preventing difficulties in reading and comprehension processes. Additionally, the study has practical implications. Explicit morphological instruction and intervention are required for dense morphological forms and texts, particularly among children with reading disabilities, which develops awareness of the morphemic structure of words that contributes to reading comprehension (Vaknin-Nusbaum & Raveh, [2019](https://onlinelibrary-wiley-com.ezproxy.haifa.ac.il/doi/full/10.1002/dys.1761#dys1761-bib-8005); Vaknin-Nusbaum, [2021](https://onlinelibrary-wiley-com.ezproxy.haifa.ac.il/doi/full/10.1002/dys.1761#dys1761-bib-8008)). The results also provide a valuable guidance for parents and teachers by encouraging children to engage in reading storybooks which can contribute to the development of their morphological knowledge and enhance their reading comprehension skills. As well as incorporating structures with dense morphology in speech interactions with children this can further reinforce their understanding of morphemes and their usage (Aadi, Badaraneh et al, 2024).

The findings of Abu-Rabia’s study (2007) and Mahfoudi (2010), that uncovered the importance of morphological awareness with respect to developing basic literacy among both typical and dyslexic readers in third, sixth, ninth, and twelfth grades and concluded that morphological awareness is a strong predictor of reading accuracy and comprehension, even for dyslexic students. Despite the controversy between researchers regarding the impact of morphological awareness on the reading process, there is no doubt that it is significant for reading acquisition.

## Phonological Awareness and Reading in all the Languages in General and in the Arabic Language in Particular

Phonology refers to the sounds of a word in a language. Phonological awareness relates to the ability to discern between the sub lexical constituents of a spoken language, such as syllables, rhymes, and phonemes, and then to process and utilize them. It is expressed in the ability to perform mental analyses on components of speech, by omitting the beginning, middle, or end of a word, and more (Moskowitz, 2002).

The phonological processing utilizes a wide range of skills, including representation, manipulation, storage, and retrieval of oral sounds, and is made up of three components: the lexical process, short-term memory (and simultaneously, the retrieval of phonological information from the long-term memory), and phonological awareness (Wagner & Torgesen, 1987).

The Arabic language is considered a systematic alphabetic language, meaning there is an agreement between the graphemic representation (the visual part, spelling the word) and between the phonemic part (the sound of the word). The strategies that the reader uses to decoding the phonological code in a certain orthographic system are determined to a large extent by the internal structure of the system and its unique characteristics, in other words by the manner in which the phonological code is represented visually. If so, the reader might have acquired strategies that fit to his mother-tongue will face a reading process and as a result will improve his reading comprehension level (Koda, 1997; Abu Rabia, 2000; Moscowitz, 2002).

In a study conducted with first graders, some of whom were defined as typical readers and some as poor readers, a connection was established between phonological awareness and the recognition of written words (Assadi, 2011). However, word recognition and other phonological manipulations are affected by the properties of the word, in that a short word is easier to read and requires fewer phonological skills for example: PA’s link with vocabulary learning. (Assadi, 2011; Treiman & Weatherston, 1992). However, phonological awareness contributes to explaining the variability in reading comprehension among both typical and poor readers, independently of word-recognition abilities (Engen & Hoien, 2002).

Another study claimed that language acquisition affects the progress of phonological representation, and that awareness of the various phoneme sounds and knowledge of the level of the nuclear sounds do not develop spontaneously and therefore require direct instruction. Learning letters and writing syllables and words facilitates the development of phonological awareness. Understanding the connection between the sounds of the language and their written representations (symbols) is very beneficial for the reading and spelling processes (Ziegler & Goswami, 2005). A second study, which supports these findings, discovered that children’s knowledge of the phonological structure is the best predictor of an early ability to read (Bradley & Bryant, 1983).

Theories regarding the development of reading skills posited that phonological processing is a basic cognitive process, and the most important one for literacy learning (Stanovich, 1988). Waters et al. (1988) found that readers who have trouble reading find it difficult mainly when reading unfamiliar words as opposed to familiar words. In addition, it seems that this difficulty is the fundamental problem of children with reading disabilities. This disability often accompanies them into adulthood, and it is still experienced when they progress to typical reading. Correlations were also found between phonological awareness and age, vocabulary, children’s linguistic environment, and as mentioned, reading and comprehension abilities (Abu-Rabia, 2008; Ball, 1993).

In another study, this showed itself effective because, after application of the phonological intervention for students at risk for dyslexia, it was verified that of 20 students with phonological disorder (100%), only three students (15%) continued to show phonological disorder together with the difficulties in the recognition of letters, no association of relation letter/sound, alteration in the discrimination of sounds and letters based on the difficulty of distinguishing the contrastive traits. For students of the dyslexia group, the ability to discriminate auditory stimuli and process auditory information is more compromised due to the frame of phonological disorder, however, when worked on the sound discrimination in the early stages of literacy, the difficulty in distinguishing and storing information in order to hereafter use them in reading tasks, for example, becomes more effective because the phonological working memory is able to retain and manipulate information temporarily while participating in cognitive tasks such as reasoning, comprehension and learning (Silva & Capellini, 2015).

Most studies that examine the influence of phonological and morphological awareness are carried out with reference to the neurotypical and the dyslexic populations. This study will also address the latter population, as well as poor readers. Studies that defined dyslexia were therefore reviewed.

## Simple Views of Reading and Writing

Literacy represents deriving meaning from print and using print for expression and communication. The simple views describe these outcomes, reading comprehension in the case of the SVR and written composition in the SVW, as a function of components: a phonics-based skill (decoding or spelling) and oral language-based skills, linguistic comprehension or idea generation (Gough & Tumner, 1986; Juel et al., 1986). Frequently, researchers operationalize these later components with standardized oral language measures (Foorman et al., 2018; Kim & Schatschneider, 2017). More recently, theorists have revised the SVW to also include a self-regulation component and transcription (handwriting and spelling), stressing their collective coordination within the writer’s working memory (Berninger & Amtman,n, 2003). Collectively, these models can be applied to multiple languages, orthographies, and writing systems (Catts, 2018; Graham & Eslami, 2020; Florit & Cain, 2011; Yeung et al., 2017). Of course, the SVR/SVW includes shortcomings that practitioners and researchers alike must acknowledge. Both models appear to minimize the complexity of their components and outcome variables (Catts, 2018; Kim & Schatschneider, 2017). Expanded models unpack these skills, highlighting roles for phonology, orthography, morphology, semantics, and rapid naming skills. They also add other cognitive and conative sources of influence such as students’ motivation and beliefs about literacy, general background knowledge, understanding of genre, text features, or reading and writing strategy use (Kim, 2020a, 2020b; Pressley et al., 2009). Also, the simple views do not provide details around the mental processes leading to comprehension or written expression. Via elaborations and inferences from text, reading comprehension involves the construction of a situational or mental model, integrating the text with the reader’s background knowledge (Lenhard et al., 2013). As others have stressed, a reader’s comprehension varies based on the type of text and the purpose(s) for reading (Catts, 2018). Yet, scholars stress that the simple view of reading was not intended to be a complete explanation of reading development or the reading process but rather a broad, general framework of individual differences causing poor comprehension (Tunmer & Chapman, 2012).

## Dyslexia

Dyslexia has been subject of extensive research over recent years. According to the International Dyslexia Association (IDA), “the definition of dyslexia is a specific neurological learning disability, which is characterized by difficulties in word recognition and reading, writing, and decoding disabilities. These difficulties are the result of a phonological disability. It is often impossible to foresee the connection between the disability and other cognitive abilities. However, since dyslexics encounter reading and comprehension difficulties, they lack reading experience, and this leads to a smaller vocabulary and less general knowledge’ (IDA, 2002) (https://dyslexiaida.org/definition-of-dyslexia/).

The Macalester College website describes two kinds of dyslexia (Dyslexia, 2003). The first is developmental, caused by a biological abnormality in the brain before birth, and is mostly genetic. The second is acquired as a result of brain trauma that can occur before or after birth. The first kind of dyslexia is divided into three subtypes: dysphonic dyslexia (a speech impediment) defined as the inability to articulate the familiar or unfamiliar word despite visual reading ability; dyseidetic dyslexia, where readers are able to decode both familiar and unfamiliar words phonologically through slow articulation, yet fail in their visual reading of the words; and a combination of the two and the most severe, where sufferers experience difficulty in both phonological decoding and visual reading.

The website medicinenet.com (2012) posits three kinds of dyslexia. The first is “trauma dyslexia,” which usually occurs after a brain injury in the area that governs reading and writing, similarly to the description in the abovementioned research. The second is an underlying genetic difficulty, and refers to a functional disability of the left side of the brain which does not vary with age. This also resembles the description in the above-mentioned study. The innovation of this study is the discovery of a third type of dyslexia, which occurs more among boys than among girls due to hormonal changes that take place during fetal development (https://www.medicinenet.com/dyslexia/article.htm).

Thus, there is no universally agreed upon or uniform definition of dyslexia. The disability may be due to many neurological causes and other reasons related to learning techniques. Persons with dyslexia rely more on visual processes and less on orthographic processes such as morphology and writing, on which non-dyslexic people are more inclined to rely. In addition, the right hemisphere of dyslexics’ brain is larger than the left hemisphere. These students receive different methods of instruction which serve to answer their needs, and which is precisely the idea of alternative learning – a good idea, since this type of learning teaches them strategies that support the multiple intelligences theory, which holds that dyslexics can be intelligent in various ways other than linguistically, and there are indeed dyslexics who are successful.

Alexander (2000) discovered that morphological awareness differentiates good readers from those who are not as good. Egan and Pring (2004) showed that dyslexic children aged 11-12 years made more spelling errors compared to typical readers of the same age, and the former are inclined to make more morphological errors relating to the various word forms.

Elbeheri and Everett (2007) studied the connection between the phonological process in Arabic and reading ability. For the purposes of their study, they sampled 353 children (167 girls and 186 boys) aged 9-11 in Egyptian elementary schools. The participants were asked to remove components of a word, read core words, differentiate between similar words, and write. The results revealed a connection between literacy, decoding, and the level of phonology. They also showed that the variability between dyslexics and non-dyslexics is explained by their decoding abilities, a predictor of reading and writing words among Arabic-speaking children. It was found that the level of phonological awareness can be a good indication of dyslexia.

There are additional reasons that relate to physiological systems, such as neurological and other reasons for dyslexia as mentioned above. Some of these are described below. Al-Wabil and Al-Shea (2010) analyzed the eye movement of four dyslexic and four non-dyslexic readers while reading Arabic texts. The readers, who ranged in age from 10-12 years and were in the fourth to sixth grades, were asked to read four passages: Two featured a great deal of orthographic content, and the other two much less. The purpose of the study was to test whether it is possible to develop specific areas of the brain or body, which would lead to an improvement in reading, and to build a program to help the students. The findings indicated differences in eye movements between the dyslexic and non-dyslexic participants while reading. The dyslexic readers fixated on the words for long periods and had a low level of reading. The results indicated that eye movements when reading reflect readers’ cognitive processes.

Much research shows that there is no clear diagnosis of dyslexia in kindergarten. But there are a few tests that can point to a difficulty in basic literacy that predict reading difficulties, that are based on phonological awareness and flow. Therefore, you can sort the readers from preschool to typical readers, readers with difficulties and suspected dyslexia.

Typical Readershave a standard score between the mean and above (scale of 1-19, with a mean of 10) in test (RAN) (Denckla & Rudel, 1974) andThe Sound Blending subtest of Woodcock-Johnson’s (2017). The standard score of poor readers in this subtest is between low normal and borderline 5-7. Dyslexic Readers (suspected) have a standard score between the borderline and very low (4 or less).

There is a difference between defining developmental language disorder and between defining dyslexia, though there is a connection between them. A developmental language disorder is a prominent language difficulty, which is not a general difficulty but focused on language disorder (or difficulty in speaking). Another definition for language impairment is normal intelligence versus language function in the lower decile of the population. Children with language impairment are having difficulty in morphology and syntax. Meaning they have difficulties in the proper structure of the word and the sentence. They have difficulty in argumentative structure and phonology (the sound structure of the word). Most of the young children with language impairment have difficulty in producing correct sounds of words. However, vocabulary and pragmatics (the manner of use in language as communication) are related in a less close manner to language impairment. Testing vocabulary is not a good indication for locating language impairment, impairment in a language is closely related to dyslexia. Forty to fifty percent of the language impaired are having difficulty with learning to read, and afterwards suffer from reading impairment also when they are 15 years old. Most of the children with dyslexia had difficulty in speaking and in language development during school years and half of them have language Impairment.

In both groups, the dyslectic and language impaired, there is a lack in speaking perspective, phonological awareness (dismantling of a word to its sounds), repeating words and sentences, grammatical judgment, and quick naming. The link between reading to language impairment is related to a difficulty in phonological awareness as well as the speaking quality of children. There is a direct link between difficulties in pronunciation and between low phonological awareness, and afterwards also for difficulties in reading: when a child errs in pronouncing a consonant in preschool age, he has difficulty afterwards also in phonological awareness on the same consonant. Meaning, he has difficulty in locating it inside the word. Further on, he has spelling mistakes on the same consonant. The early language development amongst children in the risk of dyslexia (that one of their parents is diagnosed as dyslectic) is more similar to children with language impairment already in preschool age, between one and a half years-old to five years-old.

Much prospective research showed that children who are in risk of dyslexia have lack in speaking perspective, in phonological adaptation, in literal memory for short-term and in a meta-phonological ability. Prospective research found that children at the age of two and a half had a smaller range of syntactic structures and more errors in producing speaking were diagnosed as dyslectic at the age of eight. In the age of three and three and a half the vocabulary skills of dyslectic children were less developed and syntax difficulties continued. Syntax skills were a unique predictor of reading impairment which developed later. Other research found that lack in areas of phonological and meta-phonological adaptation predict dyslexia (Webster, R.I. & Shevell, M.I., 2004)

The Arabic language is unique in that the way of writing its letters varies according to their placement in a word (beginning, middle, or end). For example, the letter "ه appears differently in the word جاهز (ready), as opposed to the way it is written in the word جهاز (device). Dyslexics often suffer from a defect in the visual-orthographic system, impairing their ability to encode the letter so that it matches its position in the word.

Finally, and according to the above-presented research findings, funding should be allocated for experts to research the different types of dyslexia and to trace the causes, symptoms, and predictors of dyslexia in Arabic. This may enable the design of a suitable learning program that will include texts equally suitable for the needs of dyslexics and typical readers so that all students will be able to realize their potential in reading and writing.

### Dyslexia in Kindergarten

It can also be difficult to assess the risk of dyslexia as early as kindergarten because students enter kindergarten with diverse experiences, backgrounds, and exposure to academic concepts. However, children of dyslexic parents were found to have an increased risk of dyslexia (a 4.3-fold risk) when dyslexia are defined as poor phonological recoding (poor reading of nonwords and pseudo homophones of real words) (Elbro & Borstrøm, 1998). All language measures in kindergarten were statistically significant predictors of dyslexia. Logistic regression analyses with backwards stepwise selection indicated that three measures contributed independently to the prediction of dyslexia: letter naming, phoneme identification, and distinctness of phonological representations was tested by omitting parts of a word. The measure of distinctness of phonological representations also contributed significantly to the prediction of poor phoneme awareness in second grade, even after taking differences in early syllable and phoneme awareness, articulation, and productive and receptive vocabulary into account (Elbro & Borstrøm, 1998).

Dong et al. (2009) compared children who attended rigorous prekindergarten programs, children who participated in Head Start, children with home schooling and children with limited to no exposure to reading. They found that children who attended center-based daycare or a preschool program, had better reading and math achievements at the beginning (autumn) of kindergarten than children who attended Head Start. Achievement gaps based on socioeconomic status exist on the first day of kindergarten in reading and math skills, approaches to learning, and persistence in completing tasks (Garcia & Economic Policy, 2015).

Positive long-term effects of phoneme awareness training in kindergarten were found in a study with children of dyslexic parents (Elbro & Peterson, 2004). Thirty-five at-risk children (attending 26 different classes) participated in an intensive 17-week program in their regular kindergarten classes designed to help them improve in phoneme awareness. Follow-up measures indicated that the trained children outperformed 47 untrained at-risk controls in both word and nonword reading in second, third, and seventh grades. For the very poorest readers, significant effects were found even in seventh grade reading comprehension. However, the trained at-risk children were found to lag behind a second control group of 41 not-at-risk children in most aspects of reading. Treatment-resistant children had relatively poor phonological representations of known words that test with reading (Elbro & Petersen, 2004(.

As mentioned in some of the above-described studies, Arabic is a complex and especially challenging language for the reader. Its complexity needs to be recognized, as well as the reasons why it requires competence and unique skills to reach an accurate and rapid reading level.

## The Arabic Language and its Complexities

The Arabic language (Arabic: العربية) belongs to the southern branch of the West Semitic languages family. Literary Arabic (*Ala alArabia alfatzha -* اللغة العربية الفصحى,) is principally used for writing and communication throughout the Arabic-speaking world. Its key role in Muslim life is to preserve the language of the Quran. Spoken Arabic (*Ala alArabia alamaia* - اللغة العربية العامية,) exists alongside literary Arabic. Spoken Arabic is fundamentally different from the written literary Arabic, thus creating a socio-linguistic situation of diglossia producing an additional complexity in reading, unlike other languages (Abu-Rabia, 2000).

Arabic is an interesting language in which to study orthographic depth since, like Hebrew, it has two types of scripts: a more transparent vowelized version and a more opaque or non-vowelized version. Both scripts are identical apart from the inclusion or exclusion of markers that represent short vowel sounds in the language. The Arabic orthography is based on an alphabetic writing system. However, the letters of the Arabic ‘alphabet’ (sometimes referred to as an abjad) represent consonants along with long vowel sounds. Short vowels in the script are represented by diacritical markers above or below an Arabic letter/consonant. These diacritics, collectively referred to as الحركات Alharakat, are: الفتحة fatha (vowel/a/), which is indicated by a small horizontal line drawn over the letter; الكسره kasrah (vowel/i/), which is indicated by a small horizontal line drawn under the letter; and الضمة Dammah (vowel/u/), which is indicated by a small و)) waw drawn over the letter. Inclusion of short vowel diacritics can help the reader specify a word’s phonological form, allowing the reader to pronounce it correctly in isolation. Moreover, short vowels convey the meaning of the word at morphological and syntax levels (e.g., by conveying word class, such as noun or verb forms). Hence, the absence of short vowels increases opaqueness at both the lexical and phonological level. Unvowelized text can produce a large number of homographs in Arabic, potentially requiring the reader to have to process combinations of words in order to derive the meaning (and correct pronunciation) of an individual devowelized words. In such situations, the Arabic reader is heavily dependent on context to facilitate word recognition (Abu-Rabia, 2002). Studies performed on Arabic comparing the reading process on the two types of Arabic script (vowelized & non-vowelized) suggest that processing vowelized text is easier than processing non-vowelized. Abu-Rabia (2001), in a series of studies investigating the role of short vowels on reading performances, has concluded that short vowel diacritics are significant facilitators of word recognition and reading comprehension regardless of the level of reading skill or the age of the reader, possibly due to the phonological information that the short vowels carry. Despite the potentially useful role those Arabic diacritics play in supporting decoding during reading, there are several reasons to question the strong viewpoint that including diacritics always leads to advantages for all Arabic readers, particularly those who have had several years of experience of processing nonvowelized text.

First, the visual complexity of text increases when diacritics are included in text, which may slow reading down (Ibrahim, Eviatar, & Aharon-Peretz, 2002). Additionally, the different functions that these diacritics carry out at phonological, morphological and syntax levels may be a source of confusion for some Arabic readers (Mohamed, Elber, & Landerl, 2010) and may lead to misreading and misspelling (Azzam, 1993), or to slower reading (Eviatar, Ibrahim, & Ganayim, 2004). Finally, familiarity with non-vowelized text may make it harder the influence of working memory on reading comprehension to process vowelized text because the skills developed to process non-vowelized words are different from those used with the vowelized form of the orthography. One of these areas of differential processing may be working memory given the need to support word processing through context when words are devowelized. There is a general agreement that phonological processing skills play an important role in developing reading skills in vowelized and non-vowelized Arabic; and tasks assessing phonological processing skills, especially phonological awareness, are found to be significant predictors of reading skills (Elbeheri & Everatt, 2007). Similar to English, the data on Arabic have indicated differences in the contribution of phonological awareness and rapid naming to reading skills. Results argue for the influence of rapid naming to be more evident in the early stages of reading when children are exposed primarily to vowelized scripts, with this role decreasing in later stages of reading development when children are exposed to nonvowelized scripts (Taibah & Haynes, 2011). In contrast, the phonological awareness skills, especially measures of phoneme deletion, have been found to play an important role in reading regardless of the type of the script and the stage of reading development (Al-Mannai & Everatt, 2005; Elbeheri & Everatt, 2007).

One of the most prominent characteristics of the Arabic language in the context of acquiring reading and writing skills is its diglossia character (Saiegh-Haddad, 2008, 2011; Ferguson, 1959) which exists next to the spoken Arabic language (or its specific dialect) which the speakers use for daily oral communication and by which children acquire it as a mother-tongue (or other linguistic color) and it is the standard Arabic language (or literary) which is used primarily for reading and writing. The early exposure of children to spoken and standard Arabic found to be related to cognitive representation of both languages, which is similar to a state of bilingualism (Ibrahim & Aharon-Peretz, 2005). Moreover, exposure to both languages found to be accelerating the development of meta-linguistic awareness amongst children such as the one we see in a state of bilingualism (Eviatar & Ibrahim, 2000). However, research did not find a link to advantage in linguistic awareness to any advantage in reading as expected (Olstein & Zozovski, 2004). The research shows that this disadvantage can be derived from the linguistic and orthographic challenges that the Arabic language posits on children, challenges that can overcome the advantage in meta-linguistic awareness and cause difficulties in reading development.

One challenge is the linguistic gap between the standard and spoken Arabic in all the language fields: phonology, morphology, syntax, and lexicon. For instance, phonemes which are used only in the standard language (Saiegh-Haddad & Henkin-Roitfarb, 2014). Likewise, about 40% of the words in the spoken language of children aged 5 are not used in the standard language (Saiegh-Haddad & Spolsky, 2014). This linguistic gap is found to be an important cause that affects the development of basic literate skills in Arabic, such as phonologic awareness and reading words (Saiegh-Haddad, 2003, 2004, 2007, 2012; Saiegh-Haddad & Schiff, 2016, 2017, 2018; Saiegh-Haddad, Levin, Hende & Ziv, 2011; Saiegh-Haddad, Shahbari-Kassem & Schiff, 2020; Saiegh-Haddad & Schiff, 2016). Nonetheless the literate abilities of children in kindergarten predicted the reading abilities in Arabic in the first grade (Hassunah-Arafat, Aram, Korat & Saiegh-Haddad, 2017). A second challenge is the orthographic intricacy (Eviatar & Ibrahim, 2014), and especially the formative similarity between the letters and the multiple forms of the same letter. Research show that these orthographic attributes can hinder the processing of the letter and decelerate reading acquisition (Abdulhadi, Ibrahim & Eviatar, 2011; Ibrahim, Eviatar & Aharon Peretz, 2002; Eviatar, Ibrahim & Ganayim, 2004).

Eviatar and Ibrahim (2002) compared the meta-linguistic abilities of children who spoke both Hebrew and Russian to exclusively Hebrew-speaking children, and exclusively Arabic-speaking children. They found that phonological awareness among children speaking exclusively Arabic resembled the phonological awareness of the bilingual Hebrew and Russian-speaking group more than the exclusively Hebrew-speaking group. A possible explanation for this finding is that the acquisition of literary Arabic is similar to the acquisition of a second language, despite the great similarity to the Hebrew language in terms of orthography. The way Arabic letters are connected in the word generates the skill of connecting components to create a whole word.

The words in Arabic constitute a root and structure. For instance, the word راكب contains the root ر.ك.ب and the structure فاعل. Readers of Arabic rely on visual awareness to identify the root or structure of a word, especially when the beginning or end of a word is easily identifiable (Saiegh-Haddad & Geva, 2008). This process assists the reader in knowing the meaning of the word. In other words, the Arabic reader needs good analytical and combinational abilities in order to arrive at an accurate interpretation of the word. Moreover, morphological awareness is extremely important when reading Arabic, since there are myriad forms of words derived from the same root (inflections), and it is important to recognize this for the purpose of writing and reading comprehension. Arabic morphology is constructed from two key systems: derivation and declension. The morphology of derivation is the addition of morphemes to the basic verb, مجرد)) )mujarrad), which includes three or four root consonants. A new verb is produced by using the root together with additions and changes added to the same basic root,) مزيد))mazeed). When morphemes are added to a basic root, they produce new meanings for existing words or change their grammatical category. For example, تمارض (tamarada) (makes himself ill) is derived from the rootض ر م (m r d) (ill) with the addition of (t & aa) (Chalil, 1995).

The morphology of declension is linked to syntax, and depends on the grammatical role of the word. Verb declension is systematic and linked to person, number, gender and tense. Nouns have a masculine or feminine form, where the feminine form is created by adding particular endings to the male form (Abd El-Minem, 1987; Al-Dahdah, 1989; Wright, 1967). According to Qaddur (1996), there exist three types of pattern morphemes: free; linked and zero morphemes. Free morphemes, which are infrequent in Arabic, are single words such as الى) Eila). Linked morphemes (affixes) are common and are added as prefixes, for example the letters that symbolize the present tense أنيت حروف) Anit); infixes, such as duplicating the second letter in the root of a verb) فعل FaAaLa); and suffixes, such as the suffix X which symbolizes plurals (حداد welder; حدادون welders). Zero morphemes do not change the form of a word, but nonetheless indicate particular features arising from context. For example, the verb كتب (write) shows a singular, masculine person in simple construction. In this verb, the morpheme is not marked.

.Arabic reading thus relies on phonology and orthography (see Boudelaa & Marsken-Wilson, 2005).

Arabic-speaking children who begin school with limited phonological awareness a phonological basis may encounter difficulty internalizing the alphabetic principle and matching the phonology to the writing. These children will have difficulty acquiring Arabic reading skills, and it is reasonable to assume that they will increasingly lag behind, and even develop a negative attitude toward Arabic reading, and will eventually be considered as underachievers (Bentin & Leshem, 1993).

## Relationship between Phonological and Morphological Awareness and Reading and Writing in Arabic

It can be inferred from the above literature that the higher the phonological and morphological awareness, the higher the level of reading comprehension and acquisition of reading, and the richer the vocabulary. Arabic, like other Semitic languages, contains a rich morphology. It conveys considerable information through formal means, including prepositions, pronouns, verb tendencies (first, second or third person; gender, number, and tense), noun tendencies (gender, number and affiliation, roots, structures, and weight). Morphological and phonological awareness thus plays a significant role in acquiring Arabic – especially Arabic reading – and contributes greatly to vocabulary enrichment and accomplished reading, writing, and comprehension capabilities (Taha, 2009).

Findings are consistent with the results of similar studies. For example, Scarborough (Scarborough, [2005](https://www-tandfonline-com.ezproxy.haifa.ac.il/doi/full/10.1080/1034912X.2020.1737319)) found that awareness of morphemes must build on awareness of phonemes and syllables. Thus, the two-way relationship between phonology and morphology supports successful reading.

Other studies note that phonological processing and phonological awareness of word sounds in the child’s language are vital to the process of acquiring reading. This phonological knowledge requires acquisition of the orthographic structure of words, and also draws on orthographic depth (diacritic or non-diacritic words, emphatic letters, and more). In this way, orthography influences learning. It is worth noting that as with phonological and morphological awareness, good command of language as well as linguistic cognitive and meta-cognitive knowledge can also be transferred to the reading comprehension process).

In conclusion, the findings of this study expand the available theoretical knowledge of the nature of the Arabic language and how it is acquired, and contribute to better understanding of how to apply this knowledge to challenged students in Special education (Bishara, 2002).

## Research Evidence of the Importance of Reading Interventions in Preschool

Over the past few years there has been growing global concern that many children, especially those from underprivileged communities, have difficulty acquiring the basic foundations for reading. As a result, many are referred to special educations a result, many are referred to special education framework; this case is an additional reason for planning early interventions prior to formal schooling, in order to provide children with basic literacy skills (decoding and reading comprehension) (Storch & Whitehurst, 2002; Whitehurst & Lonigan, 1998). Numerous studies demonstrated the contribution of interventions whose purpose is to impart word-reading in preschool, to support smoother acquisition of reading in first grade. Preschools can offer children their first opportunity to work according to instructions and receive structured support.

Many schools and preschools have begun to take steps toward the development of intervention programs aimed at preventing reading difficulties. The *Response to Intervention* model (RTI) tests children’s response to interventions developed to improve reading. The model aims to improve the reading instruction and reduce the number of children who will encounter reading difficulties in elementary school, as well as referrals to special education (e.g., Gerstee et al., 2008). The model not only examines the level of reading at a single point in time, it also monitors progress over time. For instance, comparison research on models that took solely into account reading level, showed that later models - that combined both the reading level and progress monitored over a five-week period and follow-ups on word recognition - were able to identify reading difficulties more accurately in the second grade as opposed to the early models that presented an improvement in phonological awareness and word-recognition in the first grade (Compton, Fuchs, Fuchs, & Bryant, 2006). Al Otaiba et al. (2011) examined the reading accomplishments of first graders who began developing skills in preschool. The research covered 20 classes from seven different schools from diverse ethnic and socioeconomic backgrounds. The researchers gave the kindergarteners tasks which examined letter recognition, word decoding, phonological awareness, oral comprehension, and vocabulary. There were three interventions, delivered with help from the teachers: The children were first handed four pictures and asked questions. They were asked to point to the picture that reflected the correct answer. The second task was comprised of a letter of the alphabet which was presented to the children. The teacher read various letters aloud and the children were asked to indicate which letter matched the one in front of them. For the final task, the children were asked the sound of the letter placed before them. It was assumed that children who answered correctly would be successful in their reading acquisition in first grade.

The tests detailed below were conducted at three different times of the year – autumn, winter, and spring. They were carried out on a one-on-one basis in a quiet room. Each test lasted 30 minutes. The tests were recorded by video and analyzed and interpreted by competent experts. A subtest of the Woodcock-Johnson test )2001) containing pictures which the children were asked to name was administered, in addition to assessing the children’s reading progress. This subtest helps track the development of vocabulary acquisition and thereafter word-reading. The reading of first graders was tested using the DIBELS test (Good & Kaminski, 1998), where children read an age-appropriate text and the correctly read words per minute are counted.

Data analysis was conducted using SPSS software. Reading development in kindergarten was measured as an independent variable (recognition of letters in the word as well as vocabulary were assessed through indication of the correct picture). The reading development of first graders was measured as a dependent variable and tracked over the course of a month.

The results showed that the rate of development of letter recognition predicts the reading levels of first graders. However, a high level of vocabulary assessed by pointing at the correct picture was not a predictor. Following the predictor assessment, the researchers looked for correlations between the two predictors themselves and between the predictors and the dependent variable. A positive correlation was found between the independent variable and the dependent variable, except for the vocabulary variable, for which no positive correlation was found with the dependent variable. That is, the level of letter recognition in a word at the preschool stage was found to be a predictor of reading ability in first grade, but vocabulary was not a predictor of “reading progress” in first grade. It was also discovered that first grade reading abilities could be predicted. Less is known about the outcome of fluency and comprehension in first grade as opposed to only reading words, and it is especially challenging to predict the different components of reading This is due to the fact that existing skills on entry to preschool may have too much variability to reliably anticipate reading ability, especially fluency and reading comprehension. In other words, it is impossible to guess what the reading would be like of reading fluency and comprehension processes in first grade.

The same researchers also performed a post hoc analysis to test the correlation between the developmental process for reading and children’s personal circumstances at home. A positive correlation was found between IQ (Intelligence Quotient).

and the developmental process for reading, such that the higher the IQ, the quicker the development of the reading process. Family circumstances were found to be positively correlated with the dependent variable, so that the more importance the home attached to education, thus exposing children to information and learning such as reading practice and letter recognition in words, the better their progress in reading.

Another study (Al Otaiba et al., 2008) aimed to assess the connection between the time devoted to initial instruction in reading in kindergarten, its content and implementation, and reading progress over the rest of the year in kindergarten. As part of the study, the kindergarten teachers underwent basic orientation, which included working with small groups, training the children, and providing practice exercises after learning reading strategies (Clark & Walpole, 2000; Pressley et al., 2001). The study took place in two counties in Florida, USA, and involved 286 preschoolers. All 17 participating teachers held a master’s degree. The teachers underwent intensive training in the summer and received the tools required for imparting phonological awareness, vocabulary enhancement, fluency, decoding, and comprehension. Reading was assessed over the course of a year to track the children’s progress. The researchers used the DIBELS test (Good & Kaminski, 2002), which tested knowledge of the alphabet and the children’s ability to apply the letters presented by the examiner. Further tests as part of the experiment involved the children being presented with four pictures, from which they were asked to point to the picture that began with the letter read out by the examiner; a test asking the children to divide the word into phonemes; and finally, the children were asked to read simple words. Three further observations were conducted during the year to gain information on the amount of time devoted to literacy instruction, as well as its content and implementation. The preschool teachers received notice of the observations a week in advance. The observations were conducted by trained professionals in the presence of onlookers.

The same study found a significant improvement in letter recognition, reading fluency, decoding, and phonological awareness over the course of the year. A correlation was found between the aspects of instruction (amount of time invested, content, and application) and the children’s progress with respect to the aforementioned factors. However, it was also found that children who entered preschool already equipped with basic skills and prior knowledge, such as vocabulary, progressed more in decoding than children lacking these skills. For example, the children who had basic skills were able to utilize phonemes they already knew, to read new words; all of these were more difficult for the children who lacked the knowledge and skills (Snow et al., 1988). That is, that children who were more skillful) basic skills- vocabulary, prior knowledge), were more successful than those who possessed fewer skills, even though they were all exposed to the same amount of instruction time. It can therefore be concluded that the time devoted to teaching – both content and application – does not constitute a significant predictor of decoding fluency, especially among children who commenced kindergarten with a poor vocabulary. But what predicts a flow in reading are the children who came with vocabulary and other skills that help them during reading (Ehri, 2002).

Overall, the final model explained 35 percent of the differences between the children. Children with a large vocabulary and good phonological awareness produced better outcomes. The same can be concluded regarding the impact of basic literacy instruction in kindergarten among children who displayed fewer basic skills. The more the teachers made sure to enhance the vocabulary of the weaker children, the more their decoding improved. This requires instruction that emphasizes meaningfulness, so that instead of saying the word “coat,” the child should be informed that “this piece of clothing is a coat.” This method facilitates the development of phonological representations of words in children’s long-term memory. It is also consistent with the observation that children with a small vocabulary prefer to hear a story interactively, as opposed to children with a richer vocabulary who prefer to listen to the story and discuss it afterwards. In conclusion, the skills that children bring with them upon commencing kindergarten, and the education received at home, greatly enhance the benefits of basic instruction in preschool, which includes the time devoted, the content, and its application.

## Contribution of a Morphological-Phonological Intervention to Improving Reading in First Grade

Most of the earlier presented literature refers to the contribution of morphological and phonological awareness to a high level of reading. Few studies addressed the underlying benefits of developing this skill in the younger preschool years with the aim of improving them further after commencing school, especially the advantage them can pose at the start of learning the Arabic language. Research on this topic in Arabic is even rarer, and those that exist contain small samples and a small number of morphological tasks (Tibi & Kirby, 2017).

In light of the above, the proposed study will focus on a morphological-phonological intervention program among typical, poor, and dyslexic readers in kindergarten, and will examine the program’s contribution to the children’s morphological and phonological awareness and its impact on improving their reading level in first grade.

## Current Reasearch

### Research Question

Will a morphological and phonological intervention program for kindergarteners during the year before first grade increase their morphological and phonological awareness and improve their reading levels in first grade, compared to a control group?

### Research Hypotheses

The central research hypothesis is that an intervention program addressing morphological and phonological awareness in the year before school will contribute to improved phonological and morphological awareness and a higher level of reading and comprehension in first grade among typical, poor, and dyslexic readers.

Three sub-hypotheses are derived from the main hypothesis:

1. Children in the program group a year before school, will make significant progress in all phonological tasks, that is, post and follow up-tests scores will be higher than pre-test scores.
2. Children in the program group a year before school, will make significant progress in all morphological tasks, that is post and follow up-tests scores will be higher than pre-test scores.
3. The participants who are dyslexic and poor readers will demonstrate a higher level of improvement in the program (in their skills) compared to the typical readers.
4. Children’s scores in reading level test in first grade among children who participated in the program, are high (typical, poor, and dyslexic readers), compared to the control group.

# Method

The proposed research is a one-year longitudinal study involving experimental research which examined the impact of the intervention on dependent variables when comparing the experimental group to a control group.

## Participants

The study included 189 children in the year before school (6 years old), from the center of the country. Demographic data was collected through the parents (gender, date of birth, the existence of a developmental delay or any other diagnoses). After pupils dropped out, 200 pupils were left no significant difference between the participants was found. Some of the pupils moved to a different city in the middle of the process and some moved to private or other schools. In the end, 189 participants were left. There were 95 girls and 94 boys, almost an equal number. The participants were divided into six groups, each group made up of different children according to the diagnostic tests that they did.

Only children whose first language is Arabic were sampled. One group of 54 children had a diagnosis with a reasonable suspicion of being dyslexic (dyslexic readers). A second group included 58 children suspected of having reading difficulties (poor readers). The third group of 82 children included children who had not been diagnosed with reading disabilities (typical readers). Half of the children in each group of readers participated in the morphological-phonological awareness intervention program, and half did not participate in the intervention and comprised the control group. It is important to note that much work was done in order to locate the pupils. It was easier to locate typical pupils but pupils suspected of having reading difficulties were not easy to find, therefore eleven regular kindergartens were used to find these pupils and not special education kindergartens. Aside from that, pupils who were held back a year in kindergarten or who had other difficulties, were not entered into the sample.

## Research Tools

### Screening Tests for Classification of Children into Typical, Poor, or Dyslexic Readers

All kindergartners who participated in the study were screened in order to determine whether they are typical, poor (suspected to have reading difficulties), or dyslexic (suspected dyslexic) readers. Since it is difficult to diagnose kindergarteners who are suspected dyslexic or who have reading difficulties, their morphological awareness and phonological awareness was tested, since it is the factor that best predicts dyslexia.

1. First, for this study, a questionnaire was created for the parents of all the kindergartners. The questionnaire includes questions regarding the kindergartners' development such as neurological and psychiatric history, certain developmental delays, language delays or ADHD. The questionnaire aimed to sample children with no neurological or psychiatric history, family history of dyslexia or developmental language problems, who have a more or less similar developmental history, and no developmental delays, i.e. they have no other delays except phonological and morphological difficulties. Examples of items on the questionnaire for the kindergarten teacher included: "running and jumping: as expected/has difficulty/very difficult/refrains", Attention functions (attentive): usually/occasionally/seldom", and similarly for other areas. Examples of items on the questionnaire for the parents included: (independent vs. dependent), the extent to which the child performs tasks on their own such as:"eating, washing hands: independent/occasionally/dependent". Also, the child’s socio-economic situation and his number in the family, etc. The goal of the questionnaire was to eliminate any developmental delays or other problems, in order to ensure that there were not significant differences between the pupils, aside from the academic talent that we were interested in checking (See appendix 1).

After that, tests that predict reading level were conducted.

Phonological and morphological and rapid naming, therefore these tests were selected.

1. The Sound Blending subtest of Woodcock-Johnson’s (2017) Auditory Processes test .Awwad.et.al 2017. This test is suitable from the age of 5 up, it tests the basic phonological processing of the child. The test checks a connection to auditory syllables to one word such as . (عص-فور – عصفور) (ش-ج-رة—شجرة) (see Appendix 2)

phonological tasks were based on Shalhoub-Awwad, Abu-Ahmad, Mansour Adwan, Jabbour-Danial and Yassin (2017). The test included four simple exercises that are suitable for kindergarten-aged children: reading words where the children are asked to identify an opening and a closing sound, such as اكل- and شرب- (which is the opening and which is the closing sound). Typical Readershave a standard score between the mean and above (scale of 1-19, with a mean of 10). The standard score of poor readers in this subtest is between low normal and borderline 5-7. Dyslexic Readers have a standard score between the borderline and very low (4 or less). (see Appendix 3)

1. Morphological test: Inflectional morphology (possessivization). In this test, participants were presented with 12 spoken sentences that included the following pronouns (mine, ours, his and hers) with six items containing each pronoun. The task required participants to complete the sentence orally with the correct inflection. For example, the participants were asked to use a single word in order to say that 'the home is mine' /ʔal-bi:t ʔili:/ إلي البيت by applying the possessive suffix to 'my home' /bi:ti:/ بيتي. One point was allocated for each sentence completed correctly. Test re-test reliability was .75 (based on the present sample) (See Appendix 4). If the child’s score was average and above, the child was considered typical. If his score was a deviation and a half below average, the child was considered a poor reader and if less than that, he was considered a suspect dyslexic. Of course, the average phonological and morphological score was used.
2. Rapid automatized naming – RAN (Denckla & Rudel, 1974(test**,** where objects are placed before the child and he/she is asked to name the objects as quickly as he/she can. This test included four subtests: naming of objects (O-RAN), where the norm is 29-32 seconds. A strong relationship existed between children who received scores below the norm and prediction of reading difficulties. The children who received a significantly lower Z score than the norm can be classified as having a reasonable suspicion of dyslexia.

These tests were administered by the research assistants and me who received instruction from me at the beginning of the school year, before onset of the study. Information was also be collected from the kindergarten teacher and from worksheets ( ( famous and known tool the children worked on that indicate language difficulties that predict reading difficulties. These criteria were used to place the children into typical, poor, and dyslexic readers groups, until reaching the number of readers in each readers group necessary for performing this research. That is, the criteria for determining if the child has reading difficulties or dyslexia is the results of RAN and phonological awareness. If, on both tests, the child's score is borderline or below borderline (standard score 4 in normal distribution Z table) he was considered dyslexic. If the score is low average -borderline (standard score 4-7 in Z table) he was considered a poor reader.

The test based on research showing that RAN and phonological awareness tasks are a predictive index of reading fluency, and that poor reads perform these tasks much slower in comparison to normal readers (Wolf & Bower, 2000) (See Appendix 5 (.

1. A cognitive functioning evaluation test was performed (7 WPPSI core subtests) to rule out the possibility that the differences in intelligence produced differences between the groups. Only children with a similar IQ were sampled, with mean IQ=100 and above. This also served to screen difficulties that are caused by low IQ rather than by reading difficulties.
2. Basic cognitive skills Raven’s Colored Progressive Matrices (Raven, Raven, & Court, 1998). This test of nonverbal reasoning consists of 36 items presented in a multiple-choice format with a matrixlike arrangement of figures. Sets A, AB, and B were administered, and the child’s score calculated as the sum of the correct answers. Internal consistency is 0.64 (according to the test manual) (See Appendix 6). We added this test in order to ensure that all the children had the same range of non-verbal intelligence level, because the study put the emphasis on verbal intelligence. After screening the children into the three groups, all the children were tested prior to the intervention and of course again with the same test after the intervention.

### Pre-Post Tests

1. A preliminary post-test, which assesses phonological awareness, was administered after the intervention in order to ascertain that the program was successful (Phonological Awareness Analysis, Asadi & Abu-Rabia, 2019), in which children were asked to divide a word into its phonemes. This test was administered in cooperation with the preschool teachers. It was developed by Asadi and Abu-Rabia )2019(, and is composed of 32 exercises – 16 that test separating opening phonemes from a core word and 16 that test separating closing phonemes from a word. Theexercises were comprised of four clusters: 1) Words common to both spoken and literary Arabic, to be identified phonologically and semantically (e.g., the word “elephant”). 2) Words found only in spoken Arabic (e.g., the word “knife”). 3) Words found only in literary Arabic (e.g., the word “continent”). 4) Words that originate in both versions of the language. Each phoneme appeared twice, once at the beginning of a word and once at the end. During the test, the children repeated the word after the examiner and break it down. They received one point for every phoneme they succeed in breaking down (See Appendix 7).
2. A preliminary post-test which assesses morphological awareness was administered after the intervention in order to ascertain that the program was successful (Morphology Recognition, Morphology Production, Asadi, 2020) to evaluate the children’s knowledge of the morphological word structure in Arabic, the test coordinator read three words and the children indicated which word is the most suitable answer to a question that follows. The test contains 13 questions that relate to the syntax of the word. And the score is considered the sum of the correct answers. For example, بيت- بيوت- بيتين - Which of these words best indicates that there is many and more of something, where the correct answer is بيوت. Pre and post tests are identical but delivered in two points in time–before intervention and following intervention in order to assess the effect of the intervention program. In addition, validity and reliability are tested. (See appendix 8)

### Morphological and Phonological Intervention Program

The program is based on the work of Asadi (2020) and Saiegh-Haddad (2016) and was implemented in six kindergartens for at least four months. Ten children from each kindergarten participated in the trial, where five children were included in the control group (Group A) and five in the intervention group (Group B). The children in Group A learnt the regular linguistic syllabus and vocabulary as prescribed by the Ministry of Education, while those in Group B received exercises and activities containing morphological and phonological training with incorporated demonstrative aids such as background music and songs.

A preparatory meeting was held with the coordinator each week, as well as two sessions with the children delivered by the research team. During the preparatory meeting, the teacher received all required printed materials for the two training sessions, and underwent training herself with assistance from the coordinator. The coordinator delivered intervention training to Group B, observed by the teacher. Immediately thereafter, in the same meeting, the research team delivered the same training to Group B with the coordinator observing and providing feedback afterwards.

The first session (without the coordinator) was delivered by the research team according to the specified protocol in which the method and aims were defined: The precise method of imparting the activity; which vocabulary words to use in the program; how to respond if a child makes a mistake; how and what words should the evaluated at the end of the activity. A similar process took place in the three sessions. Each meeting lasted approximately 20 minutes and included the following agenda:

1. Introductory activity - exposing the children to a literary concept (rhymes, analysis, and synthesis) and interest-arousing activities (a story, song, film, etc.).
2. Presentation of the aims of the meeting and defining the concept.
3. Activity (instruction or practice).
4. Feedback – where the answers correct or incorrect?
5. Summary, evaluation, and report.

Two measures were taken in order to ensure adherence to protocols and consistency when delivering the intervention: 1. A detailed protocol was written, that included all content and components for each intervention session and the method of delivery (introductory activity, aim, main activity, summary, and evaluation); 2. A form documenting the activity was formulated for each session to ensure that each teacher teaches the same content in the same way for all children. The sheet also served to help maintain control and order for the teacher.

The intervention program involved the areas of literacy, phonological awareness of various phonological structures (rhymes, syllables, compounds, and phonemes), morphological awareness (inflection and derivation: root and pattern, form, name, sound, understanding sentences, understanding a story, and creating a story according to a structure). Each intervention session began with the alphabet song. A description of the morphological and phonological awareness exercises to be provided to the children is presented below.

Morphological Awareness

These exercises involve the morphological structure of words in Arabic. One of the tasks is comprised of two lists of 16 words each in literary and spoken Arabic, respectively. Every three words constitute an exercise. The idea is to practice the morphology once the child has undergone the learning process. Thereafter, the child is asked to carry out the tasks on his own. The teacher reads out three words and asks a question. The child is asked to specify which of the three words is the most suitable answer to the question. For example, which of the following words best relates to the plural form? Three words in Arabic will be provided, such as learned - third person masculine, learned - third person feminine, and learned - third person masculine plural. The child may then be asked which word is most suitable for girls. The number of correct answers comprised the child’s score. Of course, the teacher continuously records the child’s performance on the observation form, including the time taken to respond and the score. Cronbach’s alpha reliability score for this test is 0.82 (Fong & Ho, 2017; Fracasso et al., 2016).

The child carried out similar exercises requiring morphological awareness, taken from the works of Lyster et al. (2016). The original experiment is in English; however, Arabic words used for the purpose of this study. The trial is, in fact, a form of training, which includes exercises aimed at enriching children’s knowledge of word morphology. Afterwards, the teacher recites a phrase composed of two words to the child (e.g., بيت فادي is composed of بيت and فادي), following which the teacher introduced additional components for the words, relating to the singular, plural, masculine, and feminine forms, such as كل- اكلت, نام- نامت, درس- درسوا, خرج- خرجوا.

The children also practiced alone. In addition, they received different exercises related to noun inflection, according to gender or number, feminine plural or masculine plural. For instance, the teacher reads an excerpt from a story and asks the children to point out the words reflecting the female plural form (such as *the girls eat*). Additional exercises included matching verbs – the teacher says a verb and asks the child to repeat the verb but in a different form such as masculine plural (like *the boys eat*). Other similar exercises were included, which require the identification of the root and structure of the word in the context of a song or story.

Phonological Awareness

After receiving training from the coordinator, the teacher supplied the children with phonological awareness tasks. These was in Arabic and are derived from the work of Saiegh-Haddad (2003). In this area, the teacher read out words and the children were asked to break them down into their phonemes. This involves 32 words that the children were asked to recite without their first phoneme, and another 32 words to be articulated without their last phoneme. They are standard words in order to neutralize their semantic context. The child received one point for each successfully produced word (without its first or last phoneme). The overall score was then calculated. The teacher continued to document and record the time taken for the child to respond, the number of points, and additional remarks if required on the observation form throughout the session. The reliability score for this test is 0.95.

In additional exercises on phonological awareness, the children were asked to perform tasks taken from the research of Mansour-Adwan et al. (2020). The program includes six tasks. However, four were selected for the purposes of this study. Before carrying out each task, the children received two trial exercises, where the coordinator ensured that the children understand. Once completed, the children were provided with feedback. The tasks mostly involve analysis and synthesis of word components. The first task is to combine phonemes to make up a single word. The second asks the children to indicate the number of syllables in a word. The children heard 15 words in total, each comprised of one to three syllables. They received an equal number of one, two, and three-syllable words. There will be other similar exercises, which included breaking a word down into syllables, constructing a word with its syllables, reciting the last syllable of a word, and identifying rhyming word pairs as they appear in a story or song (See Appendix 9).

It is important to note, that at the beginning of the intervention program, the children were divided into 12 groups, each group contained 7 children from mixed classes. There were children who refused to join a group and were exchanged with other students, of course with the permission of their parents. There were children that were not in the intervention group who asked to join and then they joined instead of children who had dropped out of the intervention group. In the end, we maintained a fixed number of children in the intervention group for four months. Because there was a holiday at the end, there were some double time meetings.

When the post-intervention test was administered, we were assisted by the Ministry of Education in order to locate each child and which school they attended. Of course, there were children who dropped out of the study, some moved to a different city and some went on to private schools, therefore the number of children decreased from 200 to 189.

### Post-Intervention Reading Assessment Test

Following the completion of the program, a test evaluating word-reading was conducted, with the aim of considering the program’s contribution to the improvement and raised level of reading (RAMA – The National Authority for Measurement and Evaluation in Education, 2009). The test includes tasks that examine various aspects of reading, writing, and comprehension skills. Six tasks were selected for this study: (1) Reading the names of letters; (2) Reading the sounds of letters; (3) Reading combinations of consonants and vowels; (4) Reading simple punctuated words; (5) Reading words. The children were scored on the time taken to complete the test and their level of accuracy.

An additional reading test in Arabic for the first grade is one that the researcher Awad Shahbari adapted from the works of Torgesen et al. (1999) and produced in Arabic. This test contains 50 orthographic words with a maximum of three syllables. Some of the words are composed of short vowel sounds and others, long vowel sounds. The children were asked to read the words out loud, where one point was given for each correctly read word. Emphasis is on accuracy and reading speed.

For reading words we relied on the reading test in Kamil Najarag’s booklet. All research tools were tested for internal consistency, and whether they display a high Cronbach’s alpha reliability (α). (See appendix 10(

Variables

Independent variables:

(Group) With or without a phonological and morphological intervention program.

Type of group (suspected dyslexic, poor reader, typical)

The time factor.

Dependent variable: Reading level and developmental Phonological and Morphological awareness.

## The Research Procedure

### Data Collection

Stage A: Once approval has been obtained from the Ministry of Education, the study coordinator meets the children at their kindergarten (November-December 2022). The chosen time of year enabled the program to run for at least four months before the end of the school year. At the meeting with the participating children, the coordinator explains the study and its aims, while promising them a reward at the end of the program for encouragement and motivation. The parents were asked to sign a written statement consenting to their child’s participation in the program.

Stage B: The three groups of participants were formed according to the results of the screening tests (typical, poor, and dyslexic readers). All participants (in the experimental and the control groups) were administered the above-detailed tests. Each participant was administered the morphological awareness and phonological awareness tests. All tests were administered in a quiet room with the participation of the teacher and research coordinator.

Stage C: The experiment was undertaken among typical, poor, and dyslexic readers who were selected for the program. Each kindergartener participated individually in a quiet room, where he/she received the morphological and phonological tasks in cooperation with the teacher or teacher’s aide. The duration of the meeting was one hour, with two ten-minute breaks, until the child completes the batch of tasks described above. It took four months until all participants have undergone the experiment.

Stage D: At the end of the first trimester in first grade, the pupils also take a follow-up test, each child from the six groups of readers (typical, poor, and dyslexic readers in the experimental group and in the control group) were administered post reading tests.

### Data Analysis

The pretest scores, the posttest scores and the follow-up scores (these are identical tests) for all participating children were calculated (experimental and control groups) and two-way mixed ANOVA within participants and between participants with repeated measures were conducted. The independent variables are the experimental group (between participants) and the time of measurement (within participants). The dependent variables are the children's achievements on morphological and phonological tests. The analysis within participants is, in fact, a comparison of the scores of the same participant in three points in time (on pretests before intervention and on posttests- follow up after intervention) aimed to measure the difference after intervention. The analysis between participants is designed to show the differences between experimental and control groups as well as enable a comparison between the three experiment groups at pre- and postintervention in two points (post, follow-up) (typical, poor and dyslexic) regarding which population was mostly affected by the intervention program. This answers the first part of the main research question as to the contribution of the program to the improvement of phonological and morphological awareness.

The analysis at the second stage was of each score separately, for phonology on its own and morphology on its own, with the aim of testing where there was better progress. In other words, the intervention program was useful but we check if it is useful for each awareness separately (phonological on its own and morphological on its own) and thus answer the first and second research hypothesis.

The next stage examined the second part of the research question regarding the contribution of the program to the improvement in reading levels.

Stage F: After the scores and mean scores are calculated for the reading tests performed in first grade, one-way ANOVA was performed to compare the groups that participated in the intervention program to the groups that did not participate in it. A difference in reading levels is expected to be found between these two groups and also, where the change was bigger and within which group. In other words, we performed the same analysis that was performed above, but tested the reading score. (Typical, poor reader or dyslexic) as a dependent variable, without the time factor as well.

# Results

## Morphological Awareness

In order to test whether there were differences in morphological awareness according to between-subjects variables; reading group (Normal / Poor / Dyslexic) and intervention (yes / no), and within-subjects variable: time (Pre / Post / Follow-up), a three-way ANOVA for repeated measures mixed design was performed (see Table 1 and Figure 1).

A significant difference was found between the groups, F(2,182)=58.03, p<.001, η²=.389. Scheffe post hoc test revealed a significant difference between all three groups. That is, morphological awareness was significantly higher in the normal reading group than in the poor reading group, which was significantly higher than the dyslexic group. The difference between the control and the intervention group was significant, F(1,182)=23.70. p<.001, η²=.115, indicating that morphological awareness was higher for the intervention group than the control group. There was also a significant difference in time measure, F(2,364)=461.88, p<.001, η²=.717. Bonferroni's post-hoc test revealed a significant difference between all three groups. Meaning the improvement in morphological awareness was significant from pre-measures to post-measures and from post to follow-up measures.

The interaction between group and time was statistically significant, F(4,364) =9.25, p<.001, η²=.092. To identify the interaction source, one-way ANOVAs for repeated measures were administered separately between pre-, post-, and follow-up measures for each reading group. Results indicated that the improvements from pre- to post- and from post- to follow-up measures were significant for all three reading groups, but the differences between the measures were larger within the dyslexic group, and smaller within the normal group.

The interaction between intervention and time was significant, F(2,364)=81.74, p<.001, η²=.310. To identify the interaction source, one-way ANOVAs for repeated measures were administered separately between pre-, post-, and follow-up measures, separately for the intervention and control groups. The improvements in morphological awareness from pre- to post-measures and then from post- to follow-up measures were all significant in both control and intervention groups, but the differences were significantly smaller for the control group compared to the intervention group.

The interaction between intervention and group was not statistically significant, F(2,182)=0.82, p=.444, η²=.009. Meaning that the difference between control and intervention groups in morphological awareness was similar in all three reading groups.

Lastly, the three-way interaction between time, intervention, and reading group was not statistically significant, F(4,364)=1.97, p=.098, η²=.021. Thus the improvements in morphological awareness from pre- to post-measures and then from post- to follow-up measures were all significant in both control and intervention groups, but the differences were significantly smaller for the control group compared to the intervention group, and those differences were similar for normal readers, poor readers, and dyslexic group.

Table 1: Means and SD of morphological awareness according to reading group, intervention, and time.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
|  |  |  | **Pre** | | **Post** | | **Follow Up** | |
| **Reading Group** | **Intervention** | **n** | **M** | **SD** | **M** | **SD** | **M** | **SD** |
|  |  |  |  |  |  |  |  |  |
| **Normal** | **No** | 40 | 59.42 | 23.69 | 70.00 | 21.29 | 80.01 | 17.95 |
|  | **Yes** | 40 | 54.04 | 27.07 | 79.62 | 18.89 | 91.73 | 12.61 |
| **Poor** | **No** | 28 | 33.52 | 20.96 | 46.70 | 18.95 | 56.04 | 19.73 |
|  | **Yes** | 28 | 31.32 | 24.85 | 61.54 | 18.13 | 80.49 | 12.65 |
| **Dyslexic** | **No** | 27 | 20.51 | 16.11 | 30.77 | 18.72 | 40.01 | 14.89 |
|  | **Yes** | 25 | 14.77 | 16.00 | 52.31 | 13.32 | 76.31 | 9.91 |
|  |  |  |  |  |  |  |  |  |

Figure 1: Means of morphological awareness according to reading group, intervention, and time.

## Phonological Awareness

In order to test whether there were differences in phonological awareness according to between-subjects variables: reading group (Normal / Poor / Dyslexic) and intervention (yes / no), and within-subjects variable: time (Pre / Post / Follow-Up), a three-way ANOVA for repeated measures mixed design was performed (see Table 2 and Figure 2).

A significant difference was found between the groups, F(2,182)=177.65, p<.001, η²=.661. Scheffe post hoc test revealed a significant difference between all three groups. That is, phonological awareness was significantly higher in the normal reading group than in the poor reading group, which was significantly higher than the dyslexic group. The difference between the control and the intervention group was significant, F(1,182)=50.99. p<.001, η²=.219, indicating that phonological awareness was higher for the intervention group than the control group. There was also a significant difference in time measure, F(2,364)=839.44, p<.001, η²=.822. Bonferroni's post-hoc test revealed a significant difference between all three groups. This means that the improvement in phonological awareness was significant from pre- to post-measures and then from post- to follow-up measures in all samples.

The interaction between group and time was statistically significant, F(2,364)=839.44, p<.001, η²=.822.. To identify the interaction source, one-way ANOVAs for repeated measures were administered separately between pre-, post-, and follow-up measures for each reading group. Results indicated that the improvements from pre- to post- and from post- to follow-up measures were significant for all three reading groups, but the differences between the measures were larger within the poor group, and smaller within the normal group.

The interaction between intervention and time was significant, F(2,364)=141.88, p<.001, η²=.438. To identify the interaction source, one-way ANOVAs for repeated measures were administered between pre-, post-, and follow-up measures for the intervention and control group separately. The improvements in phonological awareness from pre- to post-measures and then from post- to follow-up measures, were all significant in both control and intervention groups, but the difference was significantly smaller for the control group compared to the intervention group.

The interaction between intervention and group was not statistically significant, F(2,182)=2.43, p=.091, η²=.026, meaning the difference between control and intervention groups in phonological awareness was similar in all three reading groups.

Lastly, the three-way interaction between time, intervention, and the reading group was statistically significant, F(4,364)=2.60, p=.036, η²=.028. To clarify the interaction, one-way ANOVAs for repeated measures were administered separately between pre-, post-, and follow-up measures for the intervention and control groups and the reading groups separately. Results indicate that within poor and dyslexic readers, significant improvements in phonological awareness were found from pre- to post-measures and from post- to follow-up measures in both control and intervention groups, while the differences were significantly smaller for the control group compared to the intervention group. Within the normal readers, there was a significant improvement between all three time points in the intervention group, whereas, in the control group, a significant difference was found in pre- and post-measures to follow-up measures, but not between pre- and post-measures.

Table 2: Means and SD of phonological awareness according to reading group, intervention, and time.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
|  |  |  | **Pre** | | **Post** | | **Follow Up** | |
| **Reading Group** | **Intervention** | **n** | **M** | **SD** | **M** | **SD** | **M** | **SD** |
|  |  |  |  |  |  |  |  |  |
| **Normal** | **No** | 40 | 57.40 | 19.30 | 70.12 | 18.36 | 85.68 | 15.06 |
|  | **Yes** | 40 | 47.40 | 26.25 | 79.83 | 19.80 | 98.01 | 9.43 |
| **Poor** | **No** | 28 | 15.92 | 14.28 | 28.13 | 20.38 | 48.44 | 18.71 |
|  | **Yes** | 28 | 8.85 | 9.67 | 45.09 | 12.43 | 79.91 | 12.08 |
| **Dyslexic** | **No** | 27 | 4.48 | 4.61 | 15.43 | 9.01 | 23.33 | 12.19 |
|  | **Yes** | 25 | 3.58 | 8.41 | 41.50 | 10.87 | 67.50 | 15.89 |
|  |  |  |  |  |  |  |  |  |

Figure 2: Means of phonological awareness according to reading group, intervention, and time.

## Reading

In order to test whether there were differences in reading abilities between the control and the intervention group, in each reading group (Normal / Poor / Dyslexic), three Mann-Whitney U tests were performed (see Table 3 and Figure 3). We used a-parametric tests like Mann-Whitney U tests and Kruskal-Wallis H tests (in the next section) because the reading grade was from 1 to 3 and was not distributed normally.

A significant difference was found between the control and the intervention groups in all three reading groups; Normal readers, U=140.00, p<.001, poor readers, U=75.00, p<.001, and dyslexic readers, U=42.00, p<.001, indicating the intervention group was higher in reading than control group for all three reading groups.

In order to test whether there were differences in reading abilities between the normal, poor, and dyslexic reading groups, in each intervention group (control/intervention), two Kruskal-Wallis H tests were performed.

Significant differences were found between the normal, poor, and dyslexic reading groups in the intervention and in the control groups; control group, U(2)=48.93, p<.001, intervention group, U(2)=48.95, p<.001. Post-hoc tests using Mann-Whitney U tests indicated that for the intervention group, the normal readers were higher in reading than the poor readers, and the poor readers were higher in reading than the dyslexic readers. However, for the control group, the normal readers were higher in reading than the poor readers and the dyslexic readers, while there were no significant differences between the poor readers and the dyslexic readers.

Table 3: Means and SD of reading abilities according to reading group and intervention.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  | |
| **Reading Group** | **Intervention** | **n** | **M** | **SD** |
|  |  |  |  |  |
| **Normal** | **No** | 40 | 2.13 | 0.46 |
|  | **Yes** | 40 | 3.00 | 0.00 |
| **Poor** | **No** | 28 | 1.36 | 0.49 |
|  | **Yes** | 28 | 2.46 | 0.51 |
| **Dyslexic** | **No** | 27 | 1.15 | 0.36 |
|  | **Yes** | 25 | 2.16 | 0.37 |
|  |  |  |  |  |

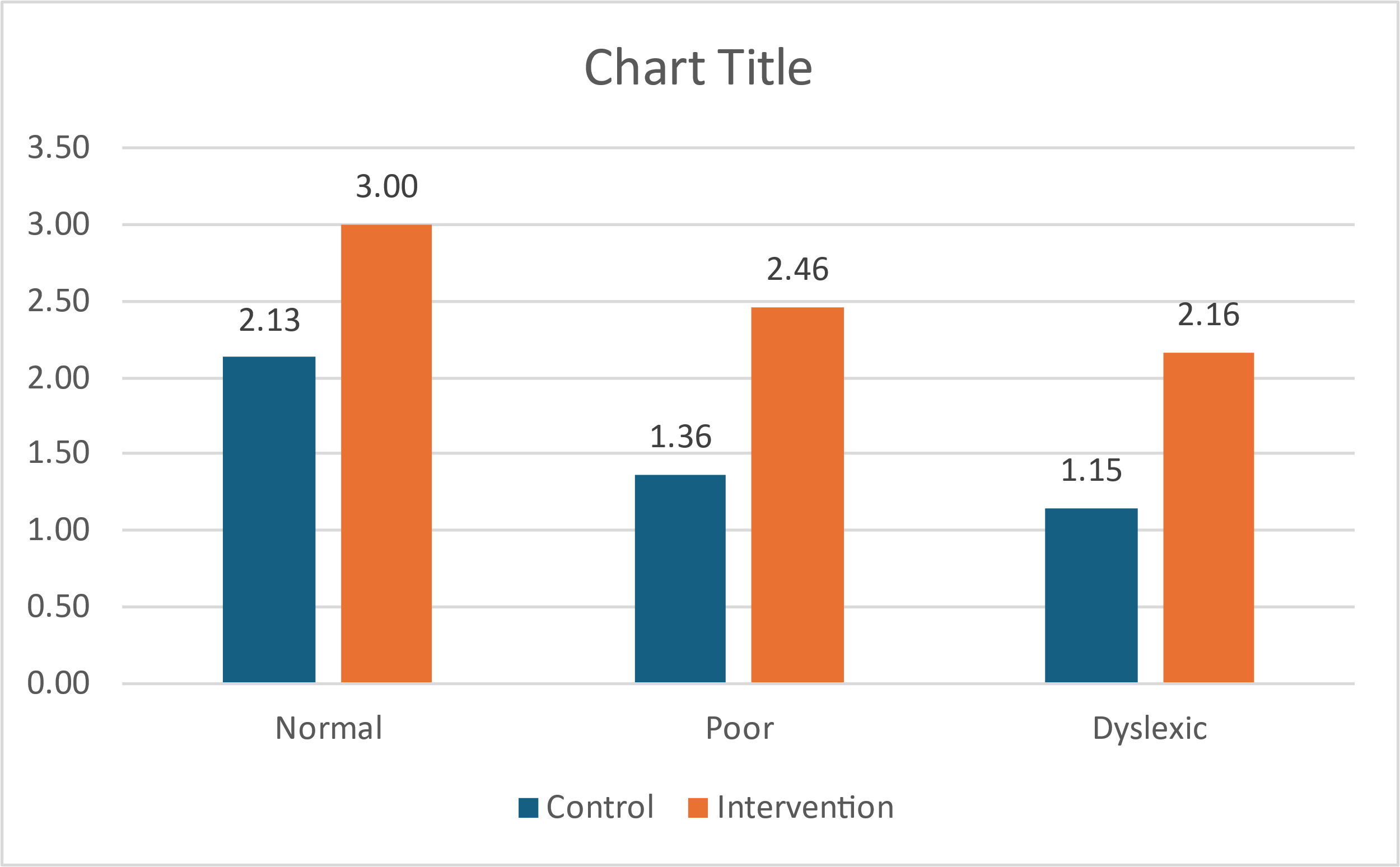


Figure 3: Means of reading abilities according to reading group and intervention.

# Discussion

## Phonological Awareness

The current study examined the effect of phonological awareness training one year before school (in compulsory kindergarten) on developing this awareness by the end of the first trimester of first grade. The children were divided into two groups - an intervention group that underwent an intervention program for about four months and a control group. A comparison was made between the two groups at three points in time: Prior to the intervention, at the end of compulsory kindergarten, and at the end of the first trimester of first grade.

Phonological awareness (identifying the opening and closing sounds of the word) is essential for the building blocks of reading, especially reading and writing fluency (Abu-Rabia et al., 2003). Phonology refers to the sounds of a word in a language. Phonological awareness relates to the ability to discern between the sub lexical constituents of a spoken language, such as syllables, rhymes, and phonemes, and then to process and utilize them. It is expressed in the ability to perform mental analyses on components of speech, by omitting the beginning, middle, or end of a word, and more (Moskowitz, 2002).

Theories regarding the development of reading skills posited that phonological processing is a basic cognitive process, and the most important one for literacy learning (Stanovich, 1988). Waters et al. (1988) found that readers who have trouble reading find it difficult, mainly when reading unfamiliar words as opposed to familiar words.

The results revealed that all students, including children who did not undergo the intervention program, improved their phonology scores. A child who learned essential phonological recognition in kindergarten and first grade should progress in phonological recognition of letters.

The results show that students in the intervention program made more progress than children in the control group. The mean scores in phonological awareness after the intervention, at the end of kindergarten and first-grade delay, were higher for the intervention group than the control group. The program's children jumped more than 20 points in their scores compared to the control group. This confirms the first research hypothesis that the children who went through a phonology intervention program make more progress than those who did not go through the program.

The program gave the children content such as that learned in the kindergarten curriculum but in a more intensive, richer, and varied manner, which helped the children develop the awareness better than the other children. The study by Engen & Hoien (2002) explained that phonological awareness at a young age helps the child develop the basics of reading at an older age, because reading and reading fluency are based on phonology and sensitivity to the sounds of the word. Especially in Arabic, auditory sensitivity is significant for correct reading. For example, some letters have the same sound but differ in tone, which changes the word's meaning (Like the letter D د and the letter ض). This sensitivity affects reading comprehension (Elbeheri & Everatt, 2007).

According to the results, the difference between the intervention and the control groups is affected by the type of student. In the study, children were divided into three categories according to special tests for the basics of reading that correspond to the age of compulsory kindergarten, which predicts reading in the first grade. The three categories were typical readers, poor readers, and readers with suspected dyslexia. The findings showed that for poor readers and suspected dyslexia, there was an improvement in the phonological level awareness between measurement at the beginning of kindergarten and measurement at the end of kindergarten, as well as between measurement at the end of kindergarten and measurement a year later. These differences are significant for the intervention and control groups but were more remarkable for the experimental group than the control group.

On the other hand, for typical readers, an improvement was found in the phonological level between measurement at the beginning of kindergarten and measurement at the end of kindergarten, as well as between measurement at the end of kindergarten and measurement one year later, but only for the intervention group. For the control group, an improvement was found between measurement at the end of kindergarten and measurement a year later. However, the improvement between measurement at the beginning and the end of kindergarten was insignificant.

Unsurprisingly, the control group improved during the first grade because of the 'regular' progress: growing up and developing phonological awareness in the first grade at school, regardless of the program. On the other hand, during kindergarten, the improvement is less noticeable because they have not yet developed phonological awareness.

In conclusion, all children progress over time, but children who go through the intervention program progress more than other children, and struggling and dyslexic children progress more than typical ones. The dyslexic and struggling child need to learn the new content, which is why the program adds to his progress throughout kindergarten and first grade. Thus, we can understand that the program has a long-term effect on him. However, typical children do not need a unique program to learn phonological awareness; they know it during first grade. Therefore, among typical children, the difference between the intervention and control groups is higher in kindergarten and less in first grade. However, among struggling and dyslexic children, the program's effect is always present (Abu-Rabia, 2008; Ball, 1993).

A study in which an intervention group underwent phonological awareness, found that the program has shown itself to be effective because, after application of the phonological intervention for students at risk for dyslexia, it was verified that of 20 students with phonological disorder (100%), only three students (15%) continued to show phonological disorder together with difficulties in recognition of letters, no association of relation letter/sound, alteration in discrimination of sounds and letters based on the difficulty of distinguishing the contrastive traits.

For students of the dyslexia group, the ability to discriminate auditory stimuli and to process auditory information is more compromised due to the frame of phonological disorder, however, when sound discrimination in the early stages of literacy is worked on, the difficulty in distinguishing and storing information for then using them in reading tasks, for example, becomes more effective because the phonological working memory is able to retain and manipulate information temporarily, while participating in cognitive tasks, such as reasoning, comprehension and learning (silva & Capellini, 2015).

## Morphological Awareness

The current study examined the effect of morphologicalawareness training one year before school (in compulsory kindergarten) on development of that awareness until the end of the first trimester of first grade. The student's ability was tested on the word's declension, according to the correct pronoun, tense, singular, plural, etc. Morphological awareness is an essential skill for the building blocks, especially for the accuracy of reading and writing (Abu-Rabia et al., 2003).

The results show that all the children progressed over time, but children who participated in the intervention program progressed more (at least 30 points) than those who did not. These results support the second hypothesis: children in the program group a year before school, will make significant progress in all morphological tasks; that is, post and follow-up test scores will be higher than pre-test scores.

The analyses revealed that a word's morphological structure plays a central role in organizing the lexicon (a set of words that provides vocabulary and knowledge), facilitating the reader's understanding of the language and logically discerning the meanings of new words. That is why it is important to work on morphological awareness before school, to help enrich children's language (Ravid, 2004).

Entering group types (typical readers, poor readers, and suspected dyslexic) to analyze and emphasize the different processes that each group underwent. The improvement of the child with suspected dyslexia was more significant than the improvement of the typical child. Still, the differences between the intervention and control groups were similar for all three group types. The fact that the three-way interaction was not significant, emphasizes that the children's progress in time depends separately on group type (Interaction between group type and time) and the manipulation (Interaction between intervention and time). Thus, the improvement of the child in the intervention group was more significant than that of the child in the control group; this was similar for normal readers, poor readers, and suspected dyslexic. However, morphological awareness was higher for normal readers than for poor readers and for poor readers than those suspected of dyslexia.

All students who underwent the intervention program improved their morphological scores by more than 30 points. Thus, the morphology intervention program in kindergarten benefits all students, including typical students, those with difficulty, and children with suspected dyslexia.

This finding contradicts other studies. Saiesgh-Haddad (2014) found that the effect of the intervention program on morphology depends on the type of child, and its impact is different among people with dyslexia and typical readers. However, their study was conducted on second-grade students. Watted and Abu-Rabia (2020) found that the progress of the dyslexic child is different from that of the typical child.

The probable major role of morphological awareness skills required in reading comprehension in Arabic texts, extends to the fact that morphological density plays a vital role in reading comprehension of Arabic as a Semitic language. Low-morphological awareness of dense morphemes (especially among children with reading disabilities) may lead to poor performance in reading comprehension. This implies that children's morphological awareness might be used as a diagnostic tool for preventing difficulties in reading and comprehension processes. Additionally, the study has practical implications. Explicit morphological instruction and intervention are required for dense morphological forms and texts, particularly among children with reading disabilities, which develops awareness of the morphemic structure of words that contributes to reading comprehension (Vaknin-Nusbaum & Raveh, [2019](about:blank#dys1761-bib-8005); Vaknin-Nusbaum, [2021](about:blank#dys1761-bib-8008)). The results also provide valuable guidance for parents and teachers by encouraging children to engage in reading storybooks, which can contribute to the development of their morphological knowledge and enhance their reading comprehension skills. As well as incorporating structures with dense morphology in speech interactions with children, this can further reinforce their understanding of morphemes and their usage (Asadi et al, 2024).

Explicit morphological instruction and intervention are required for dense morphological forms and texts, particularly among children with reading disabilities, which develops awareness of the morphemic structure of words that contributes to reading comprehension;( Vaknin-Nusbaum, [2021](about:blank#dys1761-bib-8008))

Abu-Rabia (2007) examined the role of morphology and short vowels in reading Arabic among dyslexic and typical readers in the third, sixth, ninth, and eleventh grades, using Raven’s Matrices, word reading, a working memory test, spelling, and reading comprehension. The results indicated that the morphology knowledge of typical readers contributed to the reading of more words than that of the dyslexic readers, and that for typical readers, this skill developed over time between the third and sixth grade.

The results of recent research show that the children continue progressing during the first grade of school. However, children in the intervention group progressed more than those in the control group who did not. This is true, especially for poor readers and children with suspected dyslexia. The poor readers and children with suspected dyslexia continued to progress in the first grade, although the program was over after finishing kindergarten. This can be explained by the fact that typical children in the first grade are satisfied with the normal program they receive at school, while those who struggle with reading need a special program to help them progress.

In the study, the children were also given a reading test at the end of the first trimester of grade one. The test relied on identifying letters and omitting the opening and closing sound and reading words. The scores went from 1 to 3 (3 when he had good command of the task). The differences between the children who underwent the program and those who did not participate in the program were also examined, as well as the difference between the three groups, the dyslexic, the poor readers and the typical readers. According to the findings or the study, it seems that there is a difference in the reading score between the children who underwent the intervention program and the children who did not participate in the intervention program, indicating the intervention group was higher in reading than the control group of all three reading groups.

Thus, the fourth hypothesis of the study was reinforced - the reading tests showed that children who underwent the intervention program had higher scores than children who did not participate in the program, in all the groups.

In many studies the findings are consistent with the findings of similar studies. For example, Scarborough (Scarborough, [2005](about:blank)) found that awareness of morphemes must build on awareness of phonemes and syllables. Thus, the two-way relation between phonology and morphology supports successful reading.

Other studies note that phonological processing and phonological awareness of word sounds in the child’s language, are vital to the process of acquiring reading. This phonological knowledge requires acquisition of the orthographic structure of words, and also draws on orthographic depth (diacritisised or undiacritisised words, emphatic letters, and more). In this way, orthography also influences learning (Taha,2009). It is worth noting that as with phonological and morphological awareness, good command of language as well as linguistic cognitive and meta-cognitive knowledge, can be transferred to the reading comprehension process (Ellis, [1999](about:blank)).

In conclusion, the findings of this study expand the available theoretical knowledge of the nature of the Arabic language and how it is acquired, and contribute to better understanding of how to apply this knowledge to challenged students in special education (Bishara, 2022).

In addition, in analyzing the results for comparison between the types of pupils that underwent the intervention program, it seems that the differences between the children’s results who underwent the program and those who did not, exist in all three groups, the dyslexic, the poor readers and the typical children.

That is, reading was significantly better in the normal reading group than in the poor reading group, which was significantly better than the dyslexic group.

When we compared between the three groups, it was found that among the group who underwent the intervention program, the scores were highest among normal children, more than the scores of children with reading difficulties or suspected dyslexia. Of course, the program helped all three groups, but the reading level of the typical pupils is higher and with the program would be even higher. In contrast to the child with reading difficulties who started out with a low score, he can make progress, but will stay at a level lower than that of a typical child.

The explanation for this finding correlated to the results of many studies, which found significant differences among the dyslexic children, which delays them from acquiring reading and therefore the effect of the intervention program is more successful among the typical children. The explanation is that this is contrary to their dyslexic peers who demonstrate great weakness in morphological awareness and slowness in acquiring it, which leads to impairment in reading acquisition and development. It could also be concluded that morphological awareness explains both different reading levels among pupils and their reading skills. In other words, sensitivity to word roots and patterns is a critical factor in written word identification and in every fluent reading process, among both normal and dyslexic readers (Abu-Rabia & Awwad, 2004; Abu-Rabia & Siegel, 2003; Wattad& Abu-Rabia, 2020).

These findings addressed the need for evidence regarding the impact of MA on reading fluency of children with and without dyslexia in transparent orthographies. Among typical readers, results indicated that inflectional, derivational, and compounding morphology had a small but significant effect on word, text, and silent reading fluency in 2nd grade and derivational and inflectional morphology on text and silent reading fluency in 5th grade, after controlling for non-verbal intelligence, vocabulary, and phonological awareness. For dyslexic children, a moderate-to-large effect of inflectional and derivational morphology on text and word reading fluency was restricted to 2nd grade.

Therefore, it may be concluded from this study and previous studies, that the effect of the intervention program is different among children with difficulties and typical children.

## Conclusions

The intervention program in phonology and morphology are very rich and important in kindergarten. The morphology provides all children with a lot and assists them in acquiring reading and writing in a better and more rapid manner in grade one, even the typical readers and the children with suspected dyslexia or difficulty reading. In contrast, the phonology in the program also provides the children with a lot and affects them, but it depends on the type of child. If the child has difficulty with basic reading skills, he gains more from the program. The content he learns in kindergarten helps him all the way to the end of kindergarten and in grade one as well.

### Importance of the Research

This research is important and extremely relevant to the field of education in that the findings may help in establishing techniques and methods for the advancement of reading and reading comprehension; the foundations of which constitute children’s morphological and phonological awareness, even more for children in special education programs. The findings may also contribute to the development of a training program for preschool teachers, with a focus on acquiring effective tools for raising morphological-phonological awareness, thereby bringing about an improvement in students’ early literacy achievements, enhancing their capabilities, and reducing the dropout rate, among other factors.

### Implications of Different Findings

If the results will point to a clear difference between the intervention group and the control group, this can help us use the intervention program. Which is effective and helps children acquire writing and reading skills better and faster than the children who have not gone through with the program. In addition, it is very important to compare morphological and phonological part, and which one contributes better to the pupil’s achievements after the program and very important to check amongst who the contribution is better, the readers who experience difficulties or the typical readers. This helps to build programs that match both the typical readers and the readers with difficulties.

### Limitations of this Research

results from the effects of K-1 phonological and morphological intervention are specific to K-1 and may be different in higher grades as a function of changing literacy demands of the text. Also, tasks like reading comprehension in G1 is different from RC in upper grades. Also, are differences in demands on PA and MA when texts are devowelized above grade 3.

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# Appendices

## Appendix 1. Parent`s questionnaire) screening)

**שם הילד: \_\_\_\_\_\_\_\_\_\_ ת. לידה:\_\_\_\_\_\_\_ ת. זהות:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**מען:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ טלפון:\_\_\_\_\_\_\_\_\_\_ הילד לומד ב:\_\_\_\_\_\_\_\_\_\_\_**

**1**

**4. היסטוריה רפואית של המשפחה (בעיות התפתחות, לקויות למידה וכד'):**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**5. טיפולים/אשפוזים (של הילד ו/או של בני משפחתו, תגובות מיוחדות של הילד):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**6. התפתחות מוקדמת:**

**הריון: תקין/לא\_\_\_\_\_\_\_\_\_\_ לידה\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* **הרגעה (תגובות לתסכול)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **רגישויות מיוחדות (למגע, רעש, טמפרטורה) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **אימון להרגלי ניקיון: מתי?\_\_\_\_\_\_\_\_\_\_תהליך(ספונטני/כפוי)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**אבני יסוד:**

* **מוטוריקה גסה (זחילה, הליכה) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **שפה (התחלת דיבור, היגוי, אוצר מילים, משפטים, מבנה תחבירי) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **רגשי (התקשרות, מגע, מצב רוח, תוקפנות, עקשנות, חברתי, דחיית סיפוקים) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **עצמאות (אכילה, לבוש, שינה )\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**טיפולים ואבחונים (קלינאית תקשורת, ריפוי בעיסוק,פסיכולוג,נוירולוג התפתחות הילד):**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**7. חינוך פורמאלי:**

**גיל 0-3 מטפלות וגנונים\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**גיל 3-4 גן פרטי/רשמי\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**גיל 5-6 גן חובה \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**גיל 6 והלאה: בתי ספר (פרוט כיתות ושמות ביה"ס)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**האם קיבל סיוע לימודי במסגרת הגן או ביה"ס (שעות שילוב, פרטני)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**האם זקוק לסיוע בלמידה ובהתארגנות בבית?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**8. מצב הבריאות היום:**

**\* ראיה תקינה/לקויה**

**\* שמיעה תקינה/לקויה**

**\* האם נערכה אי פעם בדיקת ראיה/שמיעה:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

## Appendix 2. Auditory Process Test (screening)

|  |  |  |  |
| --- | --- | --- | --- |
| **العلامه** | **اجابة الممتحن** | **الاجابة الصحيحه** | **السؤال** |
| 0 1 |  | درج | 1 د – رج |
| 0 1 |  | أرنب | 2 أر – نب |
| 0 1 |  | عصفور | 3 عص - فور |
| 0 1 |  | بحر | 4 بحر |
| 0 1 |  | جزر | 5 ج- زر |
| 0 1 |  | مفاتيح | 6 م- فا- تيح |
| 0 1 |  | شجرة | 7 ش-ج-رة |
| 0 1 |  | فرس | 8 فا – رس |
| 0 1 |  | مدرسة | 9 مد – ر – سة |
| 0 1 |  | حيوانات | 10 حي- وا- نات |
| 0 1 |  | صافي | 11 صا-في |
| 0 1 |  | استراحة | 12 اس-ت-را-حة |

## Appendix 3. Phonological Test (screening)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **العلامة** | **اجابة الطالب** | **الاجابة الصحيحه** | **الكلمة** | رقم السؤال |
|  |  | **ع** | **علم** | **1** |
|  |  | **ط** | **طبل** | **2** |
|  |  | **ك** | **كتاب** | **3** |
|  |  | **ج** | **جرس** | **4** |
|  |  | **ق** | **قلم** | **5** |
|  |  | **ف** | **فرس** | **6** |
|  |  | **ن** | **نار** | **7** |
|  |  | **ب** | **بئر** | **8** |
|  |  | **س** | **سن** | **9** |
|  |  | **ق** | **قمر** | **10** |

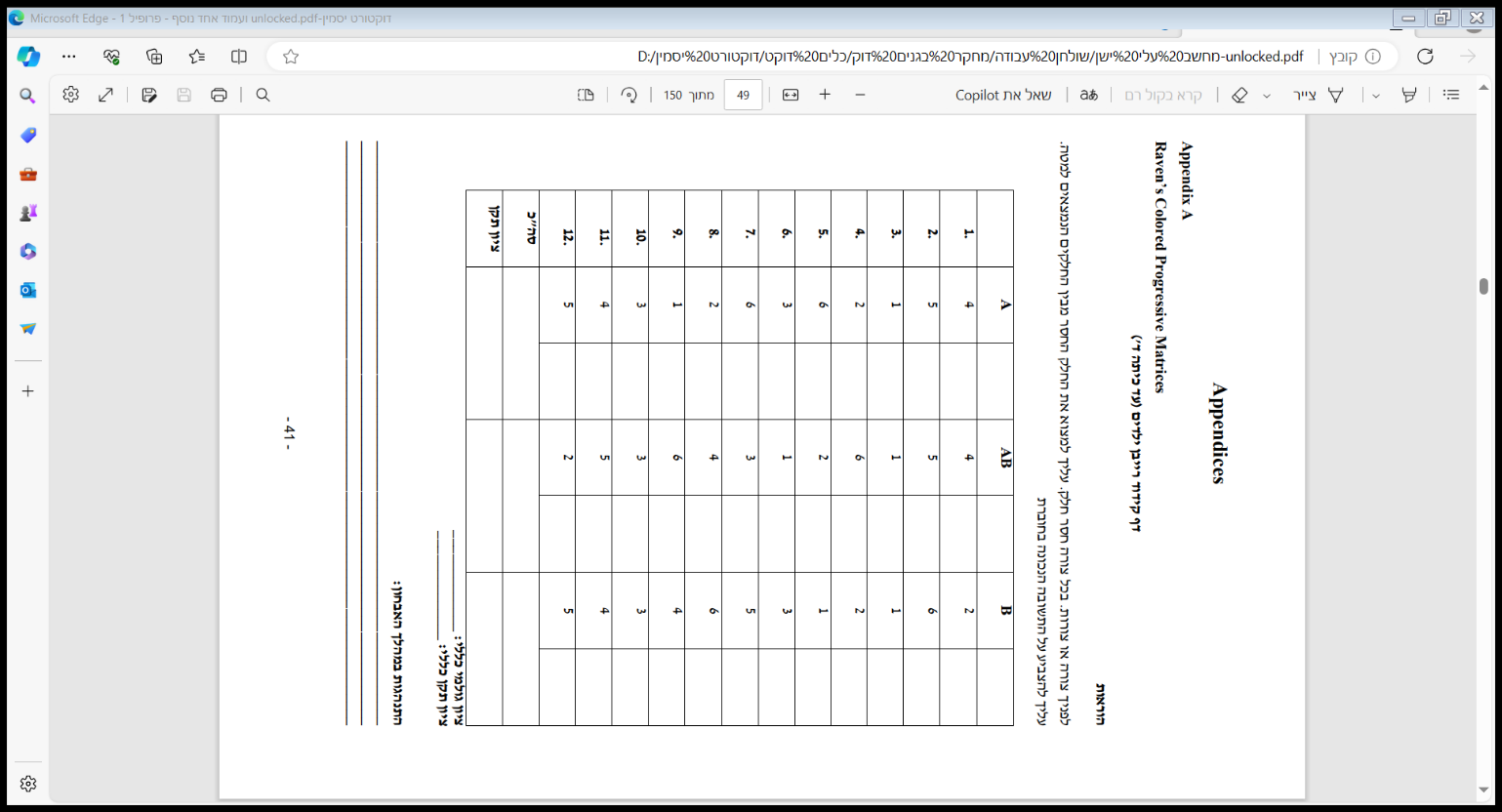
## Appendix 4. Morphological Test (screening)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| العلامه | اجابة الطالب | الاجابة الصحيحة | السؤال | رقم السؤال |
|  | +/- | قلمها | اذا القلم للبنت منقول هذا | 1 |
|  | +/- | دفتري | اذا الدفترالي منقول هذا | 2 |
|  | +/- | كأسنا | اذا الكأس النا منقول هذا | 3 |
|  | +/- | كتابه | اذا الكتاب للولد منقول هذا | 4 |
|  | +/- | خاتمها | اذا الخاتم للبنت منقول هذا | 5 |
|  | +/- | مكتبتهم | اذا المكتبه للناس منقول هذه | 6 |
|  | +/- | حاسوبه | اذا الحاسوب للولد منقول هذا | 7 |
|  | +/- | صندوقي | اذا الصندوق الي منقول هذا | 8 |
|  | +/- | هديتنا | اذا الهديه النا منقول هذه | 9 |
|  | +/- | قلمه | اذا القلم للولد منقول هذا | 10 |
|  | +/- | كتابه | اذا الكتاب للبنت منقول هذا | 11 |
|  | +/- | خاتمي | اذا الخاتم الي منقول هذا | 12 |

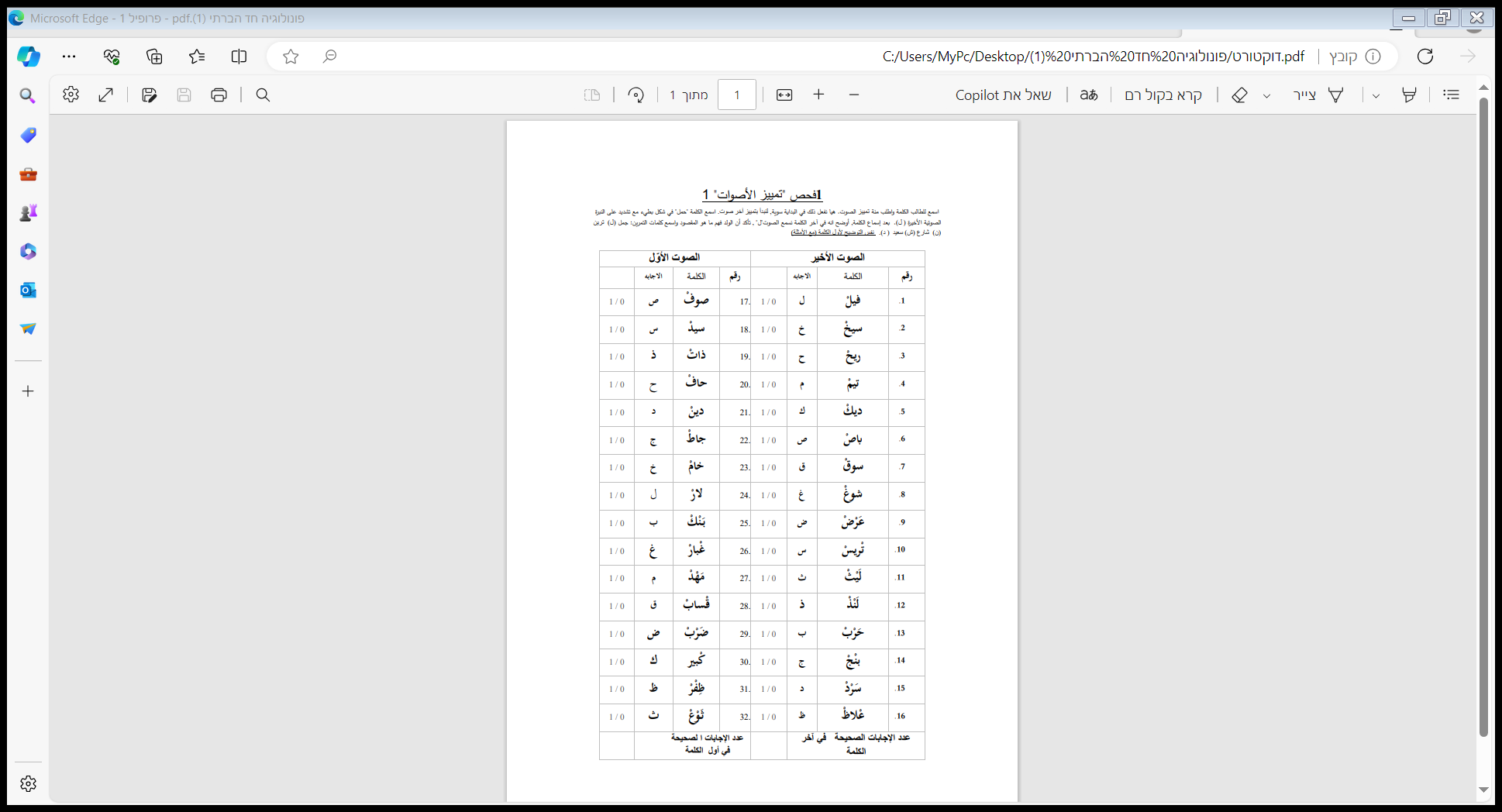
## Appendix 5. Rapid Automatized Naming (screening)



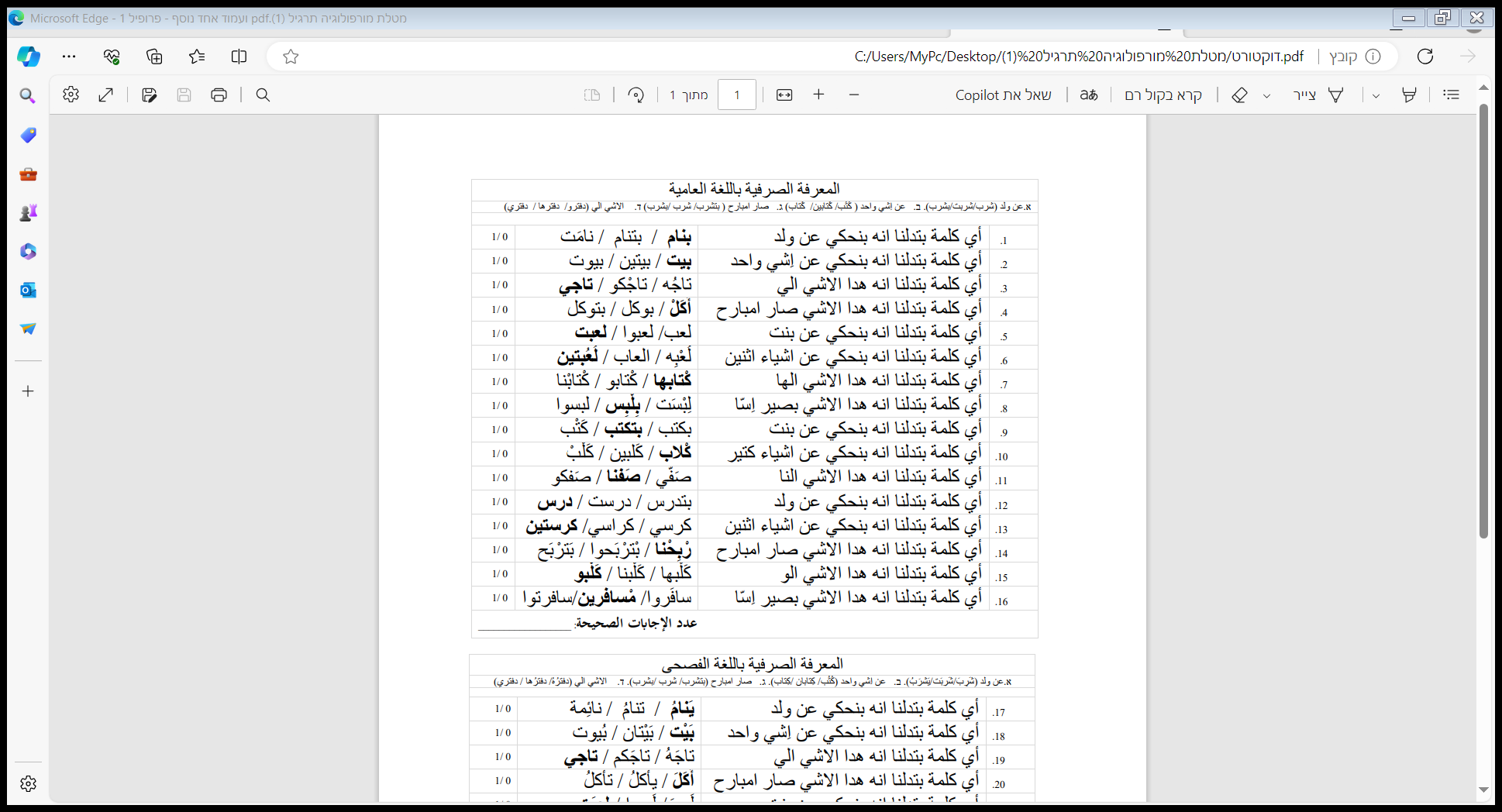
## Appendix 6. Basic Cognitive Skills Raven’s Colored Progressive Matrices (screening)



## Appendix 7. Pre-Post-Test, phonological awareness



## Appendix 8. Pre-Post-Test which assesses morphological awareness



## Appendix 9. Morphological and Phonological Intervention Program

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **מהלך המפגש** | **נושא** | **תאריך** | **יום** | **מס' מפגש** |
| המטפלת תכיר את התלמידים ותסביר להם שהולכים להיפגש שלושה פעמיים בשבוע (ראשון, שני)  ותסביר להם שבכל מפגש נלמד מילים חדשים נלמד בצורה כיפית לכן צריך להגיע ולא לפספס.  עוברים על הלוז ואומרים לילדים כל פעם שאנחנו נסיים מפגש נשים עליו מדבקה. | היכרות | 6/11 | א' | 1 |
| הצגת סדר מפגש  הקנייה ומתן דוגמאות על מילים שמבצעים עבורם פירוק הברה פותחת.  פעילות בכדור גדול שכוללת פירוק מילים- בידוד הברה פותחת.  סיכום המפגש | פונולוגיה:  בידוד הברה פותתת מתוך מילה דו-הברתית | 7/11 | ב' | 2) |
| הצגת סדר מפגש  הקנייה, תוך מתן דוגמאות ומתן הסבר על זה ש "הוא" ליחיד כמו "ילד"-"ילדים" ו "הם" לרבים.  פעילות, נותנים לילדים כמה מילים ועליו להגיד אותה ברבים.  סיכום | מורפולוגיה: נטייה, ריבוי סדיר (זכר) | 13/11 | א' | 3) |
| הצגת סדר מפגש  הקנייה  פעילות "סולמות ונחשים"  פעילות סיכום, בכדור ספוג, כל ילד לוקח את הכדור מפרק את המילה שהמנחה מבקש לבודד את ההברה הפותחת. | פונולוגיה:  בידוד הברה פותחת מתוך מילה דו-הברתית | 14/11-20/11-21/11 | א' | 4-7) |
| הצגת סדר המפגש, המשך באותו נושא שלמדנו במפגש קודם, לפני שבועיים. ניקח מילים ביחיד ונהפןך אותם לרבים.  תרגול, איתור מילים מהסיפור ולהגיד יחד מה הרבים שלהם, ואם לא ברור לחלק מהתלמידים נסביר כמו "ארנב"- "ארנבים".  פעילות, משחק קלפים. כל קלף כתוב עליו מילה וצריך להגיד את הרבים של המילים.  סיכום. | המשך, נטיית ריבוי סדיר (זכר) | 27/11 | ב' | 8) |
| הצגת סדר מפגש  הקנייה+ מודילינג  מדגימים לילדים מה אתם שומעים במילה باص בהתחלה אומרים ביחד با.  פעילות, מפזרים בה תמונות והמנחה תהגה בקול תת הברה با למשל ועל הילדים לדעת איזה תמונה מתחילה בתת הברה זו. המנצח הוא האוסף יותר תמונות.  סיכום למפגש | פונולוגיה:  בידוד תת הברה פותחת במילה חד הברתית | 28/11-4/12-5-12 | ב' | 9-11) |
| הצגת סדר המפגש, היום נלמד מילים ביחיד נקבה ואיך להפוך אותם לרבות.  הקניה, מסבירים ונותנים דוגמאות לילדים שהוספת "ות" "ات" הופכת את המילה לרבות.  כמו תלמידה הרבים זה תלמידות.  פעילות,  משחקים עם הילדים משחק הקופסא "הארנב והגזר", כל קלף רשום עליה מילה, ועל הילדים בתור להגיד מה הרבים של המילה.  סיכום. | נטיית ריבוי סדיר (נקבה) | 11/12 | א' | 12) |
| הצגת סדר המפגש מה נלמד ומה נשחק.  הקנייה ומודילינג: ניקח תמונה המייצגת מילה نار נציג אותה בפני הילדים נשיים אותה תוך הדגשה על העיצור הסוגר ر ונסביר לילדים שזה העיצור הסוגר האחרון במילה  פעילות, משמיעים בקלטת מילים לילדים ועל הילדים לזהות מכל מילה את העיצור הסוגר.  סיכום | פונולוגיה:  בידוד עיצור סוגר מתוך מילה חד הברתית | 12/12-18/12-19/12 | ב' | 13-15) |
| הצגת סדר המפגש,  נכיר את הרבים כמו המפגשים הקודמים אך הפעם הריבוי הוא שונה קצת,  נשחק משחק שעון תמונות ביחד.  הקנייה- לעבור ביחד על כל מילה מהרשימה והריבוי שלה כמו'- منشفه- مناشف  دفتر- دفاتر  مقعد-مقاعد וכל ילד מתבקש להגיד מילה בריבוי כדוגמא.  משחק למידה- פעילות של שעון תמונות כל ילד בתור עליו לסובב את השעון ולהגיד את הרבים של המילה שהתמונה מציגה.  סיכום. | נטיית ריבוי שבור | 15/1 | א' | 16) |
| הצגת סדר המפגש, נלמד על העיצור הפותח את המילה  הקנייה ומודילנג, לקרוא לילדים תוך כדי דגש על העיצור הפותח להגיד تراب ונדגיש על ت  פעילות של קריאה סיפור ולאחר מכן לעבור על המילים ולבקש מכל ילד להגיד איזה עיצור פותח מחמש מילים.  סיכום. | פונולוגיה:  בידוד עיצור פותח מתוך מילה דו הברתית | 16/1-22/1-23/1 | ב',א',ב' | 17-19) |
| הצגת סדר מפגש  הקנייה ומודילינג  מסבירים לילד כמו שלמדנו קודם שהוא ליחיד והם לרבים. כמו' הוא "פרפר" והם "פרפרים"  פעילות הסולמות ונחשים שתציג 8 כרטיסי מילות מטרה מייצגת מילה עליו להגיד אותה ברבים  סיכום | חזרה על נטייה, ריבוי סדיר (זכר) | 29/1 | א' | 18) |
| הצגת המפגש  חזרה על כל התרגילים בפונולוגיה.  שיר ואיתור המילים מאותו משקל, בידוד עיצורים    תרול באמצעות שירים  סיכום - | פונולוגיה | 30/1 | ב' | 19) |
| הצגת סדר מפגש- דוגמא מהמפגש הקודם  ואז עוברים למשחק התאמת בין מילים. התאמת יחד לרבים אחרי שלומדים שהוספת "ات" תהפוך את המילה לרבים נקבה  סיכום | חזרה על נטיית ריבוי סדיר (נקבה) | 5/2 | א' | 20) |
| הצגת סדר המפגש,  היום נלמד להגיד איך אומרים כשהחפץ של מישהוא כמו- הוא,היא, הם,הן...  הקנייה,  המנחה נותנת גוגמא ומבקשת מהתלמידים לתרגל. מילים כמו כדור שלי זה כדורי וכו'  פעילות:  מציגים תמונות, גבר, אישה, שני גברים ושתי נשים וגברים ונשים (כל מפגש מתמקד בשלושה כינויים) ומבקשים מהילד הבא בתור להגיד את החפץ לפי הכינוי המתאים לו, למשל כדור שלו זה כדורו.  כך שמעבירים ארבעה מפגשים בנושא הזה. | כינויים חבורים | 6/2-12/2-13/2 | ב',א',ב' | 21-23) |
| הצגת סדר המפגש:  נלמד היום לבודד את העיצור הפותח מהמילה. נשחר משחק בזה. ופעילות סיכום.  הקנייה:  המנחה יגיד לתלמידים איך לבודד את העיצור הפותח מכל מילה.  תרגול:  משחק תרגול שכל ילד מתבקש לבודד עיצור פותח במילה.  סיכום. | פונולוגיה:  בידוד עיצור פותח מתוך מילה חד הברתית | 19/2,20,2,26-2 | א',ב',א' | 24-26) |
| תרגילים בזוגות בנושא של בידוד הברה פותחת. תוך כדי שימוש במילים שלמדנו. | סיכום פונולוגיה | 27/2 | ב' | 27) |
| תרגילים סביב בידוד עיצור סוגר. | סיכום פונולוגיה | 5/3 | א' | 28) |
| תרגילים בנושא רבים זכר ונקבה סדיר ושבור | סיכום מורפולוגיה | 6/3 | ב' | 29) |
| תרגילים בנושא כינויים חבורים | סיכום מורפולוגיה | 12/3 | א' | 30) |
| כל ילד מקבל ארבע מטלות מסכמות שני תרגילים בנושא פונולוגיה ושני תרגילים בנושא מורפולוגיה. | תרגיל מסכם ופרידה | 13/3 | ב' | 31) |
| המנחה מציינת שזה מפגש אחרון ונותנת לכל משתתף שוקולד וכל ילד אומר איך היה לו במפגשים. | פרידה | 19/3 | א' | 32) |

## Appendix 10. Reading Assessment Test

فحص قراءة الاصوات:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ط** | **أ** | **ه** | **س** | **ب** | **ش** | **ص** |
| **ض** | **ت** | **ث** | **ف** | **ك** | **ل** | **خ** |
| **ن** | **و** | **ح** | **م** | **ق** | **غ** | **ذ** |
| **ج** | **ز** | **ع** | **د** | **ي** | **ظ** | **ر** |

***لفظ المقطع الطويل مقابل المقطع القصير***

تعرض المعلمة المقطعين أمام الطالب , المقطع الطويل والمقطع القصير, وتجري مقارنة لفظ أمام الطالب وتطلب منه أن يلفظ المقطعين وتنبهه للفرق بينهما في اللفظ .

**دَ دا رَ را بَ با**

**مَ ما لَ لا تَ تا**

**نَ نا وَ وا يَ يا**

**فَ فا سَ سا طَ طا**

**هَ ها ثَ ثا شَ شا**

**جَ جا صَ صا كَ كا**

**قراءة كلمات**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **الكلمة** | **إجابة الطالب** | **العلامة** |  | **الكلمة** | **إجابة الطالب** | **العلامة** |
| **1** | **دارٌ** |  | **+ / -** | **17** | **أَثاثٌ** |  | **+ / -** |
| **2** | **جارِي** |  | **+ / -** | **18** | **فَرَسٌ** |  | **+ / -** |
| **3** | **خَفيفٌ** |  | **+ / -** | **19** | **بَيْتي** |  | **+ / -** |
| **4** | **بارِدٌ** |  | **+ / -** | **20** | **أَرْنَبٌ** |  | **+ / -** |
| **5** | **خَروفٌ** |  | **+ / -** | **21** | **كِتابٌ** |  | **+ / -** |
| **6** | **بابٌ** |  | **+ / -** | **22** | **في** |  | **+ / -** |
| **7** | **شارِعٌ** |  | **+ / -** | **23** | **جَزَرٌ** |  | **+ / -** |
| **8** | **قَمَرٌ** |  | **+ / -** | **24** | **قَريبٌ** |  | **+ / -** |
| **9** | **زارَتْ** |  | **+ / -** | **25** | **مَدْرَسَةٌ** |  | **+ / -** |
| **10** | **نارٌ** |  | **+ / -** | **26** | **جَديدٌ** |  | **+ / -** |
| **11** | **طارَتْ** |  | **+ / -** | **27** | **غَزالٌ** |  | **+ / -** |
| **12** | **أَخْضَرُ** |  | **+ / -** | **28** | **دَفْتَرٌ** |  | **+ / -** |
| **13** | **دَرَجٌ** |  | **+ / -** | **29** | **قَلَمٌ** |  | **+ / -** |
| **14** | **جَرَسٌ** |  | **+ / -** | **30** | **بَيْتٌ** |  | **+ / -** |
| **15** | **أَسَدٌ** |  | **+ / -** | **31** | **عَلَمٌ** |  | **+ / -** |
| **16** | **بَعيدٌ** |  | **+ / -** | **32** | **نادَى** |  | **+ / -** |

**الزمن بالثواني \_\_\_\_\_ نسبة الدقة: عدد الكلمات التي قُرأت بشكل صحيح x 100 = \_\_\_\_\_\_\_\_\_**

**مجموع كلمات القائمة**

**תקציר**

המחקר הנוכחי בודק את השפעתה של תוכנית התערבות במורפולוגיה ובפונולוגיה בקרב 189 ילדי גן חובה בני כשש 6 שנים בערך לבמשך כארבעה חודשים ברציפותף. הילדים שהשתתפו במחקרהילדים הם מעיר במרכז הארץ ובמעמד סוציואקונומי דומה, והשתתפותם אושרה בידי כמובן, אחרי שאישור של משרד החינוך והוריהםאישור הורים. הילדים עברו מבדקי סינון לפני תחילת התוכנית עברו הילדים מבדקי סינון שבחנו מ, המבחנים הם מבחנים במיומנויות הבסיסיות בקריאה בסיסיות, ולפי התוצאות קוטלגו לפי שלוש קטגוריות: הילדים קוטלגו לטיפיקאליים,, מתקשים בקיריאה ועם חשד לדיסלקציה. לאחר מכן עברו , הילדים עברו מבחנים ן לפני הותוכנית וגם לאחריה, וכןגם מעקכב בכיתה א' במטרה לבדוק את התקדמותם בעזרת הילדים בתוכנית ההתערבות ולהשוותם אותם עם אלה שלא עברו את התוכנית. השוואה נוספת הייתה של מידת ההתקדמות בין קטגוריות הסיווג השונות. לשם המחקר חולקה התערבות. כמו כן, על מנת להשוות בין סוגי הילדים איזה מהם מתקדם יותר. כמובן, ככל קבוצת תלמידים חולקה לקבוצת התערבות ולקבוצת ביקורת. וגם בכיתה א' נערך גם מבדק קריאה לתלמידים. בניתוח שונות תוך ובין נבדקי הראה כי נראה, בתחום הבמורפולוגיה התוכנית התערבות כן השפיעה על התלמידים וכי אלו שעברו את התוכנית השיגו והשיגו ציונים גבוהים מאלה שלא, עברוללא תלות בקטגוריה שאליה שויך הילד. תוכנית וההשפעה היא ללא קשר לאיזה קבוצה הוא שייך. לעומת זאת, בתחום , בהפונולוגיה, התלמידים שעבהרו את תוכנית ההתערבות התקדמו יותר מאלה שלא עברו אותה, אבל ניכרה השפעה של הקטגוריה. למשל, ילדים תוכנית אבל בהשפעת סוג הילד, זאת אומרת, אם מתקשים בקריאה הוא מתקשה בקריאה או עם חשד לדיסלקציה המתקדמום יותר מהטיפיקאליים. ובמבדק הקריאה, הילדים שעברו את תוכנית ההתערבות השיגו ציונים גבוהים יותר יותר גדולים לאלהמאלה שלא עברו את התוכנית, ללא קשר לקטגוריה שבה קוטלגו. לאיזה קבוצה הוא שייך ההשפעה היא זהה בקרב שלושת הקבוצות (טיפיקאלים, מתקשים, חשד לדיסלקציה).

**תרומתה של תוכנית התערבות מורפולוגית ופונולוגית בערבית לקוראים טיפיקליים, מתקשים בקריאה ודיסלקטים (חשד לדיסלקציה) בגן, עם מעקב בכיתה א'**

מאת: היבה מגדלה

בהנחיית: פרופ' סלים אבו-רביעה

חיבור לשם קבלת התואר "דוקטור לפילוסופיה"

מונוגרפיה

אוניברסיטת חיפה

הפקולטה לחינוך

החוג לחינוך מיוחד

מאי 2024

**תרומתה של תוכנית התערבות מורפולוגית ופונולוגית בערבית לקוראים טיפיקליים, מתקשים בקריאה ודיסלקטים (חשד לדיסלקציה) בגן, עם מעקב בכיתה א'**

היבה מגדלה

חיבור לשם קבלת התואר "דוקטור לפילוסופיה"

מונוגרפיה

אוניברסיטת חיפה

הפקולטה לחינוך

החוג לחינוך מיוחד

מאי 2024