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# Current Perspectives on Prevention of Reading and Writing Learning Disabilities

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## Abstract

This chapter intends firstly to analyze the problem of identifying learning disabilities, from the standpoint of competing diagnostic models. The controversy between different models for identifying learning disabilities was presented, contrasting the characteristics of diagnostic models and models based on response to intervention. Second, an analysis of the main predictive factors of reading and writing was offered, using recent results from research carried out in different languages. The most often studied predictors—phonological awareness, speech perception, the alphabetic principle, rapid automatic naming, and vocabulary—were analyzed for their relationship to reading and writing. Finally, a discussion follows on the effects of certain programs that have been developed in different countries to prevent reading and writing learning disabilities. Most of these programs have been developed in the United States or Spain; they have also been implemented in other countries such as Canada, Australia, Mexico, Chile, and Israel.

**Keywords:** LD identification, reading, writing, predictive factors, prevention program

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## 1. Introduction

The prevention of learning disabilities has always been and continues to be a topic of great relevance in the clinical and educational areas. There is limited research, however, on the effects of implementing programs to prevent these difficulties. One reason for this is the lack of consensus about the conceptualization of learning disabilities, and the use of different models to identify them. In this chapter, the problem of identifying learning disabilities is analyzed, including the characteristics of different diagnostic models, such as discrepancy models, models based on response to intervention, and main component models.

Another reason has been the diversity of theories and hypotheses to explain the appearance of learning disabilities, the variety of factors that produce them, and the few studies that have analyzed predictive factors of reading and writing. An analysis of the main predictive factors of reading and writing will be offered here, based on recent research results in studies with different languages.

Finally, this chapter provides an analysis of the effects of some programs that have been developed to prevent reading and writing learning disabilities in different countries. We analyze the characteristics of the primary prevention programs, such as Success For All (SFA), Starting Out Right (SOR), Comprehensive Early Literacy Learning (CELL), and the Prevention Program of Reading and Writing Learning Disabilities (PREDALE).

## 2. Competing diagnostic models for identifying learning disabilities

An important issue in the study of learning disabilities has been to reach a consensus on the definition of LDs and the criteria for identifying them. Since 1963, when Kirk first coined the term learning disabilities, a number of definitions have appeared to characterize these problems. Most of these definitions have focused more on what LDs are not, instead of what they actually are.

In recent decades, the definition established in 1994 by the National Joint Committee on Learning Disabilities (NJCLD) and backed by the main international diagnosis systems (e.g., the International Statistical Classification of Diseases and Related Health Problems (ICD-10) in 2015, and Diagnostic and Statistical Manual of Mental Disorders (DSM-5) in 2013) has become more widely accepted. Exclusion criteria are predominant in this definition, although the best procedures for quantifying these are not specified. Learning disabilities are considered to be a heterogeneous group of disorders that are manifest as significant difficulties in acquiring and using the skills of reading, writing, and solving mathematical problems. These disorders are intrinsic to the person: there may be accompanying handicaps (e.g., intellectual disabilities, severe emotional disorders, and sensory deficits), or extrinsic influences (such as cultural differences, and insufficient or inappropriate instruction), but learning disabilities are not the result of these conditions or deficits (NJCLD and DSM-5).

Learning disabilities are neurologically based—processing problems. These processing problems can interfere with learning basic skills such as reading, writing, and/or math. They can also interfere with higher-level skills such as organization, time planning, abstract reasoning, long- or short-term memory, and attention. Learning disabilities can affect an individual's life beyond academics and can impact relationships with family, friends, and in the workplace.

Recent research yields a diversity of models for identifying specific learning disabilities. Difficulties in learning reading and writing have received the most attention [1]. The identification of reading-writing LDs has varied in recent decades, differing between countries and over the years [1].

The traditional model for identifying these problems in many countries has been and continues to be a diagnostic criteria-based model [1]. These models have been the most popular for

assessing specific learning disabilities, most notably models based on the concept of discrepancy [1]. The IQ/achievement discrepancy model is used internationally and has continued in use for longer [1]. This model claims that persons with reading-writing LDs are characterized by a discrepancy between their IQ and their achievement, that is, they have normal IQ but their reading and writing achievement is below the 20th percentile [2, 3].

Some authors defend the discrepancy model, but specify discrepancies between oral comprehension and achievement as an alternative to the IQ/achievement discrepancy, asserting that IQ is not relevant in diagnosing reading and writing LDs [2, 3]. Elsewhere, other researchers have questioned the discrepancy model as a means of defining and identifying students with specific learning disabilities [4–8]. These researchers have recently proposed other diagnostic criteria not relating to discrepancy. Low achievement scores have been suggested as being sufficient to identify reading-writing LDs, given that the purpose is to identify a need for intervention, not IQ or an IQ/achievement discrepancy. Still, other authors look more to low scores in phonological awareness [9] or in cognitive processes, as diagnostic criteria for reading and writing LDs [10].

A more recent model in use today is based on the response to intervention model (RTI) [4–6, 10]. In 2004, the Individuals with Disabilities Education Improvement Act (IDEIA), in accordance with the Commission on Excellence in Special Education and the Office of Special Education and Rehabilitation Services of the US Department of Education, and with the National Associations of School Psychologists (NASP), proposed that the IQ/achievement discrepancy model be abandoned in favor of the RTI model. This means a considerable change in the conceptualization and identification of these problems. Since 2004, studies on the RTI model have become increasingly prevalent, having a substantial presence in the most prestigious journals, such as the *Journal of Learning Disabilities*, *Learning Disabilities Quarterly*, *Reading & Writing*, and *Reading & Writing Quarterly*.

This move toward RTI, however, has not occurred in every country or at the same time. For example, the change occurred earlier in Australia than in other countries (2001), and in the United Kingdom, Japan, and Germany, the IQ/achievement discrepancy model was never adopted, or it was abandoned more quickly, focusing more on the criterion of these children's need for reeducation [1, 11]. Based on this model, a child with difficulty learning to read and write is identified as having specific LDs based on his/her immediate response to instruction in written language, as long as there is severely low achievement and unexpected early difficulty in learning, manifest as a failure to respond to standardized instruction [4–6, 12, 18].

Even though most current studies defend the RTI model, some authors indicate that this model is effective for improving achievement in reading and writing only if certain conditions are met. Some studies show that the RTI model is effective for identifying these problems only at early ages (4–6-year-olds); it cannot adequately predict later reading achievement, and it may present many false positives [13, 14]. In other words, the RTI model is insufficient for identifying children with specific LDs, and it does not offer greater benefits than other models mentioned above [15].

Consequently, other studies [16, 17] put forward a new diagnostic model, the component model of reading (CMR), including three significant domains for identifying these problems:

cognitive components (e.g., phonological awareness, decodification, vocabulary and comprehension), psychological components (e.g., motivation, locus of control, teacher expectations, gender differences, and learned helplessness), and ecological components (e.g., behavior at home, culture and parental involvement, classroom environment, peer influences, and dialects) [16, 17]. This model assesses reading and writing performance from a multidimensional perspective, and facilitates more adequate, individualized instruction, with better chances for success [17].

Finally, based on these research studies, some authors have proposed a fusion of the diagnostic and RTI models. This solution serves to evaluate students' skills and determine their academic needs, so that they may receive special education that is adequate for their needs [18]. There is a great need for further objective research.

### 3. Main predictive factors of reading and writing

A large number of studies have been carried out over the years, with different individuals at different ages and in different languages, in order to explain reading and writing and the appearance of learning disabilities. These studies assign varying degrees of importance to the various factors [19–28]. We analyze below some of the main predictive factors that have been recognized as important in a majority of studies from recent decades.

#### 3.1. Phonological awareness

Phonological awareness makes it possible for the individual to operate with segments of speech, and refers to the awareness that words are made up of linguistic units like the syllable and the phoneme [20]. Different levels of phonological awareness are identified: syllabic, intrasyllabic, and phonemic. The literature includes many research studies that demonstrate that syllabic knowledge and especially phonemic knowledge are strong predictors of reading and writing in students with and without dyslexia at early ages (4–7-year-olds), and in languages with differing orthographic consistency such as Spanish, Italian, Greek, English, Chinese, Arabic, and others [21–28].

Most of these studies emphasize that phonological awareness is responsible for grasping the grapheme-phoneme relationship needed for reading and writing words of different lengths, consistency, and frequency. They also note that the relationship between phonological awareness and written language is stronger in transparent languages, and at early ages. The relationship declines with age [23, 24, 26, 29], and phonological awareness relates differently to different ways of measuring reading: accuracy, speed, and efficiency/fluency [21, 23–26, 28–30]. There is current debate about what variables intervene in reading in languages with different linguistic consistencies, at what age they have the greatest influence, and how these variables relate to other cognitive variables such as phonological memory, letter knowledge, and rapid automatic naming [25].

### 3.2. Speech perception

Processes of speech perception refer to the preliminary, auditory perceptual analysis of words, taking into account their phonetic and auditory characteristics, and how their phonological representation is formed [19]. Speech perception has been investigated in children of different ages with and without dyslexia [31–34]. Ref. [31] analyzes the relationship between speech perception and reading of words, presenting word segments of progressively greater length. Speech perception is found to predict reading in novice readers but not in expert readers. Other authors consider that speech perception loses importance in typical readers as they acquire experience [25].

Some studies have found that deficits in phonetic discrimination produce errors in phonological representations of the lexicon, and therefore in phonological decodification [32–34]. Thus, readers with dyslexia present deficits in phonological processes due to difficulty creating phonological representations based on acoustic signals of speech [32]. In other words, they present difficulties in identifying and discriminating speech segments, specifically, identifying and discriminating consonants that differ in the place and manner of articulation and sonority [33, 34].

On the other hand, the relationship between speech perception and phonological awareness is unclear. Some authors indicate that children with dyslexia have deficits in phonological awareness due to their deficits in speech perception [35], and that speech perception is not directly related to reading words [36]. Others consider that speech perception is unrelated to phonological awareness [37] and that it is independently related to reading in the case of readers with dyslexia, but not in typical readers [38].

In conclusion, there is controversy about whether speech perception is a predictor of written language or of learning disabilities, and whether speech perception is related to reading in a direct, independent relationship [33, 34, 36–38]. There seems to be more agreement, however, that this relationship varies with the student's age and experience.

### 3.3. Alphabetic principle

The alphabetic principle, or letter knowledge, is based on the correspondence between speech sounds (phoneme) and a written graphic transcription (grapheme). The alphabetic principle is based on the grapheme-phoneme conversion and makes it possible to decode a word by applying systematic association rules and joining the sounds to form words [19]. Children use letter knowledge for spelling and internally store the pronunciation of the word in order to facilitate access to the lexicon.

The importance of the alphabetic principle in written language depends on age and reading experience. Namely, there is a critical relationship between the alphabetic principle and reading when one first begins to read and write. In Ref. [39], letter knowledge is found to be one of the best predictors of reading words in 4-year-olds. Similarly, the importance of letter knowledge has been demonstrated in children with and without dyslexia between the ages of 4 and 7 years [40, 41].

Elsewhere, there is some controversy about the influence of letter knowledge in languages with different orthographic consistency. Some studies indicate that letter knowledge is more strongly related to reading in transparent languages than in nontransparent languages [19, 23], and others indicate that it is not relevant in the latter, given that there is no direct correspondence between graphemes and phonemes [28].

Other studies have demonstrated that letter knowledge is also strongly related to PA at early ages in languages with different orthographic consistency [39, 42], but they do not establish the nature of these relationships. More research is needed to determine relations between PA, letter knowledge, and reading-writing of words, in order to establish what variable precedes the others in languages with different linguistic consistency.

### 3.4. Rapid automatic naming

Rapid automatic naming, or naming speed, consists of naming different high-frequency visual stimuli, such as colors, objects, letters, and numbers, that are presented on multiple occasions in controlled fashion [43]. Rapid automatic naming is considered to be a measurement or index of phonological and visual recovery, depending on whether the items are alphanumeric (letters and numbers) or nonalphanumeric (colors and objects) [44].

Studies have focused mainly on the relationship of rapid automatic naming to reading, in students with and without dyslexia, at different ages and in different languages. Children with dyslexia have been found to be slower in naming high-frequency visual stimuli than children without dyslexia [45–47]. In Ref. [45], rapid naming was found to have a strong relationship with word-reading speed in children with dyslexia, but not with word-reading accuracy.

Most studies consider alphanumeric rapid naming to be a predictor of several reading measures in typical learners [21, 25, 44, 47]. By contrast, there is no consensus on the influence of nonalphanumeric naming: some studies find no relationship to reading measures, while others do [21, 24, 25, 40, 41, 44, 48, 49]. Consensus is also lacking as to what measure of reading is influenced by rapid naming, at what age, and with what type of language. Some studies find that rapid naming influences only measures of speed, at early ages, and more strongly in nontransparent languages, while others also find a relationship with reading accuracy, at a later age and in transparent languages [23, 25, 26, 40, 46, 48–51].

Finally, there are studies that try to clarify how rapid automatic naming relates to phonological awareness and other cognitive variables, in order to explain reading and writing in languages of different linguistic complexity. Some find that rapid naming is independent of phonological awareness and contributes differently to the explanation of word and pseudo-word recognition [21, 45, 52, 53]. For others, rapid naming is indirectly related to reading, through phonological processing [54].

### 3.5. Vocabulary

The meanings of words constitute a representational system that makes up the lexicon of a language. When we speak of vocabulary, we refer to words that we know, in order to communicate with each other, both orally and in writing.

Vocabulary is also considered an important factor in the acquisition of reading and writing; when children have difficulties in vocabulary, they have also been shown to present problems in reading and writing. Some studies find that vocabulary is a facilitator in word recognition, in fluency, and also in reading comprehension for children with and without dyslexia [40, 55, 56]. A vocabulary deficit is reflected in problems with fluency and reading comprehension [57].

Vocabulary is also related to phonological skills. Phonological representations start becoming more specific with the development of vocabulary [31]; word codification and recovery require analysis of the linguistic segments that words are made of. In this way, deficits in vocabulary are accompanied by poor phonological representations, and therefore by difficulty with decoding processes that are involved in reading and writing [19].

Other authors find that vocabulary differences between children with and without dyslexia generally appear at older ages, when children already have a scholastic history. These authors consider that difficulties with written language are themselves the cause of these differences [58]. Some research defends a combination of vocabulary and other phonological measures in order to better explain problems with written language [48].

In conclusion, there is much need for research that analyzes the combined contribution of the main predictive factors. More clarification is needed as to how these factors affect different measures of reading and writing, in languages with different orthographic consistency or transparency, and at different ages [22, 24, 29].

## **4. Programs for preventing reading and writing learning disabilities**

There are not many studies that design programs to prevent disabilities in learning written language, and that analyze their effects on students' achievement. Consequently, in the United States, the National Institute of Child Health and Human Development (NICHD) and the National Research Council's (NRC) Committee on Preventing Difficulties in Young Children have established the need for a National Reading Panel (NRP) that would agree on topics for reading instruction and for preventing reading disabilities.

Most programs that have been designed for this purpose seek to offer instruction in concrete aspects known to facilitate reading and writing and to present a global model that considers different instructional components. In this section, we present the characteristics and general objectives of some programs that consider different instructional components in an integrated fashion, and analyze the effects that these produce in students. These programs have been developed in the United States and in some cases have been implemented in other English- or Spanish-speaking countries.

### **4.1. Success For All**

The objective of the program Success For All is to prevent difficulties in scholastic learning through a change in curriculum content during early childhood and primary education [59]. It was developed at the Center for Research on the Education of Students Placed at Risk, at



Johns Hopkins University in Baltimore, and has been implemented in various states of the United States, as well as in Canada, Australia, Mexico, and Israel. This program consists of an intensive early intervention where students at risk for learning disabilities are able to meet curriculum-related objectives and avoid the need for special educational services. Reading and writing are emphasized as a strategic metacognitive process. The program does not defend a clear conceptual model of reading, but its foundational bases can be distinguished. Teacher training is a key element for program success. Coordination between classroom teachers and the reading specialist is ongoing. Mainstream teachers apply instructional strategies to all the students, and specialists do so at the individual level. The SFA program is implemented by an expert teacher who works directly with mainstream teachers and specialists who apply the program, helping them resolve any type of difficulty that appears.

The SFA program contains two subprograms: Reading Roots (3-to 6-years old) and Reading Wings (7-to 11-yeras old). Both have been adapted to Spanish and to Latin American culture [60].

The instructional components of Reading Roots are as follows:

- (a) Oral language. By telling and retelling stories and sharing books, the program fosters an understanding of story structure, comprehension, and the mechanics of writing.
- (b) Auditory discrimination. Listening to and isolating sounds in words in order to decode them.
- (c) Phonological awareness. Presentation, identification, and production of rhymed endings and initial sounds in order to establish the sound-letter relationship.
- (d) Knowledge of the alphabet. Letter knowledge connected to stories and to daily routine.
- (e) Vocabulary. Development of basic concepts and lexical families.
- (f) Emergent writing. Knowledge of the utility and purpose of writing through scribbling, formation of letters and words, connecting the dots to form letters, and so on.

The instructional components of Reading Wings are as follows:

- (a) Oral comprehension. Listening to stories read by the teacher, identifying their meaning (characters, situation, solution, etc.), establishing the purpose of the reading, introducing new vocabulary, and discussing the story.
- (b) Reading comprehension. Selecting main ideas, drawing conclusions, and contrasting ideas, through daily independent reading.

The effects of SFA have been analyzed by the American Institute of Research and the Thomas Fordman Foundation, as well as others. An effect size of 0.50 percentage points in the reading average has been demonstrated for each school year. Children at risk gained more than one full point in the first year, and this increased exponentially through the fourth year and was maintained over the long term [61, 62]. Another finding was that the percentage of students referred to special education was lower among students trained with SFA in comparison to

control students. In third grade, 2.2% of students in the trained group were referred to special education, and in the control group, 8.8% were referred [61]. Finally, the effects of gains from SFA are also noticeable in the second year, when reading and writing achievement of these students was compared to that of students who received the intervention accelerated schools [63].

#### 4.2. Starting Out Right

Another program whose objective is to prevent learning disabilities is the Starting Out Right program, with planned instruction for both the school and family contexts, from the first months of life until third grade [62]. This program is sponsored by the Committee on the Prevention of Reading Difficulties in Young Children, of the National Research Council, and the National Academy of Sciences.

The SOR program is implemented from the first months of life until third grade, and includes family and school involvement [64]. It contains two subprograms: Growing up to Read (0-to 4-years old) and Becoming Real Readers (5-to 8-years old).

The instructional components of Growing up to Read are as follows:

- (a) Oral language and vocabulary. Understanding new meanings through conversations and dramatic play and understanding stories read aloud to them.
- (b) Phonological awareness. Identification of phonemes that make up words, detecting and building rhymes, segmenting words, dividing syllables, spelling words, and so on.
- (c) Speech discrimination. Detecting the differences between words that sound similar.
- (d) Knowledge of the alphabet. Letter and word recognition.
- (e) The concept of writing. Knowledge about directionality in writing, spacing between words, and so on.
- (f) Knowledge of narrative. Detecting elements and parts of a story.
- (g) Awareness of handwriting and books. Awareness that letters are in written stories and in stories read aloud.
- (h) Knowledge of the function of writing and reading. Awareness of the utility of writing and developing positive feelings toward written language.

Some of the instructional components of Becoming Real Readers are similar to those of Growing up to Read, although others are added to foster more complex processes. These components are as follows:

- (a) Awareness of handwriting and of books and phonological awareness. Identifying phonemes in different positions in oral and written words, composing and decomposing words in syllables and phonemes, segmenting words into syllables and phonemes, and so on.

- (b) Oral comprehension and vocabulary. Acquisition of new meanings through comments about texts read aloud or narrated.
- (c) Letter and word recognition. Identification of all letters in any word position.
- (d) Writing and spelling. Tracing letters in lower and uppercase, spelling words with different linguistic complexity, preparing texts with different purposes, following punctuation rules.
- (e) Reading comprehension and fluency. Locating the main idea, making connections and inferences, and semantic maps or diagrams.
- (f) Meta-comprehension. Developing self-control over the reading process itself, using strategies for predicting, asking, summarizing, and clarifying the text information.

There is a need for relevant research studies that analyze the effects of the program on scholastic achievement, and its repercussions in decreasing scholastic learning disabilities [19].

### 4.3. Comprehensive Early Literacy Learning

The Comprehensive Early Literacy Learning (CELL) program seeks to avoid the appearance of learning disabilities, to improve students' performance, and to further teachers' professional development, by training teachers in processes for teaching reading and writing and in how to prioritize reading and writing in the classroom [65]. This program has been implemented in several states in the United States, as well as in Canada, Australia, Chile, and Mexico. It is characterized by giving priority to the teaching of reading and writing through the school curriculum, and to teacher training, as key elements in the prevention of LDs. The program is designed for 3- to 8-years old, although a continuation was designed later on, for children through 13 years old (ExLL). A Spanish version is available, entitled *Enseñanza inicial de la lectura y la escritura* (EILE), designed for the Spanish-speaking population in the United States [66].

The instructional components that make up this project are as follows:

- (a) Oral and spoken language. Fostering listening skills and verbal discussion, telling stories and explaining stories that were heard.
- (b) Knowledge of sound, symbol, and structure. Development of phonemic knowledge (segmenting words, identifying rhymes, isolating initial and final phonemes, etc.), and knowledge of writing (directionality in writing words, structure of sentences and texts, etc.).
- (c) Reasoning skills. Letter and word recognition and phonological decoding (knowing the grapheme-phoneme rules).
- (d) Reading and comprehension strategies. Reading to and with the children (independent reading, silent reading, reading aloud, guided reading, and shared reading with books of different formats and genres), comprehension strategies and reading speed (prediction and meaning summaries), and diversification of reading (critical, reflective reading of different types of texts in different areas of study).

- (e) Writing, vocabulary, and spelling. Spelling and writing letters, words and a variety of stories, respecting spelling rules, and using different grammatical uses and text structures, both interactively and independently.

Application effects of the CELL program have been assessed in different schools in different states of the United States (California, Utah, Montana, Kentucky, Nevada, etc.) and in Mexico and Chile [65–67]. Children trained with CELL were shown to have higher levels of reading comprehension, reading fluency, vocabulary, and writing (spelling and composition) than control groups who were trained with only the ordinary curriculum, from first to sixth grades. Learning outcomes were also greater in mathematics, language arts, and sciences, from third to fifth grades, in English- and Spanish-speaking children who were trained with CELL [65–67].

#### **4.4. Program for the prevention of learning disabilities in reading/writing**

The program for the prevention of learning disabilities in reading/writing (PREDALE, for its initials in Spanish) was designed to prevent these disabilities in Spanish pupils from the ages of 4–7 years [68–71]. Its objective is to prioritize reading and writing and to foster cognitive-linguistic skills through all curriculum subjects, in order to avoid or minimize risks of specific learning disabilities and to improve performance in reading, writing, and mathematics at these ages. The program is applied daily by mainstream teachers in the ordinary classroom, where children devote approximately 3 h to reading and writing, using this method as a procedure for learning scholastic content. During the first hour, activities are carried out to foster phonological awareness and oral language. Afterward, reading and writing are focused on through the reading of stories and/or textbooks on different school subjects.

Activities are assigned progressively, with increasing difficulty, for each instructional component of this program, throughout early childhood education (3-to 5-years old) and the first 2 years of primary education. The easiest activities are carried out between the ages of 4 and 5 years, with more complex activities at ages 6 and 7 [68–71].

##### **(a) Phonological awareness**

###### **Syllabic awareness**

- Counting syllables in words
- Identifying initial and final syllables
- Identifying rhymes
- Adding syllables to form new words
- Omitting syllables to form new words
- Substituting syllables to form new words
- Linking words by using the final syllable of one word to start a new word

### Phonemic awareness

- Identifying vowels and consonants in words
- Recognizing the vocalic structure of words
- Counting phonemes in words
- Adding phonemes to form new words
- Omitting phonemes to form new words
- Substituting phonemes to form new words
- Linking words by using the final phoneme of one word to start a new word
- Making words with jumbled letters
- Guessing words from their spelling
- Spelling backwards

### (b) Vocabulary and morphosyntax

#### Vocabulary

- Defining drawings (persons, objects, and actions)
- Drawing-word associations
- Choosing the term to define a drawing (persons, objects, and actions)
- Forming sets of drawings in different categories
- Drawing-phrase associations
- Classifying drawings and words by semantic category
- Oral definition of words
- Identifying synonyms and antonyms
- Identifying absurd content
- Constructing and solving word search puzzles
- Solving crosswords
- Use of the dictionary

#### Morphosyntax

- Putting drawings in order to make a story
- Putting words in order to make a sentence
- Completing sentences of varying length, with and without alternative choices

- Putting sentences in order to make a story
  - Transforming words into masculine and feminine, plural and singular
  - Detecting malformed sentences that lack subject-verb agreement
  - Identifying interrogatory and exclamatory sentences
  - Transforming negative statements into affirmative
  - Placing punctuation marks in a text
- (c) Grapheme-phoneme correspondence
- Articulate and discriminate sounds of letters
  - Reading vowels and consonants
  - Reading syllables with CV, VC, and CVC structures
  - Reading words of varying length and familiarity
  - Copying and taking dictation of vowels and consonants
  - Copying and taking dictation of syllables with CV, VC, and CVC structures
  - Copying and taking dictation of words of varying length and familiarity
- (d) Reading and writing fluency
- Reading phrases of varying length
  - Reading short stories
  - Reading with intonation, respecting punctuation marks (periods, commas, exclamation points, question marks, etc.)
  - Copying and taking dictation of sentences of varying length
  - Taking dictation of texts of varying length
  - Following basic spelling rules in writing: punctuation marks, m before p and b, capitalizing proper nouns and first word of a sentence
  - Spacing, organization, and directionality when writing on paper
- (e) Reading comprehension and written composition
- Comprehension of words
  - Comprehension of phrases and stories of varying length
  - Reading comprehension strategies: identifying main ideas, oral and written summaries, changing the end of a story, creating a title for a text, and predicting the end of a story

- Regulation strategies for reading comprehension: rereading, dictionary use, and self-questions
- Composition guided by drawings, words, and phrases
- Spontaneous composition of texts (special occasions, requests, stories, etc.)
- Written composition strategies: selection and organization of ideas
- Strategies of self-regulated writing: self-correction, self-questions

The effects of program application have been assessed in different studies; improvements were found in academic achievement, oral language, reading and writing in children with and without risk for presenting specific learning disabilities, from 4- to 7-years old, and a decrease in the percentage of these problems from 5- to 7-years old [68–72]. More research is needed to confirm whether these gains are maintained in the long term.

## 5. Conclusion

The use of diverse methods to identify learning disabilities, and a lack of consensus on the factors that explain their appearance, together account for a dearth of studies on programs applied to prevent these problems. In the case of models used to identify learning disabilities, we find a controversy between diagnostic models and models based on response to intervention. As for predictive factors, there seems to be a consensus on the importance of certain aspects: phonological knowledge, speech perception, letter knowledge, naming speed, and vocabulary. Agreement has not been reached, however, on how these factors relate to each other or on how much weight each one carries at different ages and in languages with different spelling transparency.

Finally, we note that the programs that have been designed for preventing learning disabilities share an emphasis on systematically fostering oral and written language in the classroom, and they begin to teach reading and writing from a young age. The benefits attained include reducing learning disabilities by a high percentage, and improved reading, writing, and mathematics, in the best cases.

In conclusion, more research is needed to help identify the risk factors for these problems, so that preventive programs that are effective in both the short and long term may be designed.

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