

# Pitfalls that lies ahead in dyslexia comprehension

Imprevistos que estão por vir na compreensão da dyslexia

Los engaños que se avecinan en la comprensión de la dislexia

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## Los engaños que se avecinan en la comprensión de la dislexia

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### Abstract

This paper presents a broad discussion on the evolution of the dyslexia conceptualization since the first known written reference until present. The focus is over models used all around the world, particularly the two most used by clinicians: DSM - Diagnostic and Statistical Manual of Mental Disorders (of the American Psychiatry Association), and ICD - International Classification of Diseases (of the World Health Organization). We also pay close attention to the International Classification of Functioning, Disability and Health - ICF - World Health Organization. Some considerations have been made about the implications in the assessment of dyslexia caused by changes in classification over the years. For instance, one of the most relevant changes was the need rethink the simple models of classification from assess to label to response to intervention (RTI).

*Keywords:* Dyslexia assessment; Dyslexia classification changes.

### Resumo

Este artigo apresenta uma ampla discussão sobre a evolução da conceitualização da dislexia desde a primeira referência escrita conhecida até ao presente. O foco é sobre os modelos utilizados em todo o mundo, particularmente os dois mais utilizados pelos clínicos: DSM - Manual Diagnóstico e Estatístico de Transtornos Mentais (da Associação Americana de Psiquiatria) e ICD - Classificação Internacional de Doenças (da Organização Mundial da Saúde). Também prestamos muita atenção à Classificação Internacional de Funcionalidade, Incapacidade e Saúde - ICF - Organização Mundial da Saúde. Algumas considerações foram feitas sobre as implicações na avaliação da dislexia, causada por mudanças na classificação ao longo dos anos. Por exemplo, uma das mudanças mais relevantes foi a necessidade de repensar os modelos simples de classificação, desde avaliar até rotular a resposta à intervenção (RTI).

*Palavras-chave:* Avaliação da dislexia; Alterações na classificação da dislexia.

### Resumen

Este artículo presenta una amplia discusión sobre la evolución de la conceptualización de la dislexia desde la primera referencia escrita conocida hasta el presente. La atención se centra en los modelos utilizados en todo el mundo, particularmente los dos más utilizados por los médicos: DSM - Manual Diagnóstico y Estadístico de los Trastornos Mentales (de la Asociación Americana de Psiquiatria), y ICD - Clasificación Internacional de Enfermedades (de la Organización Mundial de la Salud). También prestamos mucha atención a la Clasificación Internacional de Funcionamiento, Discapacidad y Salud - ICF - Organización Mundial de la Salud. Se han hecho algunas consideraciones sobre las implicaciones en la evaluación de la dislexia causadas por los cambios en la clasificación a lo largo de los años. Por ejemplo, uno de los cambios más relevantes fue la necesidad de replantear los modelos simples de clasificación de evaluar a etiqueta a respuesta a intervención (RTI).

*Palabras clave:* Evaluación de la dislexia; Cambios en la clasificación de dislexia.

*Learning disability* is a general term that refers to a heterogeneous concept related to academic failure that emerges wildly based on broad scientific paradigms in a given culture. Thus, the concept may present more than one definition across history. Despite all the written information about its meaning and scientific definition, it lacks objectivity and formal criteria for a broad understanding. Some view learning disabilities grassing in at least average intelligence people with isolated problems in specific areas, others as a condition related to mental retardation (Fletcher, Stuebing, Morris, & Lyon, 2013; Pullen, Lane, Ashworth, & Lovelace, 2011).

## Evolution of learning disabilities conceptualization

Since the introduction of the term by Kirk (1962), there have been several definitions of learning disabilities. Kirk recognized that perceptual and language problems were linked with inability to learn but not caused by low intelligence or environmental factors. In order to exclude this individuals from the mental retardation group, Clements (1966) used the term *minimal brain dysfunction* to characterize children average or above average general intelligence with learning disabilities which was associated with central nervous system dysfunctions, which in turn may combine to cause impairments in perception, attention, memory, conceptualization, language, and control of impulse (Bryan, Burstein, & Ergul, 2004; Chard, Vaughn, & Tyler, 2002).

Later on, Kirk (1977) explains that the term *learning disability* stands for a disorder in one or more basic psychological processes that are involved in understanding. It may include perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia, but it does not include learning problems caused by visual, hearing or motor disabilities, or by emotional disturbance, environmental, cultural or economic disadvantage (Chard et al., 2002; De La Paz, 2005, 2013; Hallahan & Bryan, 1981).

Since then, most definitions have evolved and include references to the concepts of average intelligence and a measurable ability-achievement discrepancy. This new definition does propose that learning disabilities are demonstrated by impairments in one or more processes related to learning, unexpected low academic achievement or average achievement only attained due to educational support or high levels of effort. This disorders may occur across life-span and problems with self-regulation, social perception, and social interaction may co-occur with learning disabilities but do not constitute learning disabilities by themselves (Danforth, 2011; Gilbert, 2009; Kaufman, Hallahan, & Pullen, 2015).

## The particular case of Dyslexia

The word dyslexia is just one of the many terms that have been used over the years to describe subjects with reading difficulties and it has suffered great debate during historical evolution (López-Escribano, 2007). Although the first reports of this disturbance relate to the 19th century by Adolph Kussmaul and Pringle Morgan (Adolph Kussmaul,

1887 cit. in. A. Alnaim, 2016; Morgan, 1896), the definition of the etiologic causes and manifestations of dyslexia have been subject of controversy and several revisions (Peterson & Pennington, 2015).

The discussion on this learning disability comes to such a basic level as its terminology. Since their first reports, this disturbance is recognized by various classifications as "verbal blindness", "verbal congenital blindness", "strephosymbolia", "developmental alexia", "constitutional dyslexia" and "part of the language disorders, characterized by a deficit in verbal processing of sounds" (Campbell, 2013; Morgan, 1896; Paixão, Paixao, & Paixão, 2015; Teles, 2004).

The term dyslexia was coined by the German ophthalmologist Rudolf Berlin, in 1887 (Wagner, 1973). However, it only started to be used in a common base in academic circles from the mid-30 of the 18<sup>th</sup> century. The word dyslexia come from Greek, and means the absence ("dys") of language ("lexia") (Richardson, 1992).

Dyslexia was first used at the World Federation of Neurology, in 1968 (as *cit in* Nicolson, Fawcett, & Dean, 2001), to define a disorder manifested by difficulties in learning to read, although the kids be taught with conventional teaching methods, have normal intelligence and adequate socio-cultural opportunities. However, this definition was massively criticized, because it only conceptualizes dyslexia through exclusion criteria (Fletcher, 2009).

One of the major themes debated in study of dyslexia is related to its etiology. Over the last century, this has been linked to a hemispheric atypical development, with researchers finding temporo-parieto-occipital regions differences (Lyon, Shaywitz, & Shaywitz, 2003), visual deficits (Peterson & Pennington, 2015; Stein, 2001), low auditory processing (Farmer & Klein, 1995) and in most studies, a deficit in phonological processing ability (Ramus et al., 2003; Snowling, 2012; Vellutino, Fletcher, Snowling, & Scanlon, 2004). These heterogenic suggestions for etiology result from different evidence gathered by several studies. Hemispheric specialization hypothesis results of neuroimaging studies, which show an atypical development of the right hemisphere in Dyslexic population, which may explain the use of a visual strategy in their learning process (Moll, Hasko, Groth, Bartling, & Schulte-Körne, 2016).

Rollback errors, common in subjects with dyslexia, led to the formulation of the hypothesis that its etiology is related to the visual system, which also results from limitations on hemispheric specialization, with no inhibition of mirrored images of visual stimuli, in this population (Peterson & Pennington, 2015). Visual deficit theories still ascribe the cause of dyslexia to a transient visual system malfunction (Stein, 2001). However, in recent decades, the phonological deficit hypothesis is the theory that collects greater consensus in dyslexia explanation. This hypothesis argues that dyslexia is a language disorder, with at slightest part of its etiology and manifestations to be explained by problems with phonological processing (processing of sounds of oral language), which subsequently leads to the graphic language processing problems (Ramus et al., 2003; Snowling, 2012; Vellutino et al., 2004). Another variable that makes it difficult to obtain a single definition of

dyslexia, results from their different manifestations, which vary according to language, culture and education systems, despite the etiologic causes are similar (Ramus et al., 2003), as well as the existence of comorbidity with other conditions (Lyon et al., 2003; Snowling, 2012).

## Problems of classification using clinical and functional Models

Although dyslexia is being recognized as an official category of learning difficulties, there is still a debate among researchers about the need to assign a specific label to this population, or if it should be inserted in the broader category of learning difficulties (Snowling, 1998). This problem is reflected in the use of different terminologies and research agglomeration on the general category of "learning deficit", which covers a wide spectrum of disorders of hearing, language, reading, writing and mathematical reasoning (Lyon et al., 2003), directing to a situation in that the results of different studies are more diffuse, and its generalization should be done carefully. It is important to distinguish people with specific learning disabilities in reading from people with reading difficulties resulting from more general learning difficulties (Snowling, 1998).

Currently, it is considered that dyslexia does not have a single etiology or clearly defined cut-off point (Snowling, 2012) which makes this to be regarded as a continuum rather than as a separate category (Peer, 2006). Dyslexia is considered to be an inherited condition, neurobiologically in origin (while in the past it was assigned a constitutional etiology). However, environmental factors may have a role on this specific learning disorder development (Fletcher, 2009). Most current definitions extend also the difficulties of decoding words to a natural level, the limitations on accuracy and fluency in word recognition and poor spelling skills. It is estimated that these difficulties typically result from a deficit in the phonological component of language that is unexpected when you consider other cognitive functions and the providence of academic instruction. As secondary consequences, there may be difficulties in reading comprehension and reduced reading experience that can be reflected on a weak lexical knowledge (Lyon et al., 2003).

The historical evolution, changes in its conceptualization and lack of consensus on most of the fundamental issues surrounding dyslexia discussed up to this point, are clearly visible if we focus on two of the most widely used manual for diagnosing mental disorders and neurodevelopment: Diagnostic and Statistical Manual of Mental Disorders (DSM) and the International Classification of Diseases (ICD). If we consider DSM-I (American Psychiatric Association [(APA, 1952)]), we note that dyslexia appears on the terminology "Learning Disturbance", inserted in an unexpected group, taking into account the current conceptualization: "Personality Disorders". Within this group, "Learning Disorders" are inserted in the subcategory of "Special Symptoms". This category should be used in instances where the specific symptom is expressed as isolated from individual's

psychopathology. The insertion of dyslexia in the group of "Special Symptoms" is conserved in DSM-II (American Psychiatric Association [(APA, 1968)]). However, this group ceases to be included in the "Personality Disorders", becoming an independent category. We can also find in this version of DSM, a modification of the nomenclature of "Learning Disturbance", with this disturbance to be referred as "Specific Learning Disorders". The publication of the third version of the DSM (American Psychiatric Association [(APA)] in 1980, brought a revolution to the classification system used to that date, being this the first version that presents diagnostic criteria to describe several problems, including the 5 axes.

The mentioned disorders in DSM-III (American Psychiatric Association [(APA, 1980)]) in the Group of "Primarily Obvious Disturbances in childhood and adolescence", consisting of 5 main axes. Among them are the "Specific Learning Disorders", including specific areas of development disorders that cannot be explained by other disturbances. It is in this category that we find the "Developmental Reading disorder". This version of the DSM (APA, 1980) mentions that this disturbance can also be classified as dyslexia, being this condition defined by a significant loss in the development of reading skills, resulting in a discrepancy between the actual reading performance and the performance of reading expected for the chronological age and the general intellectual capacities of the subject. This discrepancy cannot be explained by the lack of suitable academic conditions. Subjects diagnosed with this disorder have reading difficulties. Subjects diagnosed with this disorder have a reading characterized by omissions, additions and distortions of the words. Their reading tends to be slow, often being accompanied by a reduced understanding, although the ability to write and copy printed words, if present typically, remains preserved.

According to this version of the DSM (APA, 1980), the diagnosis can be accomplished (used only by professionals in psychometry) by intelligence tests that include verbal subtests and producing a full-scale IQ level and performance tests covering read subtests. In these scales if the subject shows reading levels below the expected for his chronological age, educational level and mental age (all this is established through an IQ test) and in reading tasks must be carried out a diagnosis of Developmental Reading disorder.

The DSM-IV (American Psychiatric Association [(APA, 1994)]) adopts the terminology "Reading disorder" as part of the Group of "Learning Disorders". This manual presents reading performance (accuracy, speed and comprehension) as a fundamental characteristic. In order to be diagnosed, subjects have to perform below the levels expected for their chronological age, intelligence and education, measured through standardized tests. In addition to the above, the reading skills significantly interfere in daily life and in academic achievement. A subject may still be classified as dyslexic if presenting a sensory deficit, where the reading difficulties are manifestly superior to limitations typically associated with this condition. As it regards features associated with dyslexia, the fourth version keeps the same than the previous version, making mention of distortions, substitutions or omissions in reading, as well as slowness and errors

of comprehension in oral reading. In addition to the above, it is stressed that the disturbance may persist into adulthood.

In the year 2000 a review of the DSM-IV (American Psychiatric Association) is published with the name DSM-IV-TR (APA, 2000). Despite the revision about learning, the same disturbance remains within the group "Primarily Obvious Disturbances in childhood and Adolescence". Within this large group are presented the "Learning Disorders", in which "Reading Disorder" is again inserted. It is remarkable that the attention is drawn to the title that is attributed to the group. Is added that it is not only a matter of sustaining that these disorders are specific to that age group, but that this disturbance is usually diagnosed at that chronological time, adding that sometimes the diagnosis only happens in adulthood. As mentioned in the DSM-IV (American Psychiatric Association, 1994), the criteria remains unchanged, with only a small change in criteria (C), where a note, removing the medical condition, appears. As before, the symptoms can persist into adulthood. It should be noted that in this edition is added that there should be a discrepancy of more than two standard deviations between the performance and IQ. It was added the importance of focus also into adulthood, once APA (2000) indicates that there is the possibility of difficulties at work or social adjustment in these individuals, as a result of dyslexia.

The last version that currently exists is the DSM-V, released in 2013 by the American Psychiatric Association (APA, 2013). However, the publication in Portugal dates from 2014. This manual encompasses within itself all the "Specific Learning Disorders" in their diagnostic criteria, differing from the DSM-IV-TR (APA, 2000), where, based on these criteria, the professional should specify in which field there is a deficit. In this sense, and according to the DSM, dyslexia appears as a "Specific Learning Deficit Disorder in reading." In addition to the above, you must also specify the current severity of symptoms as mild, moderate or severe (APA, 2013). This issue tells us that dyslexia is a neurodevelopmental disorder, of biological, epigenetic and environmental origin, in interaction since it is the foundation of deficits at cognitive level, related to the behavioral signs of pathology (APA, 2013).

In terms of the most common manifestations for this disorder highlights "the difficulties in learning and how to match letters with the sounds of a given language", that is, read the written words, in which the concept of "dyslexia" normally is associated (APA, 2013). The previous version of DSM-V sustained that poor results in reading has to be verified in relation to individual age and IQ. However, the DSM-V requires that reading skills should be below expectations in all cases (Peterson & Pennington, 2015).

At the same period of historical development, the international classification of diseases (ICD) was organized to cover classifications that relate to health and disease, in a global perspective (WHO, 1993). This report besides enabling the storage and the reintegration of epidemiological and clinical information regarding to purposes of quality of life, also provides the basis for the anthology of national statistics of mortality and morbidity in Member States of World

Health Organization (WHO, 1993). In the seventh revision of the international classification of diseases (WHO, 1957), this condition falls in the category of "Other and unspecified character, behavior, and intelligence disorders", being designated as "specific learning defects". According to ICD-7, in order to diagnose a person with specific learning disorder (reading, mathematics or strephosymbolia), is necessary that he clearly presents alexia (or blindness to words), not organic in nature, or unspecified.

The eighth revision of International Classifications of Diseases (ICD) (WHO, 1967) was published in 1967, a more radical than the previous one that was unchanged in its philosophy and basic structure of diseases classification, more directed to etiology instead of demonstrations. Dyslexia is integrated in the category "Special symptoms not elsewhere classified" considered as "Specific learning disturbance" (WHO, 1967). In International Statistical Classification of Diseases, Injuries and Causes of Death, the 9th revision of ICD (WHO, 1977) "Developmental Dyslexia" is integrated in the group of "Specific Delays in Development", considered as "Specific Reading Disorder".

The 10th revision of International Statistical Classification of Diseases and Related Health Problems (WHO, 2004) states that dyslexia is included in the group of "specific disorders of scholastic skills development", which translates into a "specific reading disorder". It refers to a specific and significant involvement in the development of reading skills, which cannot be justified solely by mental age, visual acuity problems or inadequate schooling. The ability of reading comprehension, word recognition, reading and oral performance of tasks requiring reading may be compromised. The difficulties in spelling are often associated with a specific disturbance of reading and often remain in adolescence even after the subject obtains some progresses in reading (WHO, 2004).

There is another very important model of classification of disorders: International Classification of Functioning, Disability and Health (ICF) (WHO, 2001). The International Classification of Functioning, Disability and Health, is usually known as ICF, comprising the classification of health and health-related domains. Once operational reality and incapacity of an individual happens in a context, ICF likewise comprises a list of environmental factors. "ICF is the WHO framework for determining health and disability at both individual and population levels. ICF was officially endorsed by all 191 WHO Member States in the Fifty-fourth World Health Assembly on May, 22nd, 2001 (resolution WHA 54.21) as the international standard to describe and measure health and disability. ICF is operationalized through the WHO Disability Assessment Schedule (WHODAS 2.0). WHODAS 2.0 was developed through a collaborative international approach with the aim of developing a single generic instrument for assessing health status and disability across different cultures and settings" (see official website from WHO in <http://www.who.int/classifications/icf/en/>). The aspects related with Learning Disabilities, in ICF, will be briefly approached in this paper.

### Implications for Evaluation

As already mentioned, in 2013 the fifth edition of the diagnostic and Statistical Manual of mental disorders (DSM-5) was published for the first time. This new edition of the DSM-V brought some news, among which, the emergence of a new concept, Specific Learning Disorder-Reading (Purushothaman & Rout, 2015). This concept, in addition to the new nomenclature, brought some changes in diagnostic criteria, which consequently generates an adaptation with regard to evaluation and psychological intervention (Mousinho & Navas, 2016; Purushothaman & Rout, 2015). The criteria were set from A to D, which include difficulties in three areas: reading, writing and mathematics. The criteria A —"A. difficulties in learning and using academic skills, as indicated by the presence of at least 1 of the following symptoms, which persisted for at least 6 months, despite the provision of targeted interventions for those difficulties." (APA, 2013) — is where the new greatest focus is. Prior to this new edition of the manual, the patient assessment was performed and then it was possible to give a diagnosis of presence or absence of dyslexia. However, currently another method is followed: response to intervention (RTI) (Snowling, 2013). This method aims not to give the patient an immediate diagnosis, but rather establish a diagnosis hypothesis and proceed immediately to the intervention (Cavendish, 2013; Fuchs & Vaughn, 2012; Mousinho & Navas, 2016). Why? Because the criteria established as minimum time of difficulties - 6 months. So, if difficulties continue during the intervention, then the final diagnosis is maintained. However, if there is a positive evolution of the patient before the procedure, then the diagnosis is rethought. Figure 1 demonstrates how the RTI model works (Mousinho & Navas, 2016).

The criteria that specifies the difficulties in reading, writing or mathematics, are, in this new manual, very specific and detailed. Previously, one of the difficulties associated with this diagnosis, was to find criteria that were targets for this type of difficulties (Tamboer, Vorst, & Oort, 2014). This change in criteria, improves indelibly the psychological evaluation, as it gives examples and is much more focused on the goal of detecting changes in individuals' learning (exactly how is made in ICF, (WHO, 2001)). For example, in reading, the current criteria addresses the type of difficulty that the subject can demonstrate in this dimension ("A1. Imprecise reading words or slow and hardworking - for example, reads aloud single words incorrectly or slowly and hesitatingly, often confabulate words, has trouble pronouncing words", (Kirk, 1977) while in the previous manual it only meant that the individual's aptitude would be below the expected for their intelligence quotient (IQ), age and education (Mousinho & Navas, 2016). Another of the amendments seen in the new Manual, is the elimination of the requirement of discrepancy between the performance and IQ. So, in psychological assessment this relationship between performance-IQ is no longer regarded as a factor (Ferrer, Shaywitz, Holahan, Marchione, & Shaywitz, 2010). Currently, subjects with low IQ and also with above average IQ, can be diagnosed with Specific Learning Disorder. As stated by Gus and Samuelsson (1999), the requirement of discrepancy can, at first glance, make sense; however the concepts inherent in these ideas, are little. Intelligence is a concept whose definition is very comprehensive and raises some discussion in the scientific world such as the term dyslexia because it is a disturbance whose cause is not easy and the inherent criteria is subject to changes and questions by professionals of psychology and education. Several studies have demonstrated that the deletion of the requirement of discrepancy is a wise choice

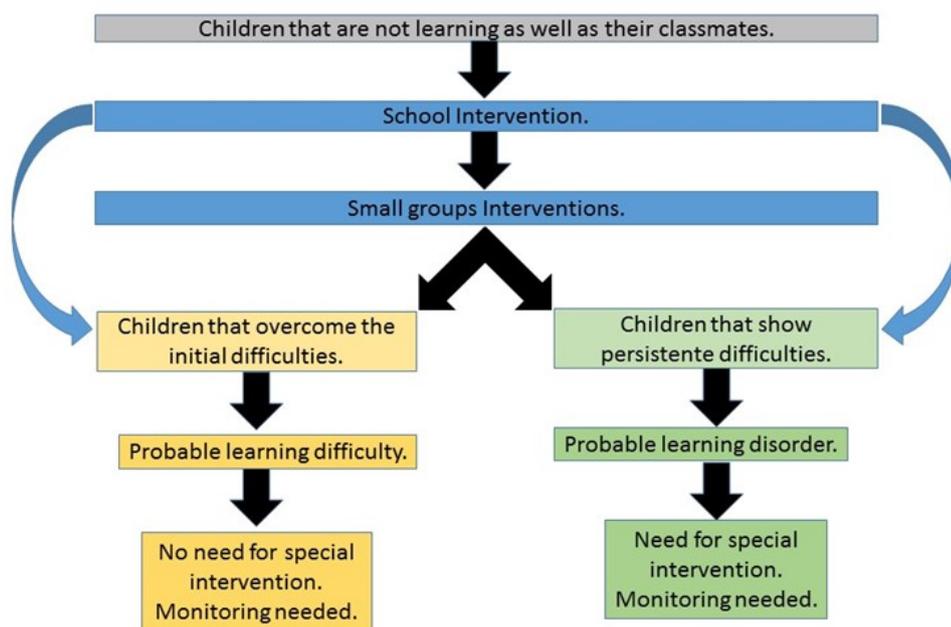


Fig. 1  
 RTI Model [adapted from Mousinho & Navas (2016)]

because there is low correlation between IQ and performance/capabilities (Gus & Samuelsson, 1999; Lundberg & Høien, 1991; Stanovich, 1996).

Dyslexia is often associated just to kids, however, one of the novelties of the DSM-5 changes are the presence of a criterion which focuses on this same problem in other ages. Criteria C ("The learning difficulties begin during the school years, but may not manifest itself completely until the requirements for these academic skills exceeds the limited capabilities of the individual (...)"(APA, 2013), what shows that learning problems originate in childhood, but that may not show at that stage, which means that adulthood can be marked by these difficulties (Hughes, Ball, Bisset, & McCormack, 2009). This amendment brings changes to the assessment level for the diagnosis of this pathology, becomes part of the evaluation of the adult, if this is entered in related criteria (Mousinho & Navas, 2016).

## Conclusion

According to Tannock (2014), a member of the DSM-V work group, it is expected that changes in the evolution of the concept of dyslexia, (for example) from DSM-IV to DMS-V, have implications for intervention in this pathology. As already mentioned, the identification of a single comprehensive category of Learning Difficulties (LD) is compatible with several educational systems. Therefore, this change is expected to create a better alignment of practices among the communities of clinicians and educators. In other words, these implications are not only for clinicians but also for school psychologists, special education teachers, researchers and for interdisciplinary professional's communities around the world. All of them must work in a collaborative model for interdisciplinary decision making in order to have a clinical synthesis of developmental, medical, family, and educational reports (Al-Yagon et al., 2013; Cavendish, 2013; Tannock, 2014).

Since a requirement for a neuropsychological assessment of cognitive processing skills for diagnosis has been eliminated, this assessment may be more useful to guide the development of intervention plans and unnecessary for diagnosis of dyslexia. Therefore, psychologists can change their view from "assessment for diagnosis" to "assessment for intervention", and they probably have more time to provide psychopedagogy and counselling to parents and teachers (Tannock, 2014). Specifically, in the school context, this change (elimination of the IQ - Realization discrepancy DSM criteria) may result in the possibility of providing special education services not only to children with Specific Learning Difficulties (SLD) but also to children with lower IQ without intellectual disability (Tannock, 2014).

In general, in the operational changes of DSM-V, it's possible to identify positive advances for clinical performance and promotion of educational adaptations, although there is still a need for scientific discussion in this matter (Mousinho & Navas, 2016). The same could be referred if we consider ICD and ICF, but the most important aspect that we would like to stress is that a great field of knowledge about

these three types of classification was opened and it is very important for assessment and intervention amongst all scholar community.

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