Neurodivergences. 2025; 4:180
doi: 10.56294/neuro2025180

REVIEW

Specific Learning Disabilities: New approaches to understanding and support

Dificultades Especificas de Aprendizaje: Nuevos enfoques para la comprensión y apoyo

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Cite as: López Sánchez AA, Castillo-González W. Specific Learning Disabilities: New approaches to understanding and support. Neurodivergences. 2025; 4:180. https://doi.org/10.56294/neuro2025180

Submitted: 08-07-2024 **Revised:** 19-10-2024 **Accepted:** 16-01-2025 **Published:** 17-01-2025

Editor: Prof. Dr. Javier González Argote

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ABSTRACT

Introduction: specific Learning Difficulties (SpLD), otherwise referred to as Specific Learning Disorders (SpLDs), are defined as a collection of lifelong conditions that negatively influence learning and daily functioning. Most SpLDs are initially detected within education settings such as schools, colleges and universities. This can make the world of SpLD diagnosis and support a complex and daunting world for learners and their families. The aim of this research was to characterize the SpLD with focus on new approaches on diagnosis and learning methods.
Method: a bibliographic review was conducted by accessing data bases such as PubMed and ResearchGate using Key words including SpLD, inclusive education, dyslexia, dyscalculia, and dysgraphia. A total of 20 articles were selected, over 70 % of which were published in the last 5 years.
Results: SpLDs such as dyslexia and dyscalculia are complex learning difficulties that show multiple underlying cognitive deficits. The diagnosis of SpLDs has become increasingly simpler and more effective. Inclusive education is a dynamic and contested concept. There are multiple obstacles in the implementation of inclusive education techniques for students with SpLDs. Among the primary challenges were found lack of knowledge, training and parent's support. Among alternative methods more distant form the traditional approach to working with SpLDs, contemporary practice includes the use of the play-based interventions.
Conclusions: numerous obstacles exist in most educational scenarios regarding the preparation of educators and their strategies for addressing the needs of these students. The advent of technologies like game-based learning enables the implementations of inclusive educational methods.

Keywords: SpLD; Inclusive Education; Dyslexia; Dyscalculia and Dysgraphia.

RESUMEN

Introducción: las Dificultades Específicas de Aprendizaje (SpLD), también conocidas como Trastornos Específicos del Aprendizaje (SpLDs), se definen como un conjunto de condiciones permanentes que influyen negativamente en el aprendizaje y el funcionamiento diario. La mayoría de los SpLDs se detectan inicialmente en entornos educativos tales como escuelas, colegios y universidades. Esto puede convertir el mundo del diagnóstico y el apoyo a SpLD en un ámbito complejo e intimidante para los estudiantes y sus familias. El objetivo de esta investigación es caracterizar los SpLD con énfasis en nuevos enfoques para el diagnóstico y los métodos de aprendizaje.
Método: se realizó una revisión bibliográfica accediendo a bases de datos como PubMed y ResearchGate utilizando palabras clave como SpLD, educación inclusiva, dislexia, discalculia y disgrafía. Se seleccionaron un total de 20 artículos, más del 70 % de los cuales fueron publicados en los últimos 5 años.

Resultados: SpLDs como la dislexia y la discalculia son dificultades de aprendizaje complejas que presentan múltiples déficits cognitivos subyacentes. El diagnóstico de los SpLDs se ha vuelto cada vez más sencillo y eficaz; La educación inclusiva es un concepto dinámico y objeto de debate. Existen múltiples obstáculos en la implementación de técnicas de educación inclusiva para estudiantes con SpLDs. Entre los principales desafíos se encontraron la falta de conocimiento, capacitación y apoyo de los padres. Entre los métodos alternativos más alejados del enfoque tradicional para trabajar con SpLDs, la práctica contemporánea incluye el uso de intervenciones basadas en el juego.
Conclusiones: existen numerosos obstáculos en la mayoría de los escenarios educativos respecto a la preparación de los educadores y sus estrategias para atender las necesidades de estos estudiantes. El advenimiento de nuevas tecnologías como métodos de aprendizaje basado en juegos permite la implementación de métodos inclusivos de educación.

Palabras clave: SpLD; Educación Inclusiva; Dislexia; Discalculia y Disgrafia.

INTRODUCTION

Specific Learning Difficulties (SpLD), otherwise referred to as Specific Learning Disorders (SpLDs), are defined as a collection of lifelong conditions that negatively influence learning and daily functioning.[1]

Although other authors include different conditions in this category beside the ones mentioned in this article, Autism Spectrum Condition (ASC), Attention Deficit Hyperactivity Disorder (ADHD) and Tourette's syndrome are also specified by Stack-Clutter[2] as SpLDs on his article from 2020.

Developmental dyslexia, or specific learning disorder of reading hereinafter referred to as "dyslexia", is the most common form of specific learning disorder.[3] Dyscalculia is a less well understood SpLD and research is still in its infancy.[4] But if we approach the concept it will be an impairment in mathematical abilities, involving difficulties with numerical concepts, arithmetic operations, and recalling mathematical facts.[5]

Building upon these learning disorders, it's also important to consider Dysgraphia, a specific learning disability affecting writing skills, is characterized by difficulties in handwriting, spelling, and organizing written text.[6]

Dyslexia and dyscalculia are two examples of high- incidence SpLDs, and these can often co- occur. To provide an example, with regard to dyslexia, varied prevalence rates have been reported internationally, ranging from as low as 3 % to as high as 20 %.[4] In the UK neurodiverse individuals represent a significant portion of the population, according to the British Dyslexia Association, the number of people with dyslexia in the UK is around 10 %.[7] Dyscalculia also presents similar prevalence rates.[4] Although It is also known that dysgraphia impacts a significant number of children globally, affecting their academic performance and self-esteem,[6] with boys being more affected than girls, in most of the SpLD.[8]

Although dyspraxia is also a SpLD, is beyond the scope of this paper and, thus, is not discussed in detail here.

Most SpLDs are initially detected within education settings such as schools, colleges and universities. This can make the world of SpLD diagnosis and support a complex and daunting world for learners and their families.[9]

These learning disorder disrupt the normal pattern of learning academic skills.[10] There is an ongoing global concern for educators and educational institutions about the growing number of learners experiencing learning disabilities linked to neurodiversity and learning styles.

Over the past century, the human society has witnessed changes and ongoing development in the provision of education and supportive services for people with cognitive challenges and needs.[11] The educational landscape is undergoing a profound transformation, moving towards more inclusive models that embrace the neurodiversity paradigm.[12,13]

In inclusion schools, teachers are expected to possess the ability to adapt to the curriculum, understand the learning style, and know how to stimulate students with disabilities. Moreover, teachers should be able to create learning materials and provide instructions and assessments to meet the needs of students with disabilities.[14]

In recent years, the massive introduction of new technologies has injected new vitality into the education industry, especially opening up new learning methods for students with learning disabilities, includes a range of tools designed to support and enhance the learning process.[15] It must, however, be acknowledged that recent research in this area is still early-stage and small-scale, with limited funding available to support such studies.[9,16]

This paper will focus on the study of Dyslexia, Dyscalculia, and Dysgraphia, as SpLD. SpLDs such as those mentioned above are increasingly recognize within educational settings. Consequently, implementing a more inclusive educational system -one that incorporates targeted strategies and accommodations tailored to the unique needs of these students- is essential. In this context, reviewing current literature and research studies

is critical that's why the aim of this research was to characterize the SpLD with focus on new approaches on diagnosis and learning methods.

METHOD

A bibliographic review was conducted by accessing data bases such as PubMed and ResearchGate using Key words including SpLD, inclusive education, dyslexia, dyscalculia, and dysgraphia, combined with the Boolean operator AND. A total of 20 articles were selected, over 70 % of which were published in the last 5 years. Relevant information was extracted, summarized and organized to support the development of this research.

RESULTS

New Ways of Diagnosis

Over the past 25 years, international interdisciplinary research has mapped out relations of academic and cognitive skills, and related comorbidities, and helped establish a basis for effective intervention. In addition, research on brain structure and function and the genetics of SpLDs has taken advantage of new technologies.[17]

More recently, advances in the Magnetic Resonance Imaging (MRI) technique have shown that the same areas described as under activated in functional imaging that have been reported as presenting a regional decrease in cortical thickness: temporal regions, corpus callosum; and the visual word form area; seems to be the most significantly underactive part of the brain in dyslexic children and adults, among others.[3]

Studies of the neurobiology of math difficulties have frequently pointed to the intraparietal sulcus as a hub of numerical processing, with reduced activation during math tasks in individuals with math difficulties compared to peers who doesn't.[18]

Yet another potential explanation is that SpLDs such as dyslexia and dyscalculia are complex learning difficulties that show multiple underlying cognitive deficits, but people often try and reduce these difficulties to a single explanatory factor.[4]

Bishop and Snowling,[8] in 2004 created a two-dimensional model that demonstrates the relationship between dyslexia and Language Impairment on the basis of phonological deficits. This model also allows for possible additional disordered domains of oral non-phonological language skills. This confirms the importance of diagnosing the different underlying disorders as explained above.

Conventional dysgraphia diagnosis often comes late, after writing struggles are noticed. However, early detection is crucial for effective intervention. Timely recognition can prevent negative outcomes like academic failure, low self-esteem, depression, and social issues. Prompt diagnosis is key to addressing dysgraphia effectively.[19]

Nevisi Z. et al.[19]; on their study developed a computer game to detect dysgraphia based on cognitive differences, enabling pre-school diagnosis. The game-based approach offers a stress-free, accessible, and cost-effective alternative to traditional clinics for assessing children's writing disorders.

After numerous updates in this field, the diagnosis of SpLDs has become increasingly simpler and more effective. The authors argues that the primary objective should be identify these children during early years, prior to entering formal schooling, in order to facilitate a more effective educational intervention and to develop a plan aimed at improving performance across various areas of student life. Additionally, this early diagnosis would help alleviate the workload of educators, who are often the first to recognize these conditions in their students.

Inclusion challenges in SpLD education

Inclusive education is a dynamic and contested concept, characterized by varying interpretations and practices across cultural, educational, and policy contexts. While its overarching goal is to ensure equitable access to quality education for all learners, the pathways to achieving inclusion differ significantly.[5]

A study conducted in Haridwar,[20] showed that 67 % of teachers had no knowledge of LDs. Overall, teacher educators who participated in that study had a low level of knowledge about SLDs, the study found that the teachers in the inclusive classroom require skill training to impart education to students with SpLD.

Sharma P[21], during a study in a Formal Primary School in India in 2021 found that the teachers didn't have any training regarding these students. The Government not provides any training to teachers especially children with special needed students. All teachers except special educator.

There are multiple obstacles in the implementation of inclusive education techniques for students with SpLDs. Among the primary challenges highlighted by Pasiningsih[14] in her research conducted at kindergarten in Indonesia in 2024 were found lack of knowledge, training and parent's support. Coinciding for the most part with the mentioned previous authors.

Even with such discouraging results from the aforementioned studies, it is necessary for teachers, staff, and relevant institutions to take action in a context where the emergence of this type of students is increasingly common in classrooms. The authors realize that governments should play a pivotal role in strengthening

inclusive learning systems by implementing comprehensive policies and strategic measures.

New Approaches on Learning Methods

Academic interventions are complex cognitive therapies that involve more than simply encouraging children to engage. Instruction must be explicit. This means that the instructor purposefully and intentionally involves the learner in the material to be mastered, with direct explanations, modeling of skills and strategies, and opportunities for supervised practice; differentiated according to strengths and weaknesses in the academic domains.[17,22]

Effective support for children with dyscalculia and dyslexia and others SpLD requires an integrated approach that brings together schools, families, healthcare providers, and communities. The implementation of shared digital platforms for storing developmental and educational records has been shown to enhance collaboration and communication among stakeholders.[5]

Among alternative methods more distant form the traditional approach to working with SpLDs, contemporary practice includes the use of the play-based interventions. The impact of games on children's training with SpLD has been discovered recently, and the number of studies on this topic has increased.[23]

In this study, run by Yildirim[23] in 2021 five different serious games and their prototypes were developed to provide training material for children with any type of SpLD. Results on comments and technology acceptance of the students show that children evaluated the games as easy-to-use and easy-to-learn.

There is growing evidence that, more broadly in education, teaching with mobile technology brings learner benefits, including increasing student motivation; recent literature continues to support the efficacy of visual strategies for teaching tasks to individuals with SpLD, although there is mixed evidence about the potential value of Augmented Reality and Virtual Reality for learners with this special conditions.[9,24]

The authors recommend the use of these new learning methods to progressively advance toward the inclusivity required in light of the increasing number of students with these conditions. Always paying attention to the specific needs of the student and the learning disability, making the learning individualized in each aspect for the patient.

Among the main limitations of the present study are its nature as a bibliographic review, that only articles in English and Spanish were reviewed and the priority was given from the last 5 years. As future projections, we recommend conducting experimental studies to evaluate efficacy of inclusive educations and new learning methods for student with SpLDs.

CONCLUSIONS

SpLDs have experienced a significant increase in prevalence in recent years. The research on this subject has progressed, supported by new diagnostics methods. Numerous obstacles exist in most educational scenarios regarding the preparation of educators and their strategies for addressing the needs of these students. The advent of technologies like game-based learning enables the implementations of inclusive educational methods.

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FINANCING

The authors did not receive funding for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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Writing – review and editing: Andrew Alberto López Sánchez, William Castillo-González.

https://doi.org/10.56294/neuro2025180 ISSN: 3072-8509