Chapter

Types of Specific Learning Disability

Vinutha U. Muktamath, Priya R. Hegde and Samreen Chand

Abstract

The chapter "Specific Learning Disability and its Types" is an effort to educate the readers, specially the educators about a developmental disorder that begins by school age, although it may not be recognized until later. It involves on-going problems learning key academic skills, including reading, writing, and math. The chapter makes an attempt to bring about understanding of SLD, brief historical perspective and its classification. The chapter elaborately discusses the seven types of specific learning disability according to Learning Disabilities Association of America. The chapter centers around seven learning disabilities namely, dyslexia, dysgraphia, dyscalculia, auditory processing disorder, language processing disorder, non-verbal learning disabilities, visual perceptual deficit; their causes and symptoms to give a holistic understanding about the disability for the teachers and parents to understand the individual differences.

Keywords: specific learning disability, dyslexia, dysgraphia, dyscalculia, auditory and language processing disorders, non-verbal and visual perceptual deficits

1. Introduction

Learning disabilities and Attention Deficit Hyperactivity Disorder (ADHD) has been the topic of study interest for more than 100 years. Over time, more and more people have become aware of these differences due to the brain research (1930–1960) that became the foundation of the field of learning disabilities.The terms such as brain-injured child was first used by Alfred Strauss and Laura Lehtinen. Although many researchers have contributed to the field, the seminal works of two important scientists are phenomenal even today. Adolf Kussmaul (1877), a German neurologist was the first to identify reading disability and coined the term "word blindness." He defines it as "complete text blindness … although the power of sight, the intellect, and the powers of speech are intact." Almost after 10 years after the term "word blindness" appeared, the term 'dyslexia' was used by Berlin (1887) to define reading challenges [1, 2].

The other influential researcher, who has made great contributions to the Learning Disability (LD) construct and develops understanding of the various issues related to LD was Pringle Morgan in the united Kingdom. The article by Pringle Morgan entitled "A Case of Congenital Word Blindness" (Morgan, 1896) in the British Medical Journal encouraged researchers and formed a basis for research to study other cases of LD to further explore studies on the definitions and identification tools of LD. Samuel A. Kirk was the first Psychologist to use the term

"learning disability" in the year 1963 in Chicago at an education conference. ADHD first appeared in 1968 in the Diagnostic and Statistical Manual (DSM) as "hyperkinetic impulse disorder." Ever since 2000, awareness and research of learning disabilities and ADHD issues has taken off and in the year 2013 DSM-5 broadened its definition of the term "specific learning disorder" [1, 2].

Learning disability is referred to as a hidden disability as children with learning disabilities do not look handicapped and their difficulties are not obvious. Hence, learning disabled children are often misunderstood and accused of not listening, being lazy or clumsy resulting in low self-esteem, confidence and motivation. So we can consider the child to be suffering with learning disability when he/she displays an educationally significant discrepancy between his/her estimated intellectual potential and actual school performance that cannot be explained in terms of intellectual potential. These children may have a combination of difficulties in speaking, listening, reading, comprehension, spelling, arithmetic calculations, writing and concepts. Children with a learning disability have average and sometimes above average intelligence.

LD is a neurodevelopmental disorder that are not due to hearing or vision problems, social-economic factors, cultural or linguistic differences, lack of motivation, insufficient or unsatisfactory instruction. It is due to the interaction of genetic, epigenetic, and environmental factors with a biological origin that affects the brain's ability to perceive and/or process verbal and non-verbal information efficiently and accurately.

Learning disabilities are multifaceted and go beyond the stereotypical perceptions of the disorder as simply reading difficulties, or letter problems. They differ significantly, both in terms of the meanings they impact and the rigorousness of the impact experienced. The proper accommodations depend upon the individual's strengths as well as his/her detailed difficult situations [3].

2. Difficulty in classifying the specific learning disabilities (SLD)

SLD is a clinical condition which is not always synonymous with "learning disabilities" as defined by the educational system: not all children with learning c deficits diagnosed by the school system would fit the definition for a DSM-5 clinical diagnosis of SLD [4].

Learning disabilities (LDs) are diagnosed using both educational and medical perspectives [5]. The most commonly used definition from an educational perspective, is found in the federal special education law, the Individuals with Disabilities Education Act (IDEA). Diagnostic and Statistical Manual for Mental Disorders (currently the DSM-5 and previously the DSM-IV) published by the American Psychiatric Association defines LD from the medical perspective [6]. A considerable overlap in the definition of LD used by professionals in educational and medical settings can be observed [5].

A specific learning disability is defined by the Individuals with Disabilities Education Act (IDEA) as a disorder in one or more of the basic psychological processes involved in understanding or using language, whether spoken or written, that manifests itself in the inability to listen, think, speak, read, write, spell, or perform mathematical calculations. Perceptual impairments, brain damage, mild brain dysfunction, dyslexia, and developing aphasia are all included in this category. It clearly establishes that specific learning disabilities are not primarily the result of visual, hearing, motor disabilities, mental retardation, emotional disturbance, or of environmental, cultural, or economic disadvantage [7].

3. DSM-5 diagnostic criteria for specific learning disabilities

SLD is a form of Neurodevelopmental Disorder, according to the DSM-5, that inhibits the ability to learn or apply specific academic abilities (e.g., reading, writing, or arithmetic), which are the foundations for all other academic learning. Difficulties in learning are "unexpected," although the rest of the child's development appears to be normal. Though early indicators of learning impairments (such as trouble learning letters or counting items) may occur in preschool, they can only be diagnosed reliably after formal education begins. The way the SLD manifests clearly implies that it typically persists into adulthood and is understood to be a cross-cultural and chronic condition albeit with cultural differences and developmental changes in children [8].

According to DSM-5, the diagnosis of a specific learning disorder includes the following symptoms:

1. During formal years at school, persistent difficulties in reading, writing, arithmetic, or mathematical reasoning skills can be identified by symptoms such as inaccurate or slow and effortful reading, poor written expression, difficulties remembering number facts, or inaccurate mathematical reasoning.

2. Current academic abilities must fall far short of the typical range of scores on linguistically and culturally relevant reading, writing, and arithmetic examinations. As a result, a dyslexic person must read with significant effort and not in the same way that a regular reader does.

3. Learning problems originate in the early years of schooling.

4. The individual's difficulties must markedly impair academic success, occupational performance, or daily activities, and they must not be explained by developmental, neurological, sensory (vision or hearing), or motor disorders [6].

In both basic research and clinical practice, categorical classification schemes are applied to select groups of children for further study or clinical intervention. DSM does not limit the diagnosis to reading, math, or written expression but more generally describes problems in achieved academic skills with the potential for specification of the more traditional areas by taking a different approach to LDs by broadening the category into a single overall diagnosis [6]. Diagnosis of SLD according to DSM-V is made based on a clinical review of an individual's history, teacher reports and academic records, and responses to interventions. To categorize the child in LD group, difficulties must be persistent, scores must be well below the range on appropriate measures, and the problems could not be better explained by other disorders. The interference in achievement, occupation, or activities of daily living must be significantly present [9].

4. Classification of learning disorder

Learning difficulties are classified at multiple levels, including categorizing children as LD, usually achieving, or mentally inferior, and within LD, as reading versus math impaired. LD is distinguished from types of low achievement that are expected due to emotional disturbance, social or cultural disadvantage, or inadequate instruction, and is identified as a particular type of "unexpected"

low achievement across classes of presumed childhood conditions that produce underachievement [10].

LD is rarely conceptualized as a single disability in any federal or non-federal classification; rather, it is represented as a broad category that includes difficulties in any one or a combination of academic disciplines. The federal definition of 1968 specifies seven domains: (1) listening; (2) speaking; (3) basic reading (decoding and word recognition); (4) reading comprehension; (5) arithmetic calculation; (6) mathematics reasoning; and (7) written expression. The inclusion of these seven aspects of impairment in the federal classification assures that the LD category encompasses a wide range of learning issues and that the very diverse learning problems should be grouped together. Even today, many studies simply label groups of students as "learning disabled," despite mounting evidence that LD correlates with poor reading, math, and other subjects [9].

5. Types of learning disability

Many mental health professionals, including the Learning Impairments Association of America, consider the seven disorders listed below to be unique learning disabilities. They identify Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD) as related but distinct learning disorders that impact learning [6].

1. Dyslexia

2. Dysgraphia

3. Dyscalculia

4. Auditory processing disorder

5. Language processing disorder

6. Nonverbal learning disabilities

7. Visual perceptual/visual motor deficit

5.1 Dyslexia

Dyslexia (also known as reading disability) a specific learning disability that affects reading and related language-based processing skills is the most common learning disability accounting for at least 80 per cent of all LDs. It can affect reading fluency; decoding, reading comprehension, recall, writing, spelling, and sometimes speech and can exist along with other related disorders. However, the severity can differ in each individual and dyslexia sometimes is referred to as a Language-Based Learning Disability.

The word "dyslexia" is of Greek origin, meaning "impaired". Lyon et.al (2003) defined dyslexia as a SLD that is neurobiological in origin and characterized by difficulties with inaccurate word recognition and poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language" [10].

Reading impairments are thought to be caused by phonological processing problems, according to study (i.e., processing the sounds of speech). Individuals

with reading impairments frequently struggle to decode words into separate sounds and/or blend sounds together in order to read words fast and properly. These decoding issues frequently lead to reading comprehension issues [10]. During reading, Magnetic resonance imaging (fMRI) reveals a different brain activation profile confirming the etiology of Dyslexia to be neurological and genetic causes. The left side of the brain is activated by three systems: an anterior system in the left inferior frontal region that affects phoneme production (articulating words silently or out loud), a left parietotemporal system that analyses the written word, and a left occipitotemporal system that performs automatic word recognition. Dyslexic youngsters, on the other hand, show decreased activation in both posterior systems (left temporoparietal, left occipitotemporal), as well as increased activity in the left inferior frontal gyrus, right temporal, and tempoparietal regions. As a result, individuals continue to struggle to read unexpected words because they rely more heavily on right-sided posterior brain regions to read via memorization rather than sound–symbol links.

According to research, RD is highly familial and heritable. Up to 50% of children with RD have the disorder, and 50% of siblings of a child with RD have it as well. Twin studies have revealed strong concordance rates for RD, indicating that genetic variables account for 69 to 87 percent of the prevalence while environmental factors account for 13 to 30 percent.

5.1.1 Dyslexia symptoms in preschoolers

- Delayed speech, problems with pronunciation.
- Problems with rhyming words and learning rhymes.
- Difficulty with learning shapes, colors and how to write their own name.
- Difficulty with retelling a story in the right order of events.
- Lack of interest in playing games with language sounds (e.g., repetition, rhyming)
- Failure to recognize letters in their own name
- Trouble remembering names of letters, numbers, or days of the week [11–13].

5.1.2 Symptoms of dyslexia in school going kids

5.1.2.1 Early graders

- Reading well below the expected level for age
- Problems remembering the sequences
- Difficulty in seeing similarities and differences in letters and words
- Difficulty in spelling words
- Receives reports of “not doing well in school”

	Word level	Sentence level
Normal reader	Reading	It is easy to read this sentence
Reader with dyslexia	Reabing	If is easy to reab fhis senfence

Table 1.
Reader with dyslexia [17].

- Unable to read one-syllable words, such as "mat" or "top"
- Problems in connecting sounds and letters (e.g., "big" for "got")
- Difficulty in sequencing numbers and letters [11–13].

5.1.3 Senior graders

- When writing, frequently mistakes letters such as 'd' and 'b' or'm' with 'w' **Table 1**.
- Writes words backwards the majority of the time, such as writing 'pit' when the word 'tip' was intended.
- Grammar issues, such as acquiring prefixes and suffixes.
- Avoids reading aloud in class and reading-related activities
- Requires lot of effort to reads single words and connected text
- Has trouble pronouncing multisyllable words
- Needs repeated reading to understand it on a regular basis [11–13].

5.1.4 Assessment tools

The reading subtests useful are

- Woodcock-Johnson Psycho-Educational Battery- Revised, and
- The Peabody Individual Achievement Test-Revised
- Test of Word Reading Efficiency (TOWRE);

5.2 Dysgraphia

Dysgraphia is a specific learning disability diagnosed in childhood that affects a person's handwriting ability and fine motor skills. It is characterized by poor writing skills that are significantly below for the child's age, intelligence, and education, and cause problems with the child's academic success or other important areas of life. Dysgraphia is also sometimes referred as spelling disorder and spelling dyslexia. Problems may include illegible handwriting, inconsistent spacing, and poor spatial.

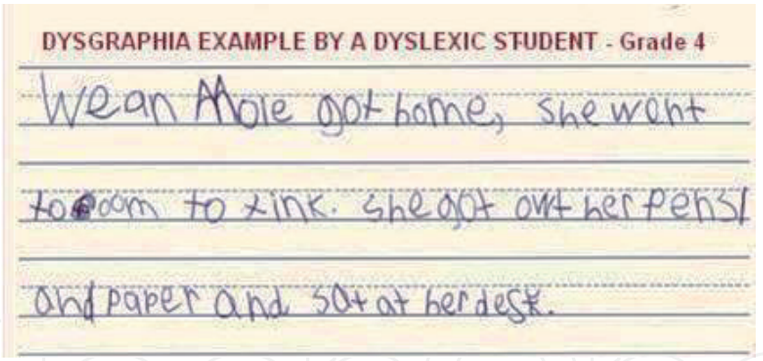

Figure 1.
Dysdraphia example by a dyslexic student [17].

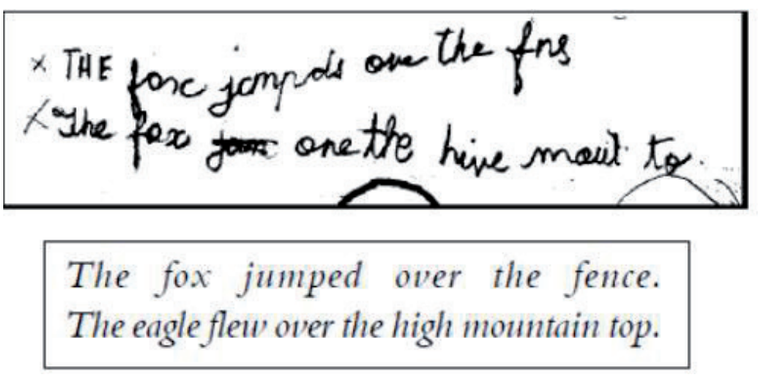

Figure 2.
Sample writing of Dysgraphic child [17].

planning on paper, poor spelling, and errors in grammar, punctuation, and poor handwriting. The children find difficulty composing writing as well as thinking and writing at the same time. This is linked to problems with visual-motor integration or fine motor skills.

Writing skills include both transcription and composition (text generation). Neuropsychological factors like difficulties in any one area (e.g., transcription, listening or reading comprehension, working memory) can delay skill development and efficient functioning in another. Research also throws light on role of genetics through twin studies and molecular genetic studies (**Figures 1** and **2**) [14–16].

5.2.1 Dysgraphia symptoms in children

- Avoiding written work
- Producing only a few words or sentences at a time when other pupils are completing many paragraphs
- Excessive difficulties in composing a text (output failure)
- Numerous technical faults of punctuation, grammar, word usage, sentence structure, and paragraph structure is observed
- Omitting words frequently in sentences or unfinished sentences
- Failure to capitalize the first letter of the first word in a sentence

- Poorly organized written work (e.g., weak paragraph organization; poor sentence cohesiveness)
- Illegible handwriting; incorrect use of upper- and lower-case letters, inverted characters; mixing of printing and cursive writing
- Basic written activities, such as taking notes, are challenging as they require simultaneous listening.
- Letters or sounds that are too similar are confused (e.g., "jumpt" for "jumped"; "caterpault" for "catapult")
- Inability to choose the correct spelling from two reasonable options (e.g., successful/succesfull; conscious/ consious; necessary/necessery)
- Use of non-permissible letter strings consistently (e.g., "egszakt" for "exact"; discuss/diskus; "freeeqwnt" for "frequent")
- Inconsistent page positioning in terms of lines and margins
- Uneven spacing between words and letters
- Cramped or odd grip; holds the writing instrument very near to the paper, or holds thumb over two fingers and writes from the wrist (**Figures 3** and **4**) [17].

5.2.2 Standardized tests for assessing written expression

- Wechsler Individual Achievement test (WIAT-II).
- Test of Written Language (TOWL; 3rd edition).
- Test of Early Written Language (TEWL; 2nd edition).
- Test of Written Spelling (TOWS; 4th edition).
- Test of Written Expression (TOWE) [14–16].

5.3 Dyscalculia

It refers to a type of specific learning disability that affects a person's ability to understand numbers and learn math facts and difficulty in learning arithmetic. Individuals with this type of LD may also have poor comprehension of math symbols, may struggle with memorizing and organizing numbers, have difficulty telling time, or have trouble with counting. Problems with number or basic concepts are likely to show up early and problems related to reasoning appear in the later grades in students. Dyscalculic children may also be unable to sort important superfluous information, recognize the proper computing technique, or assess whether the solution they acquire is appropriate (Jordan & Hanich, 2003). Mathematical challenges are typically the most severe obstacles in the academic path of individuals with LD, and they frequently persist into high school (**Figure 5**).

Various psychological, neurological, genetic, environmental and emotional factors are responsible for dyscalculia. Inferior parietal sulcus plays a dominant role

DOI: http://dx.doi.org/10.5772/intechopen.100809

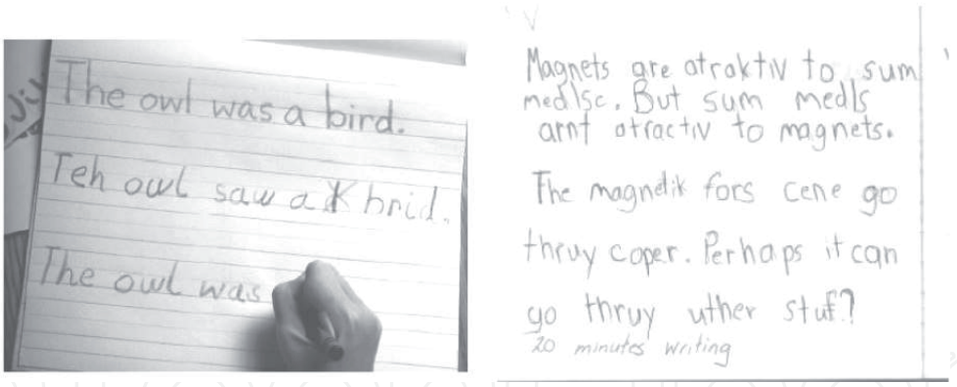

Figure 3.
Sample writing of Dysgraphic child [17].

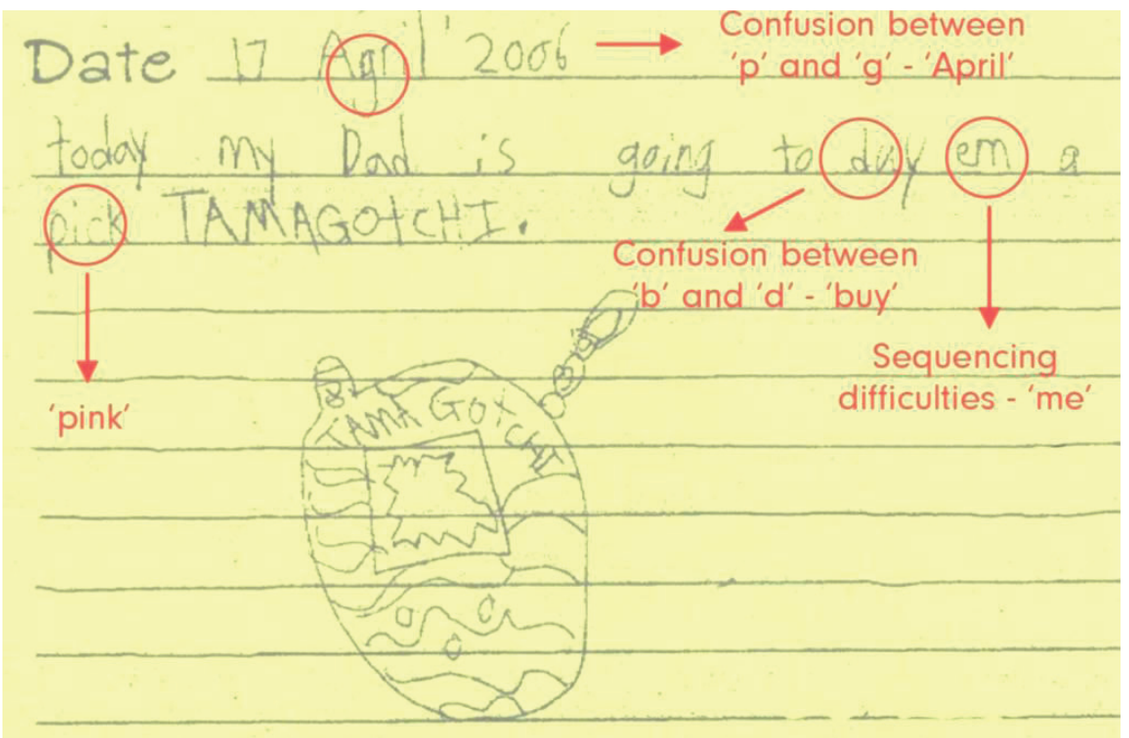

Figure 4.
Sample writing of Dysgraphic child [17].

in numerical processing. MRI studies have shown decreased gray matter in the left parietal lobe of children suffering from Dyscalculia. Environmental factors like schooling, low-income households and affective factors like anxiety and motivation are some of the causal factors of poor mathematical abilities and psychosocial adversities in children.

5.3.1 Dyscalculia symptoms

A child with inadequate arithmetic skills may just rely on rote memorization for the first 2 or 3 years of primary school. As mathematics problems include discrimination and manipulation of spatial and numerical relationships, a youngster with math challenges will be impacted negatively sooner or later.

- Individuals might have difficulty reading clocks to tell time, counting money, identifying patterns, remembering math facts, and solving mental math.

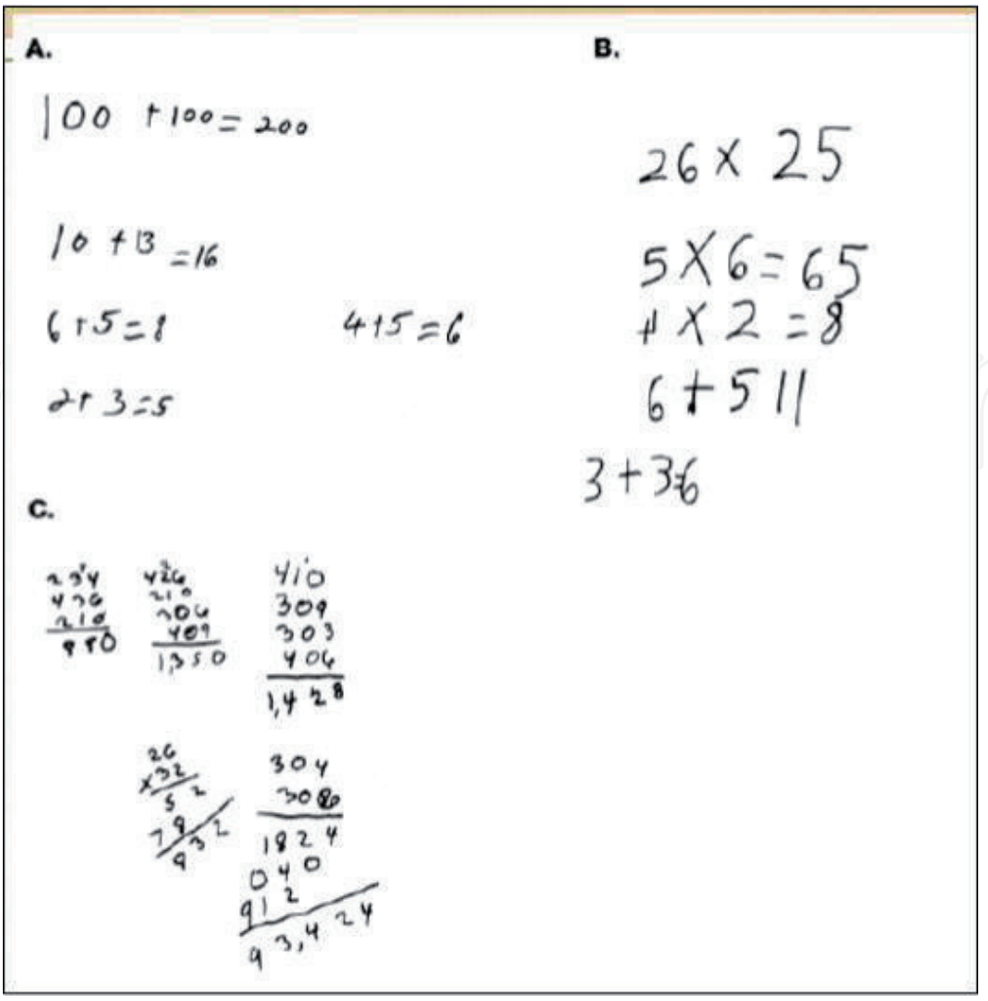

Figure 5.
Sample writing of Dycalculia [17].

- Counts with fingers because of difficulty with counting
- Problems with differentiating between left and right
- No alignment of digits and completing the arithmetic procedure in the wrong direction (e.g., left to right; top to bottom).
- Poor comprehension of fractional concepts (1/2)
- In older children (i.e., third grade and above), major impairments are evident in solving more complex arithmetic problems. And rapid retrieval of number facts (e.g., 4 × 9) and
- Difficulty keeping scores or remembering score procedures in games, like bowling, etc. Often loses track of whose turn it is during games, like cards and board games. Has limited strategic planning ability for games, like chess [18].

5.3.2 Assessment tools

Standardized tools to measure dyscalculia are,

- The Keymath Diagnostic Arithmetic Test assesses understanding of mathematical content, function, and calculation, among other things. It is used to assess students in grades one through six.Woodcock–Johnson Achievement Battery-III

- Test of Early Mathematical Abilities
- Teacher Academic Attainment Scale (TAAS)
- Child self- reported math anxiety scales. [11 items];
- Mathematics Anxiety Scale for Children [11–16].

5.4 Auditory processing disorder (APD)

APD is a deficit in neural processing of auditory stimuli that is not due to higher order language, cognitive or hearing loss and yet it is associated with difficulties in learning disorder [19, 20].

It is not a problem with understanding meaning but it means the brain of the affected child does not "hear" sounds in the usual way. It's also known as Central Auditory Processing Disorder, and it's a disorder that makes it difficult for sound to pass freely through the ear and be processed or interpreted by the brain. Even when the sounds are loud and clear enough to be heard, people with APD are unable to distinguish minor variations between sounds in words. They may be unable to filter distinct noises or mistake the order of sounds. In APD, the brain misinterprets the information received and processed from the ear [21].

5.4.1 Symptoms

APD can affect the way the child speaks as well as their ability to read, write, and spell. Affected children may drop the ends of words or mix up similar sounds and may find hard to talk with other people. They may not be able to process what others are saying and cannot come up with a response quickly. The child may find it hard to,

- Understand speech in the presence of competing background noise or in resonating acoustic environments
- Inability to localize the source of a signal
- Issues with hearing on the phone
- Inconsistent or inappropriate responses to requests for information
- Difficulty following rapid speech
- Frequent requests for repetition and/or rephrasing of information
- Unable to follow directions
- Difficulty or inability to detect the humor and sarcasm made by subtle changes in intonation.
- Difficulty learning a foreign language or novel speech materials, especially technical language
- Difficulty maintaining attention [11–16].

5.4.2 Causes

Although the actual causes of APD are unknown, it is thought to be associated to illness like chronic ear infections, meningitis, or lead poisoning. APD can develop in patients who have neurological system illnesses such multiple sclerosis and also be caused by premature delivery, low weight, head injury, and genes (APD can run in families) [11–16].

5.4.3 Assessment

An audiologist can diagnose APD by conducting a series of advanced listening tests in which the child will listen to different sounds and respond when they hear them. However, children usually aren't tested for APD until age 7 because their responses to the listening test may not be accurate when they are younger [14–16].

5.5 Language processing disorder (LPD)

LPD is a type of Auditory Processing Disorder (APD) in which people have trouble putting meaning to the sound groups that make up words, phrases, and stories. While an APD affects how the brain interprets all sounds, a Language Processing Disorder (LPD) only impacts how language is processed [6]. This disorder arises when an individual has specific challenges in processing spoken language that impacts both receptive and expressive language. These language-related issues could be caused by a variety of circumstances, including a limited vocabulary, a concrete thinking style, difficulties remembering and keeping track of what is said, or difficulties organizing one's thoughts. For example, children with a language-based LD may find it difficult to locate the appropriate words and phrases or to follow a fast-paced conversation. Language-based LDs also can make it difficult to write effectively: it might be difficult to organize ideas or determine the main topic of a written message [10].

5.5.1 Common problems

5.5.1.1 Expressive language

Children with expressive language difficulties exhibit slow vocabulary growth, pronunciation difficulties, difficulty in expressing (single words, poor/wrong retrieval of words, poor answering, narrative and conversational skills) and grammatical difficulties. They will often use a less appropriate word because the right word will not come to them. They have problems understanding complex sentence structures and responding to questions (**Figure 6**) [17].

Difficulty with ***word retrieval***	Whilst narrating a story **They escaped the tiger from getting eaten.**
4.5 year old boy Teacher: "What do you want Karim?" K: (pointing to car)"that" T: What is "that" K: (still pointing to car) That, want that	On a hot day: **I am shivering, put the fan on!** Father comes home late from work **Why are you so early Papa?**

Figure 6.
Expressive language difficulties [17].

5.5.2 Receptive language difficulties

- Trouble with processing sounds affects, with sequencing, linking thoughts, and concepts
- Need extra time to process incoming information
- Miss nonverbal language cue
- Do not understand jokes and laugh inappropriately or at the wrong times
- Problems doing group work
- Have difficulties giving or following directions
- Conversations will be marked by long silences
- Lack skill in responding to statements and questions (Hallahan & Kauffman, 2003) (**Figure 7**)

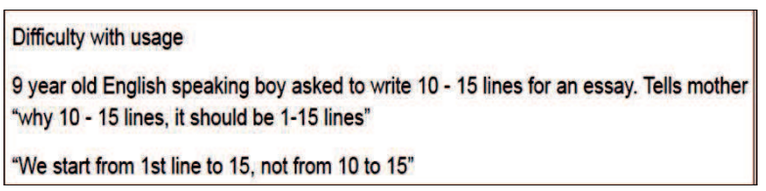

Figure 7.
Expressive language difficulties [17].

5.6 Nonverbal learning disabilities(NLD or NVLD)

Almost 65% of all communication is conveyed nonverbally. NLD is a disorder which is usually characterized by a significant discrepancy between higher verbal skills, weaker motor, visual–spatial and social skills. While it may sound like nonverbal learning disabilities (NVLD) relate to an individual's inability to speak, it actually refers to difficulties in decoding nonverbal behaviors or social cues. Children with NVLD are often well-spoken and can write well, but struggle with subtle social cues and comprehension of abstract concepts or the nonverbal aspects of communication [1, 21, 22].

5.6.1 The signs and symptoms are

- The typical characteristic of an individual with NLD (or NVLD) is having trouble interpreting nonverbal cues like facial expressions or body language, tone of voice and poor coordination. Hence they will have difficulty to make and keep friends
- Struggle with life skills that require an understanding of spatial relationships, such as recognizing how parts fit together into a whole, completing jigsaw puzzles and building with blocks, learning routes for travel, and manipulating objects in space.
- Difficulty in developing fine-motor skills those results in poor handwriting, difficulty learning to tie their shoelaces, and problems using small tools and utensils.

- Are weak in executive functions or will find hard to sustain attention. They may have trouble handling new tasks, solving problems and remaining flexible in their thinking. They may also have difficulty staying focused, completing multi-step instructions, organizing tasks and materials and controlling their impulses.

- Exhibit difficulty with reading comprehension or mathematical problem solving

- Physically clumsy, often bumps into objects or people

- Struggles with metaphors or abstract concepts and thinks of things in literal terms [21–23].

5.7 Visual perceptual or visual motor deficit

5.7.1 Visual motor and perceptual deficits

Individuals with visual perceptual/visual motor deficits have poor eye-hand coordination, lose their position frequently when reading, and struggle using pencils, crayons, glue, scissors, and other fine motor skills. When reading or completing tasks, they may also confuse similar-looking letters, have difficulty navigating their surroundings, or display atypical eye activity [8]. It impairs a person's ability to grasp information that they see, as well as their ability to draw or copy and understand information collected by visual means. Due to faults in the way a person's eyes move, sensory data gained through sight may be affected. These children's visual impairments limit reading comprehension skills, cause a short attention span, and make it difficult to draw or copy information.

The brain can process visual information in a variety of ways, as per National Center for Learning Disabilities (2003) and individuals with this disability may experience difficulty in a variety of areas, and they are not limited to experiencing difficulties in just one of the categories listed below [23].

5.7.2 These are some of the categories

Visual discrimination: Visual discrimination refers to a person's capacity to use their eyes to detect and compare the characteristics of different items in order to distinguish one item from another. An individual with issues in this area may have difficulty distinguishing between two similar letters, objects, or patterns.

Visual figure-ground discrimination: It entails determining the difference between a figure and its surroundings. A person who struggles in this category may have trouble finding a specific piece of information on a page full of words or numbers. They may also struggle to notice an image if there is distracting background.

Visual sequencing: The is the ability to tell the difference between symbols, words, and images. Individuals with problems in this category may be unable to stay in the correct spot while reading (skipping lines or re-reading the same line over and over), struggle with using a separate answer sheet, reversing or misreading letters and words, and have difficulty understanding mathematical equations.

Visual motor processing: It is the feedback from the eyes that allows other body components to move in coordination. Individuals may struggle to stay between the lines while writing (or coloring), copying from a board onto paper, moving about without tripping over things, and playing sports that involve timed and exact space motions.

Visual memory: Visual memory problems can be divided into two categories. The first has to do with recalling something that happened a long time ago. The

second is the ability to recall something that has recently been viewed. A person may have trouble remembering and spelling common words, remembering phone numbers, reading comprehension, and typing on a keyboard or pad.

Visual closure: Refers to the ability to determine what an object is while only a portion of it is visible. An individual may have difficulty recognizing an object in a picture that is not presented in its entirety (for example, portraying an elephant without a trunk), identifying a word with a letter missing, and recognizing a face with only one feature missing (such as the ears).

Spatial relationships: It refers to the skill to identify an object in space and relate it to oneself. According to National Center for Learning Disabilities, 2003, an individual child with this difficulty will have trouble going from one place to another, spacing of words and letters on a page, judging time, and reading maps [23].

5.7.3 Signs and symptoms of visual perceptual motor deficit

- Difficulty with activities such as printing or copying, or learning to tie shoelaces.
- Find hard to write, may put more pressure on a pencil or pen to control the motor movements, and may take much longer to write and experience fatigue with writing.
- Have trouble orienting their body in space and may need more help to learn dressing or may confuse left and right.
- Reversing superficially similar letters such as 'p' and 'q' or 'm' and 'w'
- Difficulty navigating around school or campus
- Turns head while reading or hold paper at odd angles and closes one eye while reading
- Often loses place while reading
- Unable to recognize a word if only part of it is shown
- Struggles with cut and paste
- Shows poor organization on the page, messy words, irregular spacing, and misaligned letters [10, 23].

5.7.4 Co-morbidity in children with specific learning disorders

Learning impairments are usually linked to mental health issues. One of the most common disorder affecting school-aged children is specific learning disorders (SLD). According to the American Psychiatric Association (APA), SLD affects 5–15 percent of school-aged children from various languages and cultures. SLD frequently coexists with other neurodevelopmental and mental abnormalities, as well as psychiatric disorders. Many studies have found that children with SLD have both internalizing and externalizing psychiatric problems. There is a substantial link between ADHD and reading problems among the children with externalizing psychiatric disorders. Children with SLD are five times more likely to develop conduct disorder (CD). Despite the fact that there is a link between SLD and internalizing disorders in the

literature, recent research have indicated a higher incidence of internalizing symptoms, with anxiety and depressive disorders at the top of the list. These mental comorbidities with SLD are either a direct result of the same central processing pattern deficiencies that produce learning problems, or they are a source of frustration and academic failure. These issues are said to be part of a vicious cycle that leads the child towards severe cognitive and social–emotional impairment [24–27].

6. Conclusion

SLD, previously known as a learning disorder includes a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of reading (dyslexia), writing (dysgraphia), or mathematical (dyscalculia) abilities despite intact senses, normal intelligence, proper motivation, and adequate socio-cultural opportunity. DSM-5 combines reading disorder, mathematics disorder, disorder of written expression and learning disorder into a single diagnosis under the classification of Specific learning disorder.

The Learning Disabilities Association of America and many other mental health practitioners regard the seven disorders as specific learning disabilities i.e. dyslexia, dysgraphia, dyscalculia, auditory processing disorder, language processing disorder, nonverbal learning disabilities and visual perceptual disabilities. The major causes of learning disabilities are inherited cause, genetic cause, neurobiological or brain injury, co-morbid disorders, environmental factors. They recognize autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD) as related disorders that impact learning, though not specific learning disorders.

Dyslexia is characterized by difficulties with inaccurate word recognition and poor spelling and decoding abilities resulting from a deficit in the phonological component of language. Dysgraphia is characterized by poor writing skills like poor spelling, errors in grammar and punctuation, and poor handwriting. Mathematics disorder refers to impairment in the development of arithmetic skills, including computational procedures used to solve arithmetic problems and the retrieval of basic arithmetic facts from long-term memory. Language Processing Disorder (LPD) relates to the difficulties in processing of expressive language and/or receptive language. Non-verbal learning disability refers to problems in understanding nonverbal cues like facial expressions or body language. Visual processing disorder includes trouble drawing or copying, inability to detect differences in shapes or letters, and letter reversals.

SLD could cause complications if not remedied earlier. Intense and focused instruction may in fact alter the brain activation profiles observed in children with SLD.

Hence there is a need to advocate for intense and focused instruction in each of the affected academic domains.

DOI: http://dx.doi.org/10.5772/intechopen.100809

IntechOpen

Author details

Vinutha U. Muktamath*, Priya R. Hegde and Samreen Chand
Department of Human Development and Family Studies, College of Community Science, University of Agricultural Sciences, Dharwad, Karnataka, India

*Address all correspondence to: vinumuktamath@gmail.com

References

[1] Alnaim FA. Global Journal of Human-Social Science: A Arts & Humanities: Double Blind Peer Reviewed International Research Journal Publisher. USA: Global Journals Inc; 2016. Online ISSN: 2249-460x

[2] Morin A. 2021. Available from: https://www.understood.org/articles/en/history-of-learning-disabilities-and-adhd

[3] Radhika K. Handling of Learning Disabilities and Problems. 2018. Available from: https://www.researchgate.net/publication/323771224_Handling_and_Learning_Disabilities_and_Problems

[4] Available from: https://dyslexiaida.org/dsm-5-changes-in-diagnostic-criteria-for-specific-learning-disabilities-sld1-what-are-the-implications/

[5] Cortiella CS, Horowitz H. The State of Learning Disabilities: Facts, Trends, and Emerging Issues. pdf (Accessed date: August 13, 2014). Available from: https://www.ncld.org/wp-content/uploads/2014/11/2014-State-of-LD

[6] APA. Diagnostic and Statistical Manual of Mental Disorders. Washington, DC: APA; 2013

[7] DOE (U.S. Department of Education). Individuals with Disabilities Education Act Amendments of 1995: Reauthorization of the Individuals with Disabilities Education Act (IDEA). Washington, DC: DOE; 1995

[8] Tannock R. Rethinking ADHD and LD in DSM-5: Proposed changes in diagnostic criteria. Journal of Learning Disabilities. 2013;**46**(1):5-25. DOI: 10.1177/0022219412464341. Epub 2012 Nov 9

[9] Committee to Evaluate the Supplemental Security Income Disability Program for Children with Mental Disorders; Board on the Health of Select Populations; Board on Children, Youth, and Families; Institute of Medicine; Division of Behavioral and Social Sciences and Education; The National Academies of Sciences, Engineering, and Medicine; Boat TF, Wu JT, editors. Washington (DC) National Academies Press (US). 2015. Available from: https://www.ncbi.nlm.nih.gov/books/NBK332886/

[10] A Handbook on Learning Disabilities, Designed by Integra® Staff, Copyright 2009: Integra is funded by Ontario's Ministry of Children and Youth Services

[11] Available from: https://wecapable.com/specific-learning-disability-definition-examples-types/

[12] Available from: https://www.slideshare.net/mordecaiEnoch/specific-learning-disorder-121330695

[13] Thapar A, Daniel S. Pine , James F. Leckman , Stephen Scott , Margaret J. Snowling , Eric A. Taylor , Child and Adolescent Psychiatry. 6th Edition, Wiley-Blackwell publisher; 2015. Available from: https://www.wiley.com/enus/Rutter%27s+Child+and+Adolescent+Psychiatry%2C+6th+Edition-p-9781118381960

[14] Kaplan and Sadocks Comprehensive Textbook of Psychiatry. 10th ed.

[15] Kaplan and Sadocks Synopsis of Psychiatry. 11th ed

[16] Ahuja. Postgraduate Textbook of Psychiatry. 3rd ed.

[17] Marita A , Samrudhi B , Nadia C, Fernandes et al. Published by rehabilitation council of India. Learning Disabilities. 2012:151-198

[18] Nancy CJ, Laurie BH. Characteristics of children with moderate mathematics

deficiencies: A longitudinal perspective. Learning Disabilities Research & Practice. 2003;**18**(4):213-221. DOI: 10.1111/1540-5826.00076

[19] Frank E. Musiek (Editor), Gail D. Chermak , Handbook of Central auditory Processing Disorder: Auditory neuroscience and Diagnosis. 2nd ed. California: Pular Publishing; 2014. pp. 3-6

[20] American Academy of Audiology Clinical Practice Guidelines Diagnosis: Treatment and Management of Children and Adults with Central Auditory Processing Disorder. 2018

[21] Javaid HI. Learning disabilities: Causes and treatments. The New American Journal of Medicine. 2020;**V**(2):1-4

[22] Non-Verbal Learning Disabilities. Learning Disabilities Association of America. Available from: http://ldaamerica.org/types-of-learning-disabilities/non-verbal-learning-disabilities/

[23] National Center for Learning Disabilities Visual processing disorders: In detail. 2003. Available from: http://www.ldonline.org/article/Visual_Processing_Disorders%3A_In_Detail

[24] Khodeir M S., El-Sady S R., Mohammed H A. The prevalence of psychiatric comorbid disorders among children with specific learning disorders: a systematic review Egypt J Otolaryngology. 2020:36, 57 10.1186/s43163-020-00054-w

[25] Sahoo MK, Biswas H, Padhy SK. Psychological co-morbidity in children with specific learning disorders. Journal of Family Medicine and Primary Care. 2015;**4**(1):21-25. DOI: 10.4103/2249-4863.152243

[26] Karande S, Satam N, Kulkarni M, Sholapurwala R, Chitre A, Shah N. Clinical and, psycho educational profile of children with specific learning disability and co-occurring attention-deficit hyperactivity disorder. Indian Journal of Medical Sciences. 2007;**61**(12):639-647

[27] Maughan B, Rutter M, Hagell A, Yule W. Reading problems and antisocial behaviour; developmental trends in co morbidity. Journal of Child Psychology and Psychiatry. 1996;**37**(4):405-418. DOI: 10.1111/j.1469-7610.1996.tb01421.x