

Clinical Practice Guidelines on Assessment and Management of Specific Learning Disorders

Henal Rakesh Shah, John Kommu Vijay Sagar¹, Mansi Pradeep Somaiya, Jitendra Kumar Nagpal²

Department of Psychiatry, T.N.M.C and B.Y.L Nair Hospital, Mumbai, Maharashtra, ¹Department of Child and Adolescent Psychiatry, NIMHANS, Bengaluru, Karanadaka, ²Consultant Psychiatrist, Institute of Mental Health and Life Skills Promotion, Moolchand Medcity, New Delhi, India

INTRODUCTION

Specific learning disorder (SLD) is one of the most common neurodevelopmental disorders affecting 3%–10% of children. Although many definitions have been proposed, there is no common consensus on the diagnostic criteria and definition of SLD.

NOSOLOGY

In the 1960s, LD emerged as a category as mentioned by Samuel Kirk. He defined dyslexia as a kind of “learning disability” and defined LD as “an unexpected difficulty in learning one or more of one instrumental school abilities.” As per Kirk, LD is a process issue which can affect language and academic performance of people of all ages which is caused by emotional disturbance, behavioral disturbance or cerebral dysfunction.^[1] Bateman through his landmark observation, mentioned those with learning disorders have a significant discrepancy between their estimated intellectual potential and actual level of performance with or without neurological dysfunction which is not secondary to mental retardation, educational or cultural deprivation, severe emotional disturbance, or sensory loss.^[2]

As curiosity and awareness progressed, various definitions have been proposed across the world. The two worldwide international diagnostic classifications-International Classification of Diseases (ICD 10) and Diagnostic and Statistical Manual of Mental Disorders (DSM) (5th Edition).^[3,4]

Address for correspondence: Dr. Henal Rakesh Shah,
Department of Psychiatry, T.N.M.C and B.Y.L Nair Hospital,
Mumbai - 400 008, Maharashtra, India.
E-mail: drhenal@gmail.com

The difference between the two is outlined in Table 1.

The ICD 10 refers to Specific developmental disorders of scholastic skills:

- Conceptually they are disorders of disturbance in the normal pattern of skill acquisition
- Not simply a consequence of lack of neither opportunity to learn nor any acquired brain trauma or disease
- Abnormalities in cognitive processing that derive from biological dysfunction
- Clinically significant degree of impairment in specified scholastic skill. Severity can be judged by scholastic terms or developmental precursors (scholastic difficulties were preceded by developmental delays or deviance, most often in speech or language in preschool years) or qualitative abnormalities
- Response– scholastic difficulties do not rapidly and readily remit with increased help at home/school
- Impairment must be specific– not solely explained by mental retardation/lesser impairments general intelligence
- Impairment must be developmental– early years of schooling and not acquired later in the educational process.


The impairments are characterized by

- Specific reading disorder: Characterized by specific and significant impairment in the developmental of reading skills which are not accounted for mental age, visual acuity problems or inadequate schooling
 - Child’s reading performance should be significantly below the level expected based on age, general

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Shah HR, Sagar JK, Somaiya MP, Nagpal JK. Clinical practice guidelines on assessment and management of specific learning disorders. Indian J Psychiatry 2019;61:211-25.

| Access this article online | |
|--|---|
| Website: www.indianjpsychiatry.org | Quick Response Code  |
| DOI: 10.4103/psychiatry.IndianJPsychiatry_564_18 | |

intelligence and school placement. Performance is best assessed by means of an individually administered standardized test of reading accuracy and reading comprehension

- Early stages: Difficulty in reciting the alphabets, in giving the correct names of letters, in giving the simple rhymes for words and in analyzing or categorizing (despite normal auditory acuity)
- Later stages: Errors in oral reading skills
- Omissions, substitutions, distortions, or additions or words or parts of words
- Slow reading rate
- False starts, long hesitations or “loss of place” in text and inaccurate phrasing
- Reversals of words in sentences or of letters within words.
- Deficits in reading comprehension:
 - Inability to recall facts read
 - Inability to draw conclusions or inferences from material read
 - Use of general knowledge as background information rather than of information from a story to answer questions about a story read.
- Specific spelling disorder: Characterized by specific and significant impairment in the developmental of spelling skills in the absence of a history of specific reading disorder which is not solely accounted for by low mental age, visual acuity problems or inadequate schooling
 - Child’s spelling performance should be significantly below the level expected based on age, general intelligence and school placement
 - Performance is best assessed by means of an individually administered standardized test of spelling.
- Specific disorder of arithmetic skills: Characterized by specific impairment in arithmetic skills which is not solely explicable because of general retardation or of grossly inadequate schooling

- Child’s arithmetical performance should be significantly below the level expected on the basis of age, general intelligence and school placement. Performance is best assessed by means of an individually administered standardized test of arithmetic
- Failure to understand the concepts underlying arithmetical operations
- Lack of understanding of mathematical terms or signs
- Failure to recognize numerical symbols
- Difficulty in understanding which numbers are relevant to the arithmetical manipulations
- Difficulty in properly aligning numbers or in understanding which numbers are relevant arithmetic/inserting decimal points/symbols during calculations; poor spatial organization of arithmetical calculations; and inability to learn multiplication tables satisfactorily.
- Mixed disorder of scholastic skills: Characterized ill-defined/inadequately conceptualised but necessary residual category of disorders in which both arithmetical and reading or spelling skills are significantly impaired but in which the disorder is not solely explicable in terms of general mental retardation or inadequate schooling
- Other developmental disorders of scholastic skills: Developmental expressive writing disorder
- Developmental disorder of scholastic skills: Unspecified disorders in which significant disability of learning that cannot be solely accounted for by mental retardation, visual acuity, or inadequate schooling
- Includes: Knowledge acquisition disability NOS; LD NOS; learning disorder NOS.

DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS 5TH EDITION

Term used “SLD”

- Difficulties learning and using academic skills indicated

Table 1: The differences in criteria of diagnosis of specific learning disorder between Diagnostic and Statistical Manual of Mental disorder 5 and International Classification of Diseases 10

| Basis | ICD 10 | DSM 5 |
|--|--|--|
| Term used | “Specific developmental disorders of scholastic skills” | “Specific learning disorder” |
| Academic domains | Specific reading disorder Specific spelling disorder Specific arithmetic disorder Mixed disorder of scholastic skills Other developmental disorders of scholastic skills (developmental expressive writing disorder) Unspecified (knowledge acquisition disability, LD NOS) | With impairment in reading With impairment in written expression With impairment in Mathematics Subtypes within |
| Emphasis on 3 settings where the criteria has to be made | Nothing specific | Diagnostic criteria to be met History School reports Psycho educational reports |
| Severity | Not mentioned | Mild, moderate and severe |
| Duration | | 6 months |

LD – Learning disorder; DSM – Diagnostic and Statistical Manual of Mental disorder; ICD – International Classification of Disease; NOS – Not otherwise specified

by presence of one of the following that have persisted for at least 6 months, despite the provision of interventions that target those difficulties:

- Slow/inaccurate/effortful reading
- Difficulty understanding what has been read
- Difficulty in spelling
- Difficulty in written expression
- Difficulty in mastering number sense, number facts, calculations
- Difficulty with Math reasoning.

The affected academic skills are substantially and quantifiably below those expected for the individual's chronological age (at least 1.5 standard deviation below the population mean for age). Significant interference with academic or occupational performance or with activities of daily living is overserved. LD is confirmed by means of standardized achievement measures and comprehensive clinical assessment. Learning difficulties start at school years. However, they may not manifest till demands in academics exceed individual capacities.

Note: Diagnostic criteria to be met using

- History
- School reports
- Psycho educational reports.

Mention the academic domains and sub skills impairment:

With impairment in reading:

- Word reading accuracy
- Reading rate accuracy/fluency
- Reading accuracy.

With impairment in written expression:

- Spelling accuracy
- Grammar and punctuation accuracy
- Clarity or organization of written expression.

With impairment in mathematics:

- Number sense
- Memorization of arithmetic facts
- Accurate or fluent calculation
- Accurate Math reasoning.

Specify current severity:

- Mild: some difficulties in one or two academic domains; mild enough and can be compensated or functions well with accommodations/support service especially during school years
- Moderate: Marked difficulties one or more academic skills; unlikely to become proficient without intensive teaching during school years, accommodations/supportive services at school/home to complete activities accurately
- Severe: Severe difficulties, several academic skills; unlikely to become proficient without ongoing

intensive teaching for most of the school years, despite accommodations/supportive services at school/home may not complete activities accurately.

THE DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS 5TH EDITION CHANGES

DSM 5 criteria for learning disorder are an overarching category and follow a spectral approach. Twin and family studies revealed significant genetic and environmental overlap amongst – reading, math and written expression disorders. Hence, the “Lumping approach” is followed than the “Splitting approach”. It reduces the challenges associated with defining the subtype of LD. For e.g., Test scores differ across academic domains/tests; with some falling just below clinical threshold.

- Intelligence quotient (IQ) achievement gap is no longer mentioned
- Intellectual assessment will be required only in cases where intellectual disability is suspected
- The focus is on early access to intervention and less on assessment for diagnosis and for this psychoeducation of parents and consultation with parents and teachers required
- Inclusion of effect of Intervention and symptom persistence is yet another change with have practical challenges.

INTERNATIONAL CLASSIFICATION OF DISEASES 11

- The potential changes in ICD 11 include a change in the terminology to “Developmental learning disorder”. This includes– with impairment in reading, written expression, mathematics and with other impairment of learning. Conceptually, the criterion continues to follow the discrepancy in achievement according to the chronological age and level of intellectual functioning.

Prevalence and comorbidity

As per the Sahoo *et al.*, 2015, prevalence of learning disorder ranges from 2% to 10%.^[5] The prevalence of learning disorders in India is 5%–17% of the children.^[6] Male to female ratio for learning disorder is 2.3:1. There is high comorbidity as depicted in Table 2 and has impact on the presentation and intervention of the disorder [Table 3].

ASSESSMENT

Assessment of children includes a detailed clinical evaluation followed by standard psychometric assessments of child's cognitive abilities and academic skills.

Clinical evaluation

Children with SLD are either brought by their parents as

self-referred or by referral from the school. Children with learning difficulties are often labelled as “lazy” or “stupid” or as being “trouble makers” if they have comorbid behavioral symptoms. They are often compared with others who perform well in academics and face punitive experiences in the home as well as school contexts. The clinical presentation is quite variable with some children presenting primarily with complaints of poor academic performance whereas others can present with symptoms secondary to the poor academic performance which may include school refusal, oppositional behavior, aggression, poor motivation for studies, low self-esteem, sadness of mood, crying spells, changes in sleep and appetite, excessive engagement in extracurricular activities, somatic complaints (pain symptoms, fatigue), dissociative symptoms (pseudo seizures, dissociative sensory loss, dissociative amnesia etc.).

Academic difficulties include writing slowly, not completing classwork and homework, poor handwriting, omission of long answer questions, inability to complete writing in time, spelling mistakes, reading slowly, reading word by word, replacing difficult words with words of similar pronunciation, reading without punctuation, mistakes while doing arithmetic etc.

Prior to psychological testing, the psychiatrist should obtain a detailed history from parents and child followed by examination of the child. The clinical evaluation should be structured to include the components listed in Table 4.

Psychometric testing

Psychometric testing helps in confirmation of diagnosis and in planning the intervention. The psychometric testing usually includes testing for cognitive abilities and testing for academic abilities. Assessment of the child’s level of Intelligence by measuring IQ can be done using Standardized IQ tests. The tests that can be used include Binet–Kamat Test, Malin’s Intelligence Scale for Indian Children (MISIC),

Wechsler’s Intelligence Scale for Children-4th Edition etc. These have differing advantages (refer to table in article on Intellectual Disabilities) MISIC will provide Performance IQ, Verbal subscale IQ and Full-scale IQ. In children with SLD, there is a discrepancy between verbal and performance IQs with the performance IQ usually being higher. Another pattern named “ACID-profile” has been described where children may score low on subtests of Arithmetic, Coding, Information and Digit-span. WISC IV often reveals weaknesses in verbal comprehension, working memory, and processing speed.^[14]

After assessment of IQ, tests to evaluate academic abilities need to be administered. There are several tests as depicted in Table 5, which are useful in the evaluation of academic abilities. These include NIMHANS Index for SLD, Wide Range Achievement Test, Test of written language-4, Wechsler Individual Achievement Test, Woodcock-Johnson III/IV Tests of achievements (WJ-III), Kaufman Test of Educational Achievement, Peabody Individual Achievement Test-Revised, Aston Index Battery.

INDIAN TESTS

- NIMHANS Index for SLD is the most commonly used battery in the Indian context. Reliability and validity of this tool has been established.^[15] It includes the tests in two levels. Level I is for 5–7 years age group and Level II for 8–12 years. The tests in

Tests in Level I are:

1. Visuo-motor skills (copying of three geometrical figures)
2. Writing of capital letters
3. Writing of small letters
4. Writing of an alphabet preceding a specified alphabet
5. Writing of an alphabet succeeding the specified alphabet
6. Writing of numbers serially
7. Writing of numbers preceding a specified number
8. Writing of numbers succeeding a specified number
9. Color cancellation test

Table 2: Comorbidity with specific learning disorder

| Comorbid disorders | Prevalence | Authors |
|--|--|---|
| Behavioral and emotional disorders | 30% | Sahoo <i>et al.</i> , 2015 ^[5] |
| Attention deficit hyperactivity disorder | Variable: 10%-60% | Various studies (Margari <i>et al.</i> , 2013; ^[7] |
| Inattention difficulties | 20%-40% | Halperin <i>et al.</i> , 1984; ^[8] Karande <i>et al.</i> , 2007 ^[9] |
| ADHD and dyslexia | | Sahoo <i>et al.</i> , 2015 ^[5] |
| Conduct disorder | 6% | Hendren <i>et al.</i> , 2018 ^[10] |
| Depressive disorder | 33% | Chaudhary and Meghwal, 2015 ^[11] |
| Anxiety disorders | 20%-30% | Fristad <i>et al.</i> , 1992 ^[12] |
| | 28% | Prior <i>et al.</i> , 1999 ^[13] |
| ASDs and dyslexia | 6% | Margari <i>et al.</i> , 2013 ^[7] |
| Language disorders | Varies - Around 30%-40% of patients with SLD have a reading disorder. Patients with dyslexia with a specific language disorder vary from 55%-77% | Hendren R <i>et al.</i> , 2018 ^[10] |
| | | Margari <i>et al.</i> , 2013 ^[7] |

SLD – Specific learning disorder; ADHD – Attention deficit hyperactivity disorder; ASDs – Autism spectrum disorders

Table 3: Comorbidity with specific learning disorder and the impact

| Comorbid disorders | How the comorbidity affects SLD presentation | How testing is impacted in presence of a comorbidity | How is remediation is affected in presence of a comorbidity |
|--|--|--|--|
| Attention deficit hyperactivity disorder | Behavioral issues Poor attention span | Drop in IQ scores Gives up easily in the tests Hurry to finish tests Spacing and letter formation is affected Omissions are more in spellings Organization of ideation is affected Dysgraphia - Handwriting is affected, alignment is affected Visuospatial errors are often seen | Longer time to drive in a concept Memory issues Forgets the learnt matter quickly Frequent breaks Process slows down Repetitions are more because of inattention Behavior - Impulsive and can lead to avoidance Counselling the parents must be included in the IEP Behavior management/modification is also to be included Gives up easily Fine motor skills and handwriting skills may also require inputs |
| Conduct disorder | Hyperactivity Disruptive in class Frequent anger outbursts Poor academic performance | Disinterested and irritable Rapport building is difficult Mazes: Poor planning and impulsivity Similarities subtest: Mostly give superficial answers followed by "That's all I know", "That's it, and nothing else", "Nothing is same" Out rightly denied answering on the same Arithmetic: Inattention Disinterest, lack of motivation or casual attitude to testing Impulsivity Manipulating and faking bad in testing | Projecting negative feelings towards the examiner as he is perceived as an authority figure Defiance or not complying with the instruction Irritability and hostility when probed Answering back, arguing or asking impertinent questions Giving up easily Process of remediation slows down Behaviour management |
| Depressive disorder | Disinterest in studies Poor academic performance Prefers to be her/himself Poor interest Slow in responding Soft speech May have a poor eye contact Low self esteem | Hesitant to respond Gives up very easily Answers very softly Downward gaze Delayed reaction time Random marking Overall time-fatigue Forgetfulness No clarifications Hesitance to clarify Low motivation Shallow processing Organisation skills are affected Not elaborate sentences Sadness in content Thought productivity in essays - Poverty of content in essays | Hesitant to respond Give up very easily Answer very softly Downward gaze Delayed reaction time Random marking Overall time-fatigue Forgetfulness No clarifications Hesitance to clarify Low motivation Shallow processing Slow process |
| Anxiety disorders | Anxiety impacts performance Disrupts attention/information processing Avoidance to write | Gives up very easily Delayed reaction time Answers hastily or may have hesitations Random marking Overall time-fatigue Forgetfulness No clarifications Hesitance to clarify Shallow processing Organisation skills are affected Not elaborate sentences In a hurry to finish | Gives up very easily Delayed reaction time Answers hastily or may have hesitations Forgetfulness Hesitance to clarify Organisation skills are affected |

Contd...

Table 3: Contd...

| Comorbid disorders | How the comorbidity affects SLD presentation | How testing is impacted in presence of a comorbidity | How is remediation is affected in presence of a comorbidity |
|---------------------------|---|--|---|
| ASDs and dyslexia | Minimal eye contact Rigidity of thought Difficulty in comprehension and completing papers in exams Difficulty to do complex tasks Many children with autism have excellent basic reading skills. Some even have what we call "Hyperlexia." However understanding is poor Visual and auditory processing difficulties, often associated with ASD "Islets of ability" - Strengths in particular areas, such as design, logic, and creative skills | Poor concept of time lapse Wanting perfection Answers to only what is asked Rigidity of thought Mechanics Concrete thoughts Poor abstraction Factual information Short sentences Vocabulary is simple Minimal spelling errors Poor receptive language Math reasoning is affected | Social skills training should be included as well Avoidance for Math is often seen Rigidity in behavior Refusal to therapy Behavioral modification may also be required Prepare for schedule changes in settings Slows down the process Wanting perfection Stuck with redundant details |
| Language disorders | Reading difficulties often associated with nonspecific language impairment - Nonverbal and language deficits Expressive language disorder-hard to put thoughts and feelings together, limited vocabulary, leave out key words, mix up tenses, mixed receptive - Expressive language disorder - Difficulty in understanding and expression, difficulty understanding verbal directions/longer sentences, trouble understanding basic vocabulary, have reading comprehension difficulties Auditory processing disorder - Trouble recording different sounds in words, frequent asking for repetition of words/sentences, drop word endings and certain syllables, at risk for reading disabilities Social communication disorders - Difficulty in making appropriate conversations, interrupt often/speak too little, at risk of reading comprehension issues | Reading comprehension difficulties Omissions may be present | Work on language deficits important and needs to be implemented with remediation |

SLD – Specific learning disorder; IQ – Intelligence quotient; IEP – Individual educational plan; ASDs – Autism spectrum disorders

Table 4: Outline for clinical evaluation

Presenting complaints and their progression
History of any behavioral or emotional problems
Schooling history - School attendance, classroom behavior, any change of school, any change of curriculum, the type of academic difficulties, whether any intervention or accommodations in school for the same, impact of the interventions etc.
Family history of any neurodevelopmental disorders or psychiatric illness or neurological disorders
Family life and relationships
Medical history
History of any evaluation and intervention
Family's awareness and perception of the child's problems
Behavioral observation and mental status examination of the child
Informal assessment of reading, writing, spelling and arithmetic skills
Physical examination of the child especially neurological and sensory system examination
Screening for common co-morbid disorders including ADHD, ODD, depression and anxiety disorders
Report from class teacher

ADHD – Attention deficit hyperactivity disorder; ODD – Oppositional defiant disorder

10. Visual discrimination
11. Visual memory
12. Auditory discrimination
13. Auditory memory
14. Speech/language (both receptive and expressive).

The tests in Level II are:

1. Number cancellation
2. Reading of English passages
3. Spelling of English words (including Schonell's 15 words list)
4. Reading comprehension of English passages
5. Arithmetic subtest
6. Bender Gestalt test for visuo-spatial abilities.

Most of the definitions of SLD whether exclusionary or inclusionary refer to terms such as adequate intelligence, appropriate instruction and socio-cultural factors which

Table 5: Various tests of achievement

| Name of test | Domains tested | Who can assess | Advantages | Disadvantages | How to access | Adapted/ validated in Indian population (yes/no) |
|---|--|---|---|---|--|--|
| NIMHANS Index for SLD - Level I (5-7 years) and Level II (8-12 years) | Level I: Assessment of preacademic skills; attention, visual and auditory discrimination, visual and auditory memory, speech, and language, Visuo-motor and language, writing and number skills Level II: Assess areas of attention, reading, spelling, perceptuo-motor, visuo-motor integration, memory, and arithmetic skills | Clinical psychologists, special educators | Used for assessment of SLD Used to monitor progress after remediation Wide range of pertinent areas covered Easily available and administered Good for early identification of learning issues Mostly paper pencil tests | Limited age range as it can only be used ages between 5-12 years Available in English, Kannada, Hindi | Purchase from NIMHANS, Bengaluru | Yes |
| WRAT-4 | Reading composite=Word reading + reading comprehension Spelling Math computation | Psychologist, special educator, teacher | Screening of difficulties in academic areas Takes 15-30 min (quick assessment) Parallel forms allowing for retesting Age and grade based norms | No applied Math assessment No broad writing skills assessed | Available on purchase/even online purchase | No |
| TOWL-4 | Vocabulary Spelling Style (punctuation and grammar) Logical sentences Sentence combining Contextual conventions Contextual language Story construction | Anyone with formal training in assessment and English proficiency | Helps in identifying students with writing difficulties Strong conceptual model of writing Good reliability Excellent tool to assess the progress of remediation in writing | Time consuming scoring Subjectivity in scoring procedures in some domains Between 7-8 poor discrimination Cannot be used to assess other areas of SLD except writing | Available on purchase/even online purchase | No |
| WIAT III | Listening comprehension Oral expression Word reading Pseudoword decoding Reading comprehension Oral reading fluency Spelling Sentence composition Essay composition Math problem solving Numerical operations Math fluency | Psychologist, special educator, teacher | Good overview of students strengths and weaknesses Good ceiling and basal of subtests | English fluency needed No college adult norms | Available on purchase/even online purchase | NO |
| WJ-III Tests of achievements (WJ-III) | Reading Writing Mathematics Academic fluency Academic skills Oral comprehension General academic knowledge | Psychologist, Educator | Range of academic capacities correlated with Cattell-Horn-Carroll theory: Wide range of areas covered. Can be used between the age of 2-90 years and grade Kindergarten to Grade 18 Intra-Individual Comparison of scores Used for diagnosis of SLD Computerized Scoring Excellent tool to check progress in remediation Tester friendly | English proficiency required Subjectivity in some scoring Training needs to be thorough to be able to administer Not standardized for Indian population, hence children often test positive for difficulties in written expression and reading vocabulary and hence training is inevitable | Available on purchase/even online purchase | Not standardized on the Indian population; hence, not culture friendly |

Contd...

Table 5: Contd...

| Name of test | Domains tested | Who can assess | Advantages | Disadvantages | How to access | Adapted/ validated in Indian population (yes/no) |
|---------------------|---|---|--|---|--|---|
| K-TEA 3 | Phonological processing Math concepts and applications Letter and word recognition Nonsense word decoding Writing fluency Silent reading fluency Math fluency Reading comprehension Written expression Associational fluency Spelling Object naming facility Reading vocabulary Letter naming facility Listening comprehension Word recognition fluency Oral expression Decoding fluency | Psychologist, special educator, teacher | Sound error analysis guidelines that are normed Looks at all areas of IDEA Alternate forms good for reevaluations Offers recommendations for writing IEPs New norms for ages 4:0 through 25:11 and for grades pre-K through 12 | Extensive training needed to learn the test American idiomatic vocabulary, hence difficult to those with limited proficiency of nonfamiliarity with American English | Available on purchase/even online purchase | No, has been normed and validated on a representative sample of the United States |
| PIAT-R | General knowledge Math Reading recognition Reading comprehension Spelling | Special educator, psychologist, teacher | Easy to administer and score Useful for decision making for interventions Good for screening | Limited questions hence not reliable measure for domains Norms are national norms, hence regional differences not recognised Ceiling effects on some subtests Time consuming for classroom administration No Math testing Ages 5-14 only | Available on purchase/even online purchase | No |
| Aston Index Battery | Visual and auditory discrimination Motor coordination Written language Reading and spelling General ability and attainment | Teacher, psychologist, special educator, speech pathologist | Good tool for screening and diagnosis of language difficulties | Ceiling effects on some subtests Time consuming for classroom administration No Math testing Ages 5-14 only | Available on purchase/even online purchase | No |

WRAT – Wide Range Achievement Test; TOWL-4 – Test of written language; WIAT – Wechsler Individual Achievement Test; WJ-III – Woodcock-Johnson III; K-TEA – Kaufman Test of Educational Achievement; PIAT-R – Peabody Individual Achievement Test-Revised; SLD – Specific learning disorder; IEPs – Individual educational plans; MISIC – Malin's Intelligence Scale for Indian Children; IDEA – Indian disability evaluation and assessment; NIMHANS – National Institute of Mental Health and Neurosciences

are difficult to standardize in a pluralistic society as that of India. Formulating indigenous assessment tools for processing deficits, intelligence testing and proficiency in reading, writing and mathematics; in the several hundred languages spoken in India will be a gigantic task. And perhaps we will never be able to achieve the same. These complex issues are further compounded by a near total lack of awareness of teachers, differences in age of school enrolment, pre-literacy, quality of teaching in schools, and learning environment and support at home.^{116,171}

- iBall is a test under construction at National Brain Research Centre (NBRC) with support from Department of Science and Technology, Government of India. It is to be available early 2019 and is in multiple languages of India
- Curriculum-based assessments can also be used to assess the academic skills in children. These tests as the name suggests are based on the child's curriculum and therefore not as wide and comprehensive as other tests of achievement. Grade Level Assessment Device (GLAD) for children with learning problems in schools has been developed by the

National Institute for Empowerment of persons with Intellectual Disability.¹¹⁸¹ GLAD can be used from the age of 6 years for grades I to IV. It is available in English, Hindi and includes mathematics. Another "Curriculum Based Test for Educational Evaluation of Learning Disability" is authored by Ms. Rukshana Sholapurwala.¹¹⁹¹

DIAGNOSIS

A child with LD is one who does poorly in academics because of impaired ability in learning the academic skills of reading, writing, arithmetic, and spelling. To diagnose SLD, such impairment should not be because of Intellectual Disability, subnormal intelligence, neurological disorders, visual/hearing acuity problems or inadequate schooling, but represent a specific and circumscribed type of dysfunction in cognitive processing.

In contrast to general learning difficulties that cut across different domains (academic and nonacademic), children with specific learning difficulties possess average to

above-average levels of intelligence across many domains of functioning, but have specific deficits within a narrow range of academic skills. In other words, this label is considered only for children whose performance is significantly below that expected (usually 2 classes below) based on their general capacity to learn. Thus, the concept of unexpected academic difficulty is central to the definition of SLD. The extent and severity of difficulties may vary from child to child. In fact, most children with SLD have only milder forms of disability.

Using the Rutter's multi-axial diagnosis will provide a better understanding about the child's problems and in setting up an effective treatment plan.

For example:

- Axis 1: Attention Deficit Hyperactivity Disorder
- Axis 2: Specific Developmental Disorder of Scholastic Skills
- Axis 3: Average intellectual functioning
- Axis 4: Nil
- Axis 5: Punitive parenting.

DIFFERENTIAL DIAGNOSIS

Prior to diagnosis of SLD, the evaluation should rule out the following conditions as primary causes of poor academic performance:

1. Borderline intelligence
2. Intellectual disability
3. Attention deficit hyperactivity disorder
4. Autism spectrum disorder
5. School absenteeism due to general medical conditions
6. Psychiatric disorders including mood disorders, anxiety disorders, and psychosis
7. Discrepancy between mother tongue and medium of schooling
8. Inadequate facilities for schooling
9. First-generation learners with poor social support
10. Hearing impairment
11. Visual impairment
12. Neurological disorders, for example, myopathy and writer's cramp.

Early identification of children at-risk

It is important to identify children at-risk for SLD. The National Joint Committee on Learning Disabilities, USA suggests that risk indicators must be checked in any screening evaluation. Table 6 lists the Risk indicators that must be included in screening for at-risk children.

There are screening tools available to assist in early identification. One of the recent tools that has been used in India is Specific Learning Disability–Screening Questionnaire. This can be used in the school setting by teachers.^[20] Recently a Dyslexia Assessment for Languages of India (DALI)^[21] a comprehensive screening and assessment

battery for children with or at risk for dyslexia, between the classes of 1–5 has been developed by Dr. Nandini Singh and team at NBRC with support from Department of Science and Technology, Government of India. DALI has two screening tools: Junior Screening Tool for classes (1–2) (5–7 years). And middle screening tool for classes (3–5) (8–10 years). In addition, there are 8 Assessment Batteries and includes testing in English and the mother tongue. This helps in separating between dyslexia and language difficulties. A sample of report is below [Figure 1]. DALI has been standardized and validated across four languages (Hindi, Marathi, Kannada and English) across schools at five centres (4840 children from classes 1–5). Work is ongoing to extend till grade X and include mathematics. The number of languages will now cover Bengalee, Urdu and Tamil.

MANAGEMENT

The psychiatrist is oftenthe primary contact person who suspects, assesses, screens for SLD and evaluates for co-morbidities and treats them. The psychiatrist can also suggest simple handy remediation techniques outlined below. Additionally, in ideal circumstances a multi-disciplinary team (psychologist, special educator occupational therapist, language speech therapist and pediatrician) would be useful in the holistic evaluation and management of these disorders. Management implies helping with the core deficits of the disorder, its negative impact on child and family and treating the associated comorbidities. An overview of management of Learning disorders has been discussed in Table 7.

Management of core deficits of disorder:

Interventions can be classified as

1. Accommodations which facilitate the student to access the educational material. This decreases the burden and stress on the child. They include larger size pen/pencils, use of grippers, special papers which provide tactile feedback, use of spell checkers, audio books, and technological devices. The later may include voice recognition devices, touchpad devices, and calculators. Individualizing assessments in terms of time, length and allowance for breaks can be planned. The child may be provided with special services in resource room while being mainstreamed
2. Modification is where the task and academic expectations from child are changed. Change in the delivery, content, or instructional level of subject matter or tests are implemented. This could include oral assignments, writing in short, may focus either on content or spelling, not having to read aloud and extra time, learning lower level of mathematics or dropping a language
3. Remedial Education is being a process to help the child acquire age appropriate skills in all his foundation areas which are required for attaining knowledge at his pace and potential. Interventions need to be systematic,

Table 6: Risk indicators for specific learning disorder

| |
|--|
| Perinatal conditions |
| Low Apgar scores |
| Low birth weight and/or preterm birth |
| Hospitalization for longer than 24 h in a neonatal intensive care unit |
| Difficulty with suckling, sucking, and swallowing |
| Chronic otitis media that may result in intermittent hearing loss |
| Genetic or environmental conditions |
| Family history of SLD |
| Family history of speech/language delays |
| Exposure to environmental toxins or other harmful substances |
| Limited language exposure in home, childcare, and other settings |
| Developmental milestones |
| Delay in cognitive skills |
| Not demonstrating object permanence |
| Limited understanding of means-ends relationships (e.g., using a stool to reach a cookie jar) |
| Lack of symbolic play behaviour |
| Delay in comprehension and/or expression of spoken language |
| Limited receptive vocabulary |
| Reduced expressive vocabulary (“Late talkers”) |
| Difficulty understanding simple (e.g., one-step) directions |
| Monotone or other unusual prosodic features of speech |
| Reduced intelligibility |
| Infrequent or inappropriate spontaneous communication (vocal, verbal, or nonverbal) |
| Immature syntax |
| Delay in emergent literacy skills |
| Slow speed for naming objects and colours |
| Limited phonological awareness (e.g., rhyming, syllable blending) |
| Minimal interest in print |
| Limited print awareness (e.g., book handling, recognizing environmental print) |
| Delay in perceptual-motor skills |
| Problems in gross or fine motor coordination (e.g., hopping, dressing, cutting, stringing beads) |
| Difficulty colouring, copying, and drawing |

SLD – Specific learning disorder

well-structured and multi-sensory. They should include direct teaching, learning and time for consolidation. Repeated revision is to be factored in as attention is variable. It should be child centric, strategy taught for learning the content, focus on strengthening the basics. Research has shown to be effective, the intervention should be intensive 2–3 times a week and either at individual level or in a small group (1–2), using an explicit and systematic instruction in phonological awareness and decoding skills. Following improvement, 50% children maintain gains for 1–2 years. This is more so when intervention is early (6–8 years). Usually fluency improves rather than comprehension. Children who improve continue to show further improvement over next few years. Changes in brain occur with remediation^[22] and which reflect plasticity of the brain.

Depending on the type and severity of the problem, an individual educational plan is made for the child. Flowchart for the process of individual educational plan is shown in Figure 2.



Figure 1: An example of a report of DALI

The intervention planned is determined by the age/grade of child and the severity and type of deficits and strengths. Usually it is 2–3 times a week for 3–4 years. In early years, developing language skills and basic skills of reading, writing and mathematics are the area of focus. In middle school besides basic skills, children need to learn concepts, critical thinking and problem solving. In secondary school accommodations and modifications to help the child to cope become more prominent. Whilst educational interventions are on the plan must also include components for the socio emotional development of child. Choice of techniques depends on the areas affected [Figure 3].

SPECIFIC EDUCATIONAL STRATEGIES

Reading

In problems of decoding (usually referred to as dyslexia), phonological awareness needs to be increased. That is the ability and understanding to manipulate the sound structure of words. Emphasis is paid on phonemes, which is the smallest unit of speech, e.g., k in kit, b in bat. Phonemic awareness includes ability to hear and manipulate individual phonemes.

Phonemic awareness includes activities such as

- Isolation, the training is in recognizing the individual sounds in words. (tell me the first sound in the letter hat)
- Phoneme identity: The ability to distinguish the common sound in differing words (tell me the sound that is same in pod and pan)
- Phonemic substitution: Replacing one phoneme for another to create a new word (cat-mat, bad-bat)
- Oral segmenting is being able to break the word into different sounds (ban b/a/n)
- Oral blending is joining the sounds to form words (c/a/n is can).

Besides phonemic awareness, letter sound knowledge is remediated. Phonics instruction works on letter sound correspondence and spelling patterns which helps in reading. To be effective it should be in conjunction with word recognition and reading books. Repeated oral reading practice may help in improving fluency. Reading comprehension skills are linked to larger language comprehension skills and needs to be developed.^[23]

Writing

Writing is more complex skill than reading and it may co-occur with reading disorder or independently. Eye hand coordination and ability to segment phonemes is essential.^[24] The basic motor functioning is enhanced using hand exercises such as working with clay, beading and finger tapping. To improve spelling, phonics instruction and teaching of letter writing is used (following numbered arrow cues, hiding letter and visualizing writing letter, utilizing the numbered cues to write letter and finally checking the

letter as compared to sample). To master automaticity the ability to retrieve letters, educational games and activities are useful. To target higher order skills of writing an essay, which involve planning, organizing, reviewing and editing skills, practice using concept maps and different aids and strategies are employed. Writing clubs and self-regulated strategy development have shown to be useful.^[25]

Mathematics

Number sense is deficient in children with dyscalculia. Educational strategies include practicing number syntax (linking numbers to related digits; e.g., 1234, one corresponds to thousand, two to hundreds, three to tens and 4 to units). Repeated additions help in internalizing the number line. Drill and practice also help to remember number facts. Verbalization of arithmetic concepts, procedures and operation is helpful as is explicit instruction.^[26]

Many remedial programs are developed, they usually work with children with reading and writing difficulties (Sunday system) or with children with mathematic difficulties (Number race, Graphogame).^[27]

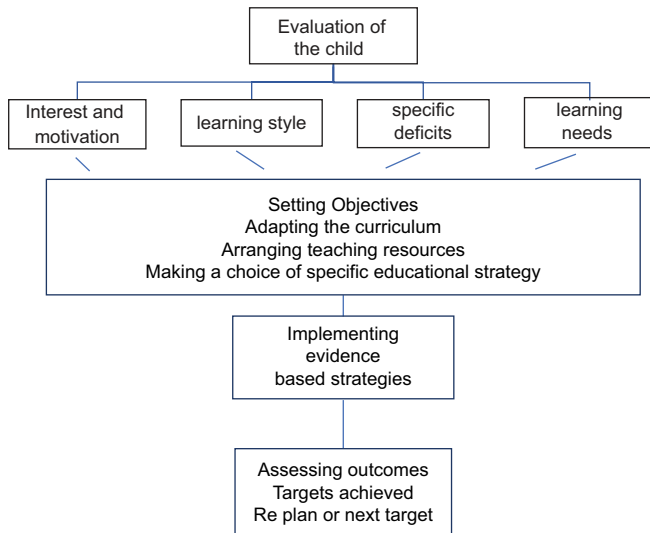


Figure 2: Flowchart for the process of individual educational plan

SPECIAL AREAS

Children with poor language skills

Many children who are first generation learners or have poor exposure to English language would have added difficulties in all aspects of academic achievement. These children are often overidentified as suffering from SLDs. Sometimes both

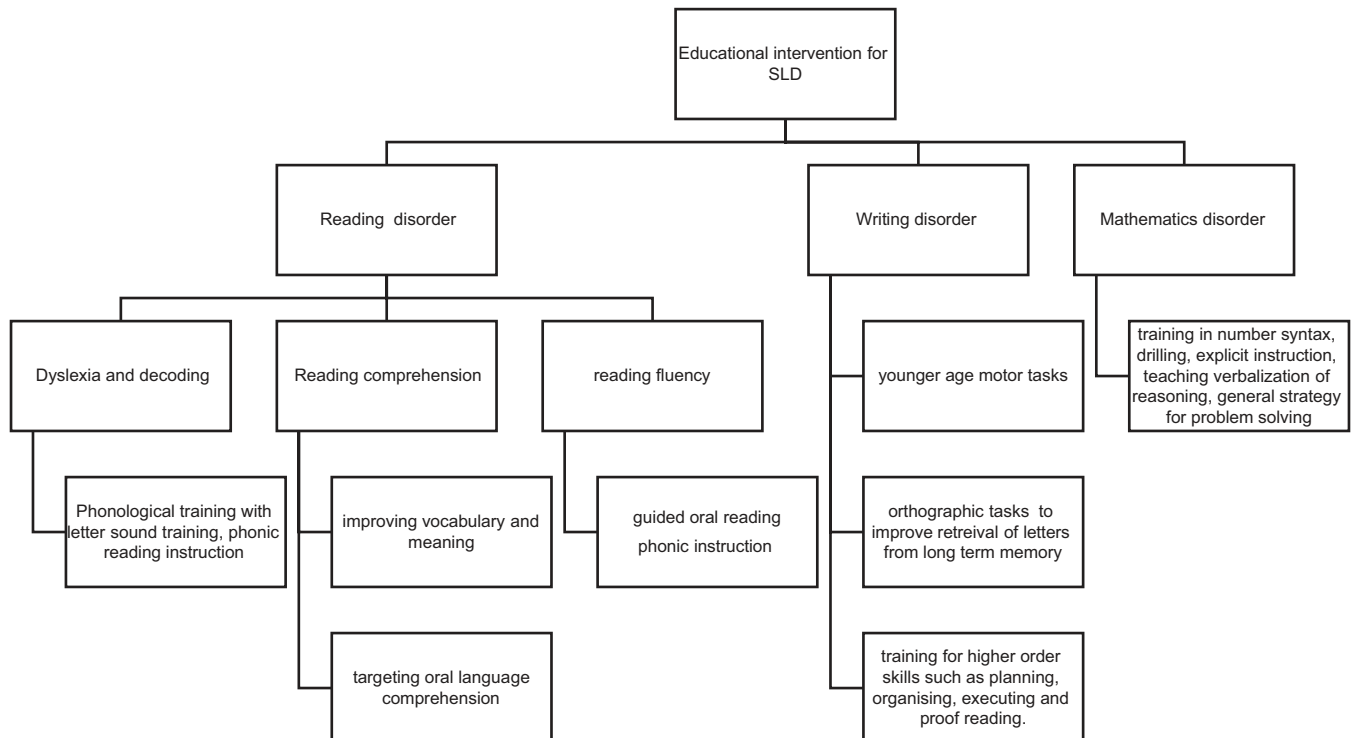


Figure 3: Flowchart for interventions for specific learning disorders

Table 7: Overview of management

| Management | Focus | Plan | Other factors |
|--|--|--|--|
| Determining the type of SLD and its impact | Academic intervention | Remediation with individualized education plan | Accommodation and modifications Classroom interventions Family education and support/therapy |
| Determining the associated comorbidity | Medical and psychological intervention | Medication, psychotherapy | Classroom interventions Family education and support/therapy |

SLD – Specific learning disorder

Table 8: Various provisions for specific learning disorder an example from Maharashtra

| Provisions | 10 th standard | | | 12 th standard | Degree colleges* |
|--|---------------------------|------|------|---------------------------|------------------|
| | SSC | ICSE | CBSE | | |
| 1 Nearest examination center of student's choice | √ | √ | √ | √ | √ |
| 2 Total 20 grace marks in either 1 subject or maximum of 3 subjects will be given | √ | √ | √ | √ | √ |
| 3 Answer books have to be sent in separate covers | √ | √ | √ | √ | √ |
| 4 Student will get 25% additional time to write exams | √ | √ | √ | √ [#] | √ |
| 5 Teachers who supervise are requested to read out the question paper as and when the student needs help (dyslexia) | √ | √ | √ | √ | √ |
| 6 Student can opt to get a writer/amanuensis at the time of examination (dysgraphia) | √ | √ | √ | √ | √ |
| 7 Student will be condoned from spelling mistakes/errors (dyslexia/dysgraphia) | √ | √ | √ | √ | √ |
| 8 Student will be exempted from directional mistakes in maps, drawing figures, maps, charts, diagrams, graphs, etc., and marks will be based on rest of the paper (dyslexia/dysgraphia) | √ | √ | √ | √ | √ |
| 9 Allowed to use the calculator (dyscalculia) | × | √ | √ | - | - |
| 10 Student can opt to take can opt to do standard VII arithmetic with one work experience subject (dyscalculia) | √ | × | × | - | - |
| 11 Student can opt to drop mathematics and can take any other subject (dyscalculia) | × | √ | √ | - | - |
| 12 Student can opt to drop science and can take physiology, hygiene, home science instead of regular science (dyslexia/dysgraphia/dyscalculia) | √ | √ | √ | - | - |
| 13 If the student opts for regular science, instead of practical examination in science and technology (Part I and Part II) oral examination will be allowed (dyslexia/dysgraphia/dyscalculia) | √ | √ | √ | - | - |
| 14 Permitted to opt avoid appearing for practical but should submit certificates of having completed the concerned course of studies from related authorities in subjects such as practical work-experience, social service, technical subjects, etc., (dyslexia/dysgraphia) | × | × | × | √ | - |
| 15 Student can opt to drop 1 language and do 1 work experience subject instead (dyslexia/dysgraphia) | √ | √ | √ | √ | √ |

Government aided/professional and nonprofessional colleges in nonagricultural universities/engineering/polytechnics and teachers training colleges, #Student will get an extra half hour (30 min) time for each examination paper. Used with permission from Shah HR, Trivedi SC. Specific learning disability in Maharashtra: Current scenario and road ahead. Ann Indian Psychiatry 2017;1:11-16. √ – Provision available; × – Provision not available

may occur. However, for these children, besides the specific intervention, English enrichment program would be very useful.

Use of technology

Assistive devices help children overcome obstacles and save time. Technological tools can vary from voice recognition programs (users dictate ideas and watch them appear on their computer screens) recording devices, word processors, concept mapping tools, smart pens and educational apps. There is software specially designed for children with SLD. (Grahphogame). Use of universal design allows easy access for children with SLD, whilst a child who has severe difficulties may use a computer to write, it would be helpful to encourage the child to try and write as brain activity is better with this. Similarly, learning basic concepts of maths are useful for daily life.

Choice of curriculum

In India, there are various boards running different curriculum, such as State Boards, Indian Council of secondary education, Central Board of secondary education, National Open school and international ones such as International baccalaureate. Each of these boards have varying educational standards, teaching learning methods, choice of subjects

and help children with disability. Based on these factors, parents and teachers may consider shifting of curriculum.

In first generation learners, low socio-economic status may add to the disorder especially when the child is not being educated in the mother tongue. SLD has shown to have similar universal neuropsychological features across alphabetic (English, Hindi) and logographic (Chinese) orthographies. Depending on the regularity of the language the difficulty would vary. Hindi is more consistent than English, that is alphabets and sound match more consistently in Hindi than English. However, changing the medium of instruction should only be attempted in the early years. Academic provisions are given to children with Learning disorder as described in Table 8.^[6]

Mitigating the impact of specific learning disorder

Psychoeducation of the family and explaining the disorder to the child would be necessary. Family counselling may also be required to combat the negative attitudes and behavior.^[28] Low self-esteem which is a common finding will require specific intervention.^[29] Protective factors that foster resilience are useful and include self-advocacy tools, identifying strengths, and improving social connections.^[10]

Managing comorbidity

Comorbidity is a rule rather than an exception. Some may be the presenting illness (attention deficit hyperactivity disorder [ADHD]/autism spectrum disorder), some may be a consequence (depression) and some may be blended with the disorder (anxiety and behavioral symptoms) However, research on treating comorbidities is limited as most studies use this as exclusion criteria.

ADHD is a frequently occurring disorder and requires treatment even before assessing as it interferes with the results. Treatment of both disorders is required simultaneously though it may not lead to additive effect. Pharmacotherapy for ADHD has had a varying effect on the reading disability.^[10] Cognitive behavior therapy and mindfulness meditation is shown to improve the emotional health with the latter also improving attention.^[10] Anxiety, depression, disruptive behavior disorder, impulsive behavior, autism, conduct disorders and other SLD also require the appropriate intervention. Flowchart of an overview of assessment and management is shown in the Figure 4.

PREVENTION AND PREDICTION

Cognitive skills that predict literacy are letter sound knowledge and phoneme awareness. Whilst as a group these may be differentiating factors, translating this at the individual level to predict is not easy.^[30] A well-trained teacher would be able to identify children who are struggling. This could be supported with checklists. In the USA, response to intervention is used both for prevention, treatment and detection. This model which is depicted in Figure 5, would start treatment before identification or failure sets in. This could be encouraged in schools and may integrate help from Sarva Shiksha Abhiyan. The early intervention for at risk children for dyslexia could be phonological skill training.

Besides phonological processes, communication impairment and deficits in naming speed (measured by RAN) are predictive of future SLD. Language impairments are a risk for reading comprehension difficulties in the future. Poor readers often come from large families and poor reading skills in parents. Better outcomes for decoding are seen when parents teach print concepts and for comprehension when parents share reading with offspring. With intervention, over half to three quarters children improve. This early intervention also prevents complication of developing poor reading fluency and comprehension.^[22]

LAW AND SPECIFIC LEARNING DISORDER

SLD is one of the benchmark disabilities encompassed in the Rights of Persons With Disability Act, 2016 and which ensures the following:^[31]

- Government and local authorities are required to ensure that children with benchmark disabilities will have

access to free education in an appropriate environment (till 18 years of age). In SLD, it has been difficult to quantify the disability

- Government institutions of higher education and other higher education institutions receiving aid from the Government shall reserve not <5% seats for persons with benchmark disabilities (which includes specific LD) and upper age relaxation of 5 years for admission in institutions of higher education
- In Government establishment, not <4% of the total number of vacancies in the cadre strength in each group of posts is meant to be filled with persons with benchmark disabilities of which, 1 percent each shall be reserved for persons with particular benchmark disabilities and one of which is specific LD.

ROLE OF PSYCHIATRIST IN SCHOOLS REGARDING SPECIFIC LEARNING DISORDER

The role of the psychiatrist includes the following:

1. Enlist the engagement of school by making them empathetic to needs of child, advocate for child in school
2. Psychoeducation the teachers
3. Facilitate screening in school

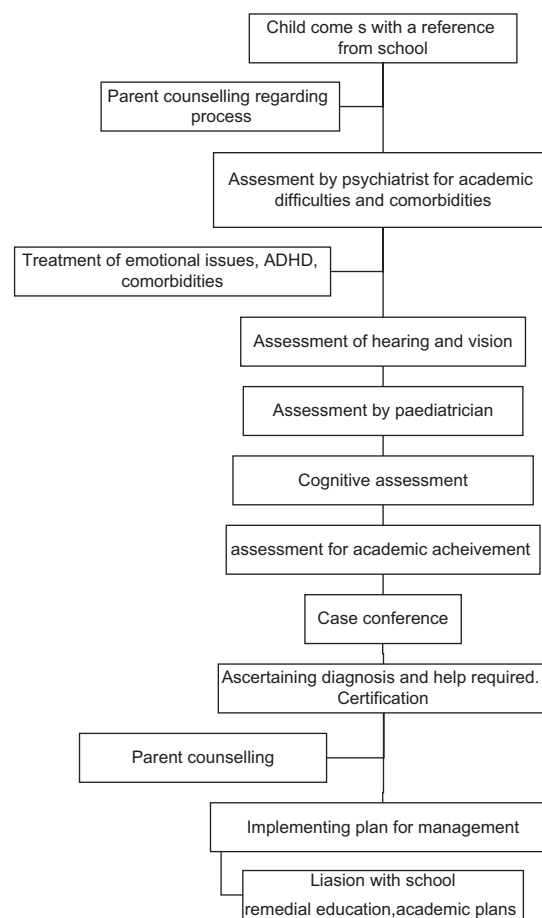


Figure 4: Flowchart for overall process in assessment and management

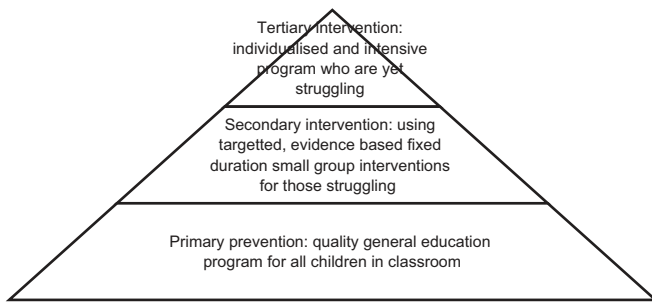


Figure 5: The response to intervention model

4. Create agreement with goals acceptable to all stakeholders
5. Mobilizing the school system to help the child and empowering them to do so
6. Raising awareness about social, emotional, behavioral symptoms associated with SLD. Training teachers to identify, refer and use classroom management strategies
7. Refer, introduce for further resources
8. Certification of the disability. A format is supplied by RWPDP rules^[32] and depicted below (the RPWD identifies the paediatrician as a certifying physician. The Indian Psychiatry has made a representation to the concerned ministry for the inclusion of a psychiatrist).

FORM-VII

Disability Certificate

Certificate No. _____ Date:- _____

This is to certify that I have carefully examined
 Shri/Smt./Kum. _____
 Date of Birth () _____ Age Years. _____ Male/female:- _____

Registration No. _____ Permanent resident of
 House No. _____ Ward/Village/_____/_____
 street _____ Post Office _____ District _____
 State _____ . Whose photograph is affixed above and am satisfies that he/she is a case of **Specific Learning Disability**. His/her extent of percentage physical impairment/disability in has been evaluated as per guidelines and is shown against the relevant disability in the table below:-

| Disability | Affected Part of Body | Diagnosis | Permanent physical impairment/mental disability (in %) |
|----------------------|-----------------------|-----------|--|
| Locomotor disability | N.A | ----- | ----- |
| Muscular Dystrophy | N.A. | ----- | ----- |
| Leprosy Cured | N.A. | ----- | ----- |
| Cerebral Palsy | N.A. | ----- | ----- |
| Acid Attack Victim | N.A. | ----- | ----- |
| Low Vision | N.A. | ----- | ----- |
| Deaf | N.A. | ----- | ----- |
| Hard of Hearing | N.A. | ----- | ----- |

Contd...

| Disability | Affected Part of Body | Diagnosis | Permanent physical impairment/mental disability (in %) |
|--------------------------------|-----------------------|-----------|---|
| Speech and Language Disability | N.A. | ----- | ----- |
| Intellectual Disability | N.A. | ----- | ----- |
| Specific Learning Disability | ----- | ----- | Specific Learning Disability is a permanent developmental disorder. Currently there are no standard approved methods to quantify the disorder. However the method of diagnosis is based on history of testing. Thus a disorder that is diagnosed implies a disability amounting to not <40% |
| Autism Spectrum Disorder | N.A. | ----- | ----- |
| Mental Illness | N.A. | ----- | ----- |
| Chronic Neurological Condition | N.A. | ----- | ----- |
| Multiple sclerosis | N.A. | ----- | ----- |
| Parkinson's disease | N.A. | ----- | ----- |
| Haemophilia | N.A. | ----- | ----- |
| Thalassemia | N.A. | ----- | ----- |
| Sickle cell disease | N.A. | ----- | ----- |

(Please strike out the disabilities which are not applicable)

2. The above condition is progressive/non- progressive/ likely to improve/not likely to improve.
3. Reassessment of disability is:
 - (i) not necessary.
 - Or
 - (ii) is recommended/after _____ years _____ months. And therefore this certificate shall be valid till (DD/MM/YY) _____ .
 @- e.g. Left/Right/both arms/legs
 #- e.g. Single eye/both eyes
 €- e.g. Left/Right/both ears
4. The applicant has submitted the following documents as proof of residence:-

| Nature of document | Date of issues | Details of authority issuing Certificate |
|--------------------|----------------|--|
| | | |

(Authorised Signatory of notified Medical Authority)

(Name and Seal)

Countersigned



(Countersignature and seal of the CMO/Medical Superintendent/Head of Government Hospital, in case the certificate is issued by a medical authority who is not a government servant (with Seal))

Note: In case this certificate is issued by a medical authority who is not a government servant, it shall be valid only if countersigned by the chief Medical Officer of the District.”

Note: The principal rules were published in the Gazette of the India vide notification number S.O. 908 (E), dated the 31st December, 1996.

Acknowledgement

Dr. Manisha Gaur for her input on remedial techniques. Masarrat Khan, Simran Sachdev Arora, Ruchi Brahmachari for their input for Table 5.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Kirk SA. Educating Exceptional Children. Oxford, England: Houghton Mifflin; 1962.
- Bateman B. An educational view of a diagnostic approach to learning disorders. In: Hellmuth J, editor. Learning Disorders. Vol. 1. Seattle, WA: Special Children Publication; 1965. p. 219-39.
- World Health Organization. The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines. Geneva: World Health Organization; 1992.
- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Arlington, VA: American Psychiatric Association Publishing; 2013.
- Sahoo MK, Biswas H, Padhy SK. Psychological co-morbidity in children with specific learning disorders. J Family Med Prim Care 2015;4:21-5.
- Shah HR, Trivedi SC. Specific learning disability in Maharashtra: Current scenario and road ahead. Ann Indian Psychiatry 2017;1:11.
- Margari L, Buttiglione M, Craig F, Cristella A, de Giambattista C, Matera E, *et al.* Neuropsychopathological comorbidities in learning disorders. BMC Neurol 2013;13:198.
- Halperin JM, Gittelman R, Klein DF, Rudel RG. Reading-disabled hyperactive children: A distinct subgroup of attention deficit disorder with hyperactivity? J Abnorm Child Psychol 1984;12:1-4.
- Karande S, Satam N, Kulkarni M, Sholapurwala R, Chitre A, Shah N, *et al.* Clinical and psychoeducational profile of children with specific learning disability and co-occurring attention-deficit hyperactivity disorder. Indian J Med Sci 2007;61:639-47.
- Hendren RL, Haft SL, Black JM, White NC, Hoefft F. Recognizing psychiatric comorbidity with reading disorders. Front Psychiatry 2018;9:101.
- Chaudhary AK, Meghwal J. A study of anxiety and depression among learning disabled children. Psychology 2015;5:484-6.
- Fristad MA, Topolosky S, Weller EB, Weller RA. Depression and learning disabilities in children. J Affect Disord 1992;26:53-8.
- Prior M, Smart D, Sanson A, Oberklaid F. Relationships between learning difficulties and psychological problems in preadolescent children from a longitudinal sample. J Am Acad Child Adolesc Psychiatry 1999;38:429-36.
- Poletti M. WISC-IV intellectual profiles in Italian children with specific learning disorder and related impairments in reading, written expression, and mathematics. J Learn Disabil 2016;49:320-35.
- Panicker AS, Bhattacharya S, Hirisave U, Nalini NR. Reliability and validity of the NIMHANS index of specific learning disabilities. Indian J Ment Health 2015;2:175-81.
- Ahmad FK. Exploring the invisible: Issues in identification and assessment of students with learning disabilities in India. Transcience 2015;61:91-107.
- Unni JC. Specific learning disability and the amended “Persons with disability act”. Indian Pediatr 2012;49:445-7.
- Narayan J. Grade Level Assessment Device for Children with Learning Problems in Schools (GLAD). Secunderabad: National Institute for the Mentally Handicapped; 1997.
- Sholapurwala RF. Curriculum Based Test for Educational Evaluation of Learning Disability. 1st ed. Mumbai, India: Jenaz Printers; 2010.
- Sinha UK. Specific Learning Disability-Screening Questionnaire (SLD-SQ). New Delhi: Psychomatrix Corporation; 2012. p. 1-5.
- DALI. Available from: <http://www.14.139.62.22/DALI/index.php>. [Last accessed on 2018 Jun 22].
- Gabrieli JD. Dyslexia: A new synergy between education and cognitive neuroscience. Science 2009;325:280-3.
- Hulme C, Melby-Lervåg M. Educational interventions for children’s learning difficulties. In: Thapar A, Pine DS, Leckman JF, Scott S, Snowling MJ, Taylor E, editor. Rutter’s Child and Adolescent Psychiatry. 6th ed. West Sussex: John Wiley and Sons, Ltd; 2015. p. 533-44.
- Döhla D, Heim S. Developmental dyslexia and dysgraphia: What can we learn from the one about the other? Front Psychol 2015;6:2045.
- Chung P, Patel DR. Dysgraphia. Int J Child Adolesc Health 2015;8:27.
- Shalev RS. Developmental dyscalculia. J Child Neurol 2004;19:765-71.
- Price GR, Ansari D. Dyscalculia: Characteristics, causes, and treatments. Numeracy 2013;6:2.
- Shah H, Rupani K, Mukherjee S, Kamath R. A comparative study of family impact in children with attention deficit hyperactivity disorder (ADHD) and learning disability. Indian J Ment Health 2016;3:70-8.
- Lahane S, Shah H, Nagarale V, Kamath R. Comparison of self-esteem and maternal attitude between children with learning disability and unaffected siblings. Indian J Pediatr 2013;80:745-9.
- Snowling MJ. Early identification and interventions for dyslexia: A contemporary view. J Res Spec Educ Needs 2013;13:7-14.
- RPWD Act; 2016. Available from: <http://www.tezu.ernet.in/notice/2017/April/RPWD-ACT-2016>. [Last accessed on 2017 May 02].
- RWPD Act 2016 Rules. Available from: <http://www.ccdisabilities.nic.in/content/en/docs/RPwDRule2017.pdf>. [Last accessed on 2018 Dec 25].