

Clinical Practice Guidelines on Specific Learning Disorders, Assessment and Management

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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 learning disability as “an unexpected difficulty in learning one or more of one instrumental school abilities”. As per Kirk, Learning disability is a process issue which can affect language and academic performance of people of all ages which is caused by emotional disturbance, behavioural 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 (5th ed.)^[3,4] The difference between 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 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; learning disability NOS; learning disorder NOS.

DSM 5

Term used "Specific Learning disorder"

- Difficulties learning & using academic skills indicated 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 SD 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 & 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

Table 1: The differences in criteria of diagnosis of Specific Learning disorder between DSM 5 and ICD 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	Nothing specific	Diagnostic criteria to be met History

be made		School reports Psycho educational reports
Severity	Not mentioned	Mild, moderate and severe
Duration		6 months

The DSM 5 changes:

DSM 5 criteria for Learning Disorder are an overarching category and follow a spectral approach. Twin & 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.

ICD 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 to 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)

Table 2: Comorbidity with SLD:

Comorbid disorders	Prevalence	Authors
Behavioral and emotional disorders	30%	Sahoo et al, 2015 ^[5]
Attention deficit hyperactivity disorder <ul style="list-style-type: none"> • Inattention difficulties • ADHD and dyslexia 	Variable ; 10-60% 20-40%	Various studies (Margari et al, 2013 ^[7] ; Halperin JM ^[8] , 1984; Karande S, 2007 ^[9]) Sahoo et, 2015 ^[5] Hendren R et al, 2018 ^[10]
Conduct disorder	6%	Chaudhary AK & Meghwal J, 2015 ^[11]
Depressive disorder	33%	Fristad et al, 1992 ^[12]
Anxiety disorders	20-30% 28%	Prior et al, 1999 ^[13] Margari et al, 2013 ^[7]
Autism spectrum disorders and dyslexia	6%	Hendren R et al, 2018 ^[10]
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%.	Margari et al, 2013 ^[7]

Table 3: Comorbidity with SLD and the impact:

Comorbid disorders	How the comorbidity	How testing is impacted in	How is remediation is affected
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	affects SLD presentation	presence of a comorbidity	in presence of a comorbidity
Attention deficit hyperactivity disorder	<ul style="list-style-type: none"> • Behavioral issues • Poor attention span 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Hyperactivity • Disruptive in class • Frequent anger outbursts 	<ul style="list-style-type: none"> • Disinterested and irritable • Rapport building is difficult 	<ul style="list-style-type: none"> • Projecting negative feelings towards the examiner as he is perceived as an

	<ul style="list-style-type: none"> • Poor academic performance 	<ul style="list-style-type: none"> • 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 	<p>authority figure</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Disinterest in studies • Poor academic performance • Prefers to be her/himself • Poor interest • Slow in responding • Soft speech • May have a poor eye contact 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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

	<ul style="list-style-type: none"> • Low self esteem 	<ul style="list-style-type: none"> • Organisation skills are affected • Not elaborate sentences • Sadness in content • Thought productivity in essays – poverty of content in essays 	<ul style="list-style-type: none"> • Slow process
Anxiety disorders	<ul style="list-style-type: none"> • Anxiety impacts performance • Disrupts attention/information processing • Avoidance to write 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Gives up very easily • Delayed Reaction time • Answers hastily or may have hesitations • Forgetfulness • Hesitance to clarify • Organisation skills are affected
Autism spectrum disorders and dyslexia	<ul style="list-style-type: none"> • Minimal eye contact • Rigidity of thought • Difficulty in 	<ul style="list-style-type: none"> • Poor concept of time lapse • Wanting perfection • Answers to only what is asked 	<ul style="list-style-type: none"> • Social skills training should be included as well • Avoidance for Math is often seen

	<p>comprehension and completing papers in exams</p> <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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

<p>Language disorders</p>	<ul style="list-style-type: none"> • Reading difficulties often associated with non-specific 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 	<ul style="list-style-type: none"> • Reading comprehension difficulties • Omissions may be present 	<p>Work on language deficits important and needs to be implemented with remediation</p>
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	<p>comprehension difficulties</p> <ul style="list-style-type: none">• 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.		
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ASSESSMENT

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

A) 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.

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 & 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

B) 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 (BKT), Malin's Intelligence Scale for Indian Children (MISIC), Wechsler's Intelligence Scale for Children-4th Edition (WISC-IV) 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 (WRAT),Test of written language (TOWL-4), Wechsler Individual Achievement Test (WIAT), Woodcock-Johnson III/IV Tests of achievements (WJ-III), Kaufman Test of Educational Achievement (K-TEA),Peabody Individual Achievement Test-Revised (PIAT-R), Aston Index Battery.

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)
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<p>NIMHANS Index for SLD – Level I (5-7 years) & Level II (8-12 years)</p> <p>** Used in conjunction with MISIC**</p>	<p>Level I: Assessment of pre-academic skills; attention, visual and auditory discrimination, visual and auditory memory, speech, and language, Visuo-motor and language, writing and number skills</p> <p>Level II: Assess areas of attention, reading, spelling, perceptuo-motor, Visuo-motor integration, memory, and arithmetic skills</p>	<p>Clinical Psychologists, Special educators</p>	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Limited age range as it can only be used ages between 5 to 12 years • Available in English, Kannada, Hindi 	<p>Purchase from NIMHANS, Bengaluru</p>	<p>Yes</p>
<p>Wide Range Achievement Test (WRAT)-4</p>	<p>Reading Composite = Word Reading + Reading Comprehension</p> <p>Spelling</p> <p>Math Computation</p>	<p>Psychologist, Special Educator, Teacher</p>	<p>Screening of difficulties in academic areas</p> <p>Takes 15 mins-30 mins(quick assessment)</p> <p>Parallel forms allowing for retesting</p> <p>Age and Grade Based norms</p>	<p>No Applied Math assessment</p> <p>No broad writing skills assessed</p>	<p>Available on purchase/ even online purchase</p>	<p>No</p>
<p>Test of written language (TOWL-4)</p>	<p>Vocabulary Spelling Style (Punctuation and</p>	<p>Anyone with formal training in assessment</p>	<p>Helps in identifying students with writing difficulties</p>	<p>Time consuming scoring</p>	<p>Available on purchase/</p>	<p>No</p>

	Grammar) Logical Sentences Sentence Combining Contextual Conventions Contextual Language Story Construction	and English proficiency	Strong conceptual model of writing Good reliability Excellent tool to assess the progress of remediation in writing	Subjectivity in scoring procedures in some domains Between 7-8 poor discrimination Cannot be used to assess other areas of SLD except writing	even online purchase	
Wechsler Individual Achievement Test (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
Woodcock-Johnson 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	English proficiency required Subjectivity in some scoring Training needs to	Available on purchase/ even online purchase	Not standardized on the Indian population; hence, not culture friendly

			<p>years to 90 years and grade Kindergarten to grade 18</p> <p>Intra-Individual</p> <p>Comparison of scores</p> <p>Used for diagnosis of SLD</p> <p>Computerized Scoring</p> <p>Excellent tool to check progress in remediation</p> <p>Tester friendly</p>	<p>be thorough to be able to administer</p> <p>Not standardized for Indian population, hence children often test positive for difficulties in written expression and reading vocabulary and hence training is inevitable</p>		
<p>Kaufman Test of Educational Achievement (K-TEA) 3</p>	<p>Phonological Processing</p> <p>Math Concepts and Applications</p> <p>Letter and Word Recognition</p> <p>Nonsense Word Decoding</p> <p>Writing Fluency</p> <p>Silent Reading Fluency</p> <p>Math Fluency</p> <p>Reading Comprehension</p> <p>Written Expression</p> <p>Associational Fluency</p> <p>Spelling</p> <p>Object Naming Facility</p> <p>Reading Vocabulary</p> <p>Letter Naming Facility</p> <p>Listening Comprehension</p>	<p>Psychologist, Special Educator, Teacher</p>	<p>Sound Error Analysis guidelines that are normed</p> <p>Looks at all areas of IDEA</p> <p>Alternate forms good for reevaluations</p> <p>Offers recommendations for writing IEPs</p> <ul style="list-style-type: none"> • New norms for ages 4:0 through 25:11 and for 	<p>Extensive Training needed to learn the test</p> <p>American idiomatic vocabulary, hence difficult to those with limited proficiency of non-familiarity with American English</p>	<p>Available on purchase/ even online purchase</p>	<p>No, has been normed a validated on representative sample the United States.</p>

	Word Recognition Fluency Oral Expression Decoding Fluency		grades pre-K through 12			
Peabody Individual Achievement Test-Revised (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	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

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
- 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 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^[16,17].

- iBall is a test under construction at 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 (NIEPID)^[18]. 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^[19].

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, psychosis etc.
- 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 e.g.: Myopathy, Writer's cramp etc.

Early Identification of children at-risk:

It is important to identify children at-risk for SLD. The National Joint Committee on Learning Disabilities (NJCLD), 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.

Table 6: Risk indicators for SLD

A) Perinatal conditions

- Low Apgar scores
- Low birth weight and/or preterm birth
- Hospitalization for longer than 24 hours in a neonatal intensive care unit
- Difficulty with suckling, sucking, and swallowing
- Chronic otitis media that may result in intermittent hearing loss

B) 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

C) Developmental milestones

a. Delay in cognitive skills

- i. Not demonstrating object permanence
- ii. Limited understanding of means–ends relationships (e.g., using a stool to reach a cookie jar)
- iii. Lack of symbolic play behaviour

b. Delay in comprehension and/or expression of spoken language

- i. Limited receptive vocabulary
- ii. Reduced expressive vocabulary (“late talkers”)
- iii. Difficulty understanding simple (e.g., one-step) directions
- iv. Monotone or other unusual prosodic features of speech
- v. Reduced intelligibility
- vi. Infrequent or inappropriate spontaneous communication (vocal, verbal, or nonverbal)
- vii. Immature syntax

c. Delay in emergent literacy skills

- i. Slow speed for naming objects and colours
- ii. Limited phonological awareness (e.g., rhyming, syllable blending)
- iii. Minimal interest in print
- iv. Limited print awareness (e.g., book handling, recognizing environmental print)

d. Delay in perceptual-motor skills

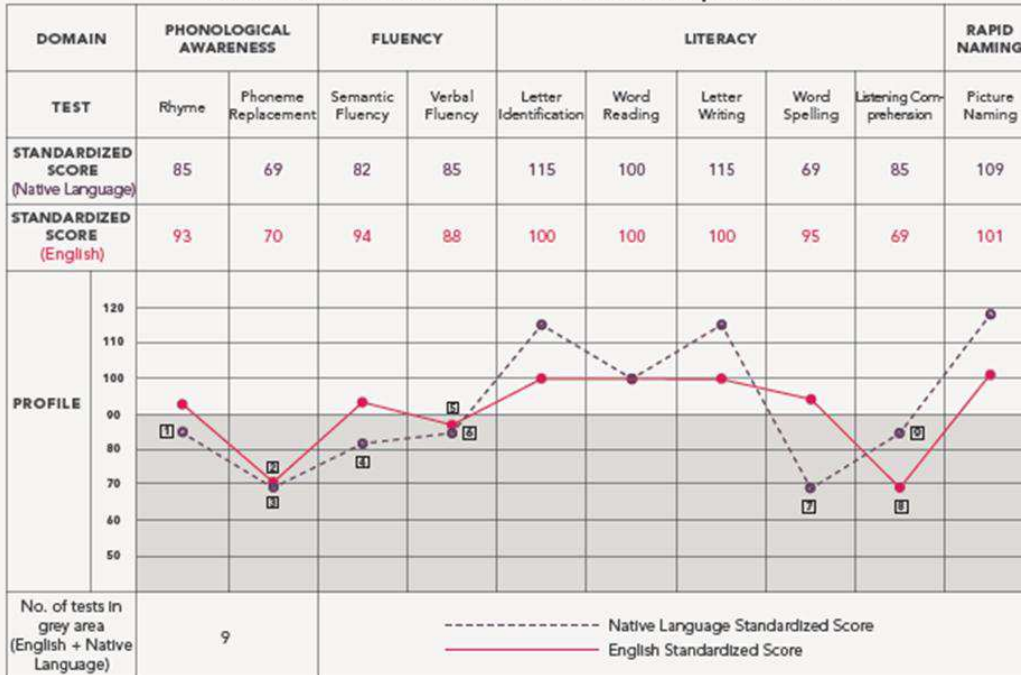
- i. Problems in gross or fine motor coordination (e.g., hopping,

- ii. Difficulty colouring, copying, and drawing

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 (SLD-SQ). This can be used in the school setting by teachers ^[21]. Recently a Dyslexia Assessment for Languages of India (DALI)^[20] a comprehensive screening and assessment battery for children with or at risk for dyslexia, between the classes of 1 to 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 (JST) for classes (1-2) (5 to 7 years). and Middle Screening Tool (MST) for classes (3-5) (8 to10 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.

Figure 1: An example of a report of DALI

LANGUAGE PERFORMANCE PROFILE | EXAMPLE



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.

Table 7: Overview of management

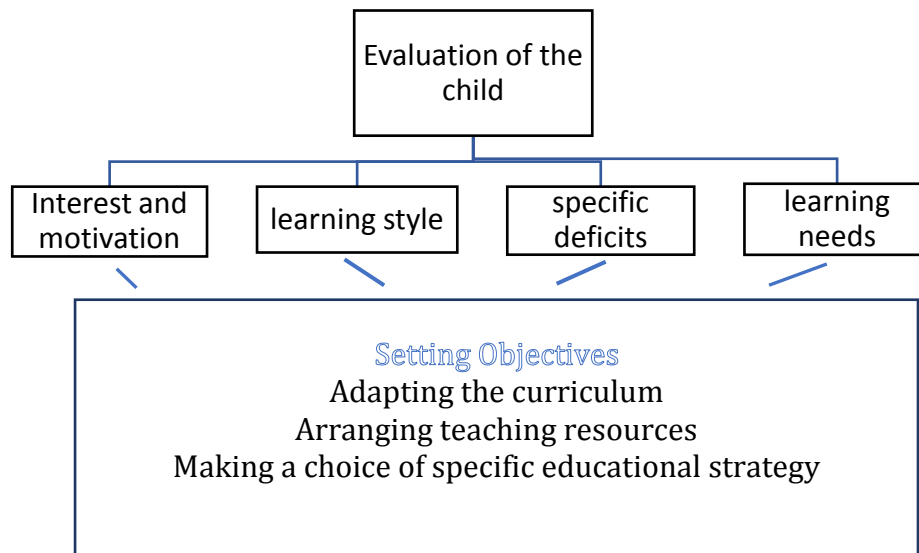
Management	Focus	Plan	Other factors
Determining the type of SLD and its impact	Academic intervention	Remediation with Individualized education plan	Accommodation and modifications Classroom interventions Family education and support/therapy
Determining the associated comorbidity	Medical and psychological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

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.

1. *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.
2. *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, 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 two-three 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 (IEP) is made for the child.



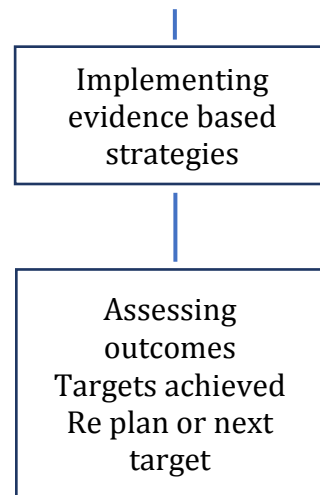


Figure 2: Flowchart for the Process of IEP

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]

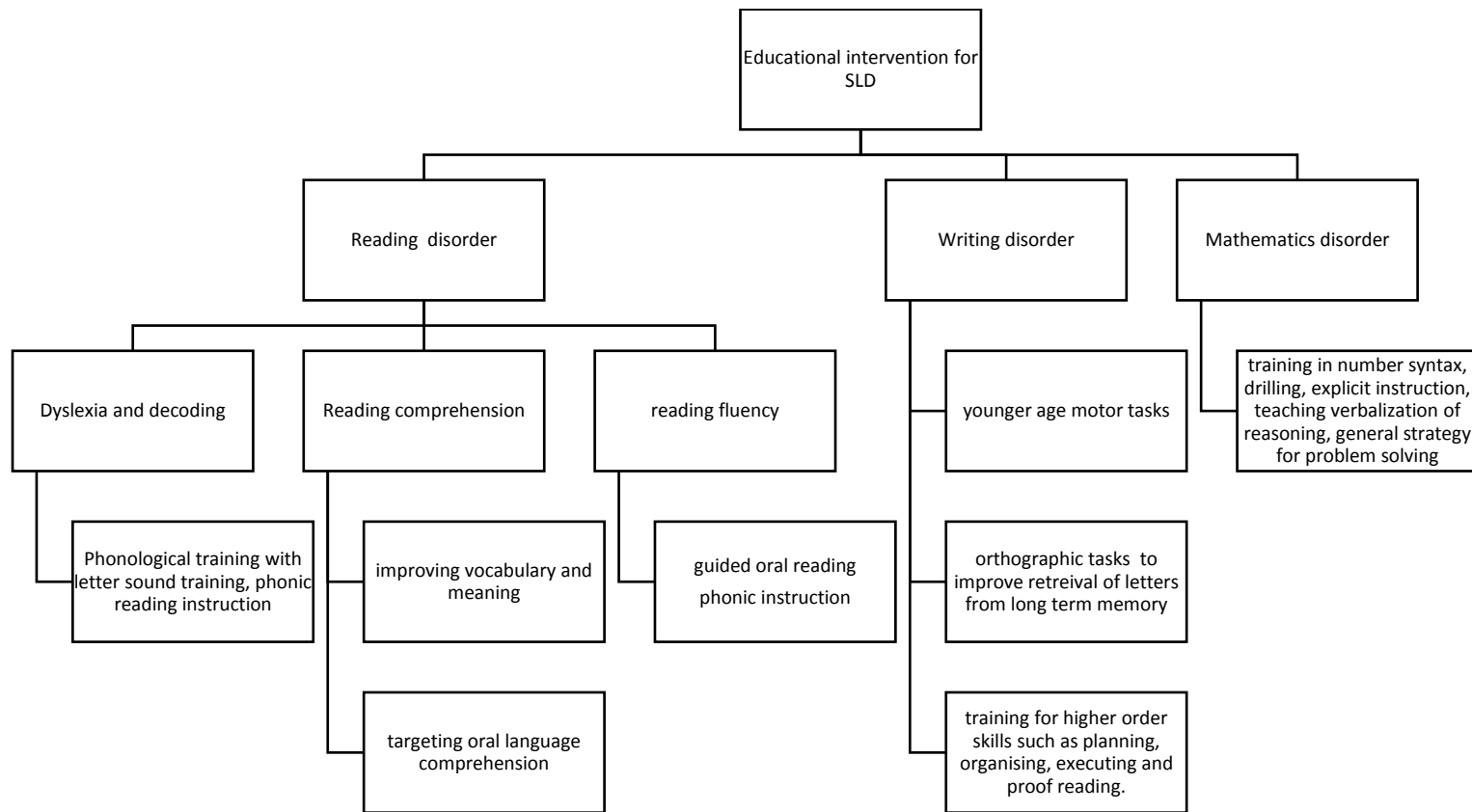
Writing

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 (Sonday system) or with children with mathematic difficulties (Number race, Graphogame).^[27]

Figure 3: Flowchart for interventions for Specific Learning Disorders:



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 specific learning disorders. Sometimes both 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.

Mitigating the impact of SLD

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 (ADHD/ASD), 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 specific learning disorder also require the appropriate intervention.

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 (RTI) is used both for prevention, treatment and detection. This model which is depicted in figure 4, 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]

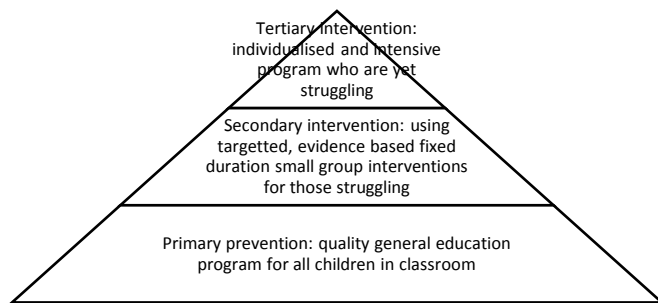


Figure 4: The RTI model

Law and SLD

SLD is one of the bench mark 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 less than 5 per cent seats for persons with benchmark disabilities (which includes specific learning disability) and upper age relaxation of 5 years for admission in institutions of higher education.
- In Government establishment, not less than 4 per cent 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 learning disability.

TABLE 8: Various Provisions for SLD an example from Maharashtra^[6]

[Used with permission from Shah, H. R., & Trivedi, S. C. (2017). Specific learning disability in Maharashtra: Current scenario and road ahead. *Annals of Indian Psychiatry*, 1(1), 11]

	PROVISIONS	10 TH STD			12 TH STD	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 Std. 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 & 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)					
14	Student can opt to drop 1 language and do 1 work experience subject instead (Dyslexia / Dysgraphia)	√	√	√	√	√

*Govt aided/professional and non-professional colleges in non-agricultural universities/engineering/polytechnics and teachers training colleges

#Student will get an extra half hour (30 minutes) time for each examination paper

Role of psychiatrist in schools regarding SLD

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
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, behavioural 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 RPWD 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 () AgeYears. 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:-

Sr. No.	Disability	Affected Part of Body	Diagnosis	Permanent physical impairment/mental disability (in %)
1	Locomotor disability	N.A.	-----	-----
2	Muscular Dystrophy	N.A.	-----	-----
3	Leprosy Cured	N.A.	-----	-----
4	Cerebral Palsy	N.A.	-----	-----
5	Acid Attack Victim	N.A.	-----	-----
6	Low Vision	N.A.	-----	-----
7	Deaf	N.A.	-----	-----
8	Hard of Hearing	N.A.	-----	-----
9	Speech and Language Disability	N.A.	-----	-----
10	Intellectual Disability	N.A.	-----	-----
11	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 less than 40%
12	Autism Spectrum Disorder	N.A.	-----	-----
13	Mental Illness	N.A.	-----	-----
14	Chronic Neurological Condition	N.A.	-----	-----
15	Multiple sclerosis	N.A.	-----	-----
16	Parkinson's disease	N.A.	-----	-----
17	Haemophilia	N.A.	-----	-----
18	Thalassemia	N.A.	-----	-----
19	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

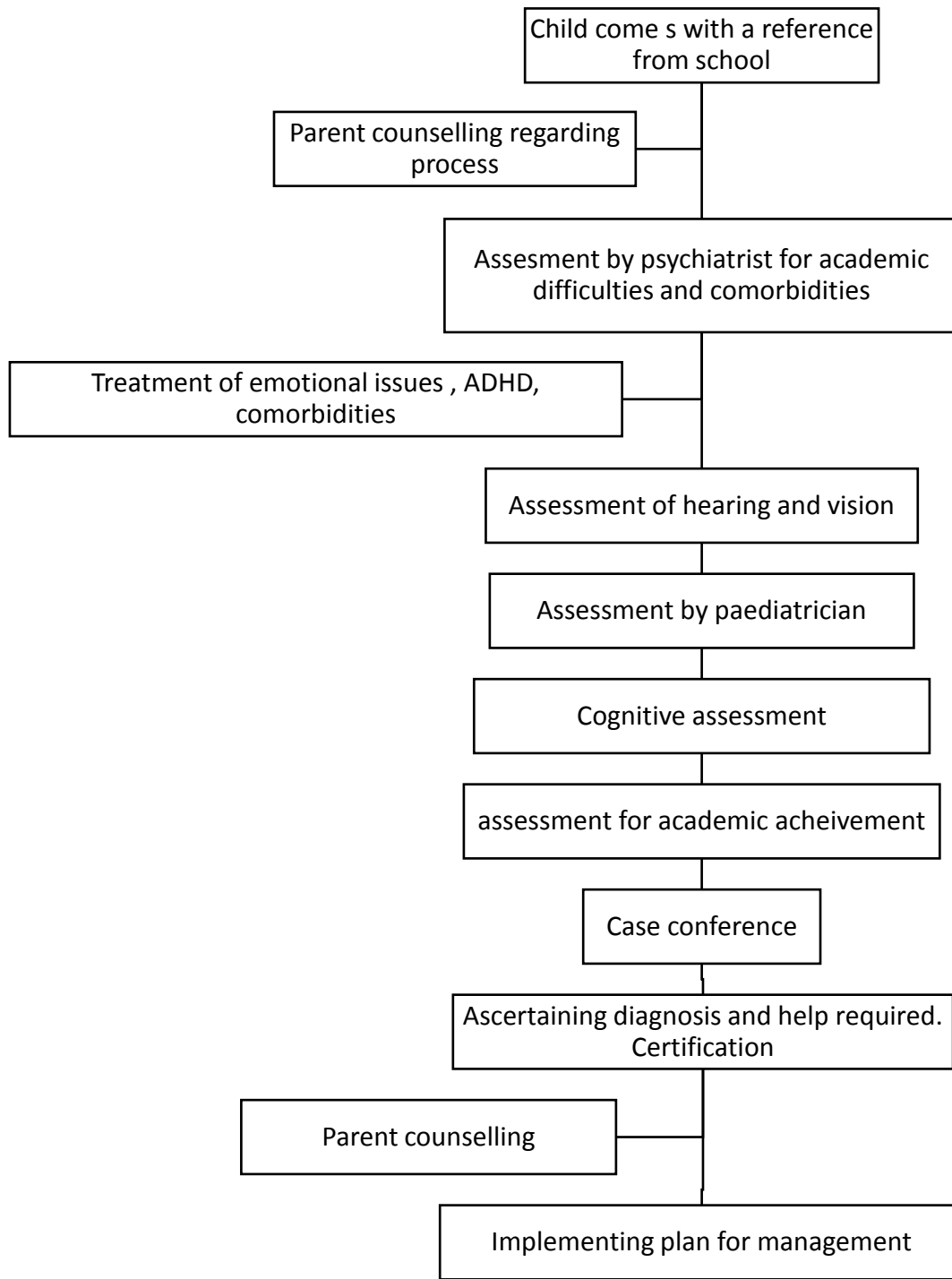


(Countersignature and seal of the CMO/ Medical Superintendent/Head of Government Hospital, in case the certificate is issued by a medical authority who is not a government servant (with Seal)

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.

Figure 5: Flowchart for overall process in assessment and management



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