

Diagnostic Decision Tree for Specific Learning Disability

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Abstract:

Learning disability is among the most abused and misunderstood upcoming conditions being identified in child clinical practice. In the absence of an official definition, combined with reliance on borrowed and offshore conceptualizations about the condition, professionals as well as parents appear to be miserably caught in the whirlpool of its diagnosis. To add to this confusion, a significant portion of the diagnostic errors result from inadequate knowledge, piecemeal observations and the absence of a complete picture on or about the condition. This paper seeks to highlight several problems and issues related to its nomenclature, definition, identification, diagnosis, classification, and formal certification of specific learning disabilities in the country. In doing so, the need for maintaining a developmental or longitudinal life span perspective is strongly recommended while undertaking differential diagnosis. A prototype on diagnostic decision making tree for specific learning disabilities is given. Its value and implications are presented and discussed in the light of recent rights based legislation that is happening in the country.

Keywords: Argument Map – Decision Trees - Diagnostic Reasoning – Clinical vs. Actuarial Judgment - Heuristic Decision Making

Diagnosis is not an all or none phenomenon. There are various levels and hues in diagnostic decision making. At level one, a complete data base on the current condition, its history, personal and social background, family and social details are important (McGann & Hutson, 2011). In the next level, commonalities are identified. This is followed by differential diagnosis which involve matching and contrasting with other similar or differing conditions. Thereafter, a decision tree is drawn to select the most likely provisional diagnosis among other coexisting or co-morbid conditions (if any). The ultimate strength of a diagnosis lies not in a mere label. It weighs on how long it lasts or how much it lends to stability of the perceived condition through program planning to the end of its interventions (Flamez & Sheperis, 2016).

Venkatesan (2016) employed a model of concept analysis (Walker & Avant, 2005) to determine the critical attributes that define Specific Learning Disability (SLD) in published articles of Indian origin to find that half of them gave no operational definition. They merely listed its features, did not use formal, standardized and psychometrically valid tools to identify such children. There was minimal agreement on nomenclature, inclusion/ exclusion criteria, official definition, diagnostic criteria, and in understanding the course, consequences or prognosis of this condition. In another comparative analysis between official definitions of learning disability, there was plurality with little agreement on what qualities characterize the condition (Venkatesan, 2017). There is confusion on what is and what not SLD in Indian context (Venkatesan, 2012). Academic problem or underachievement, scholastic backwardness, and slow learners are mistaken as SLD (Venkatesan, 2010). A retrospective cross sectional case history analysis of data on clinical presentations in children diagnosed as SLD showed how their presenting complaints vary with age/stage at which they are seen (Venkatesan & Purusotham, 2007).

The diagnosis of SLD in a given instance is not simple as using an inventory of present or absent signs and symptoms. It must take into account the cross sectional snapshot picture of the child's sensory, intellectual, social, emotional and adaptive status; as also, their current level of academic achievement. There is more exclusion than inclusion factors to be considered (Venkatesan, 2012; Rudel, 1980). It is not yet clear whether no opportunity, never tried, and/or refusal behaviors is discounted before making a final diagnosis of the condition. A majority of pupils in the country are first generation learners, lack home support, have poorly staffed schools, with little or no infrastructure, teaching aids or text book facilities. There is disparity between the language spoken at their home and medium of instruction at school. Additionally, instances of home violence, domestic discord, faulty parenting, and home discipline practices explain academic problems in some children. Undetected health or sensory issues in the learner, defective study habits or poor examination taking skills in the child cannot be mistaken as SLD (Karande & Kulkarni, 2005; Kavale & Forness, 2000).

Notwithstanding these ambiguities in identification and diagnosis of SLD in India, practice guidelines (John et al. 2013) based on an archaic definition (NJCLD, 1998) with minimum of two years schooling and assessment by use of foreign tools has been recommended. Response to Intervention (RTI), a pre-condition to diagnosis in West (Reynolds & Shaywitz, 2009; Thapa, Van Der Aalsvoort & Pandey, 2008), is suggested but neither elaborated nor mandated. It is questioned if grade discrepancy alone despite average level of intelligence, adequate schooling opportunity, good health and no sensory handicaps is sufficient to diagnose SLD (Kavale, 2002). The RTI dimension is seldom mentioned in Indian settings (Venkatesan, 2016). From the foregoing, it is apparent that attempts to bring in diagnostic decision making tools to

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identify children with SLD are sparse in our country. The time has now arrived to do this for certification of such children. A few research questions on this theme are: What will be the agreed nomenclature? What are its defining characteristics? Is there a discernable course in the varied clinical presentations of these affected children? Is there age, stage, or severity based variation in the features that characterize this condition? If so, would it require different names to identify or designate such differences? Is there any clearly discernable inclusion/exclusion characteristics that must get into the diagnostic decision making process before labeling such children? Against these questions, it is the general aim of this study to outline a provisional diagnostic decision tree as a conceptual tool for conscientious and judicious use by practitioners for identification of children with SLD. More specifically, such diagrammatic representation of diagnostic decision making is expected to be delineated across age levels, albeit with different nomenclature, diverse presenting complaints, varying inclusion/exclusion criteria for its current stage in the overall course of this prevailing condition.

I. METHOD

This study adopts a hermeneutic strategy of decision making in the context of clinical practice. This involves use of various methods of analysis based on interpretations. This contrasts research strategies which stress objectivity and independence of interpretations during the formation of knowledge. It combines historical or longitudinal and cross sectional approach with use of case-studies, records of interview and observations, and evidence based clinical research findings to attempt a proposed hierarchical scheme of decision making for diagnosis of SLD in Indian settings. The key terms used in this enquiry are: (i) Diagnostic Decision Making; (ii) Specific Learning Disability.

Operational Definitions:

'Diagnostic Decision Making' is 'a specialized form of clinical activity which culminates as the product of professional judgment based on systematic accumulation, organization and interpretation of information about an individual through several sources' (Morrison, 2004). It is not easy, simple or intuitive. Its cardinal element is discerning. It involves distinguishing one condition from another. A diagnosis conveys three things: nature of the problem (symptoms, signs and history), its cause, and changes that consistently occur as a result (Thammasitboon & Cutrer, 2012; Weiss, 2011; Schwartz & Bergus, 2008; Elstein & Schwartz, 2002). The term 'Specific Learning Disability' is preferred to designate the particular condition of diagnosis as it finds mention in the recently introduced Rights Based Disability Bill (2016).

Tools & Techniques:

A 'Decision Tree' is a supporting device. It guides its user through a series of hierarchical steps to arrive at some goal. The goal in this case is diagnostic decision making of SLD. On paper, it looks like a tree growing upside down. It involves answering several yes-no questions. Each answer determines which branch to take next. It follows an inductive-

deductive process of scientific method. The term 'algorithm' is sometimes used to designate this type of decision making. In informal logic and philosophy, the word 'argument map' or 'argument diagram' is used to designate the visual representation of the structure of an argument (Davies, 2010). It requires judgment or choosing between alternatives. Decision making in clinical practice often involve the need to make complex and intricate choices with important long term consequences (Jong-Myon, 2014; Aleem, Schemitsch & Hanson, 2008; Plionis, 2004). More specifically, information needed for the building blocks in decision tree is drawn from clinical observations and interviews, case history records, parent/caregiver reports, case studies from archives of psychological reports, proceedings of in-house seminars, discussions with professional peers on the theme and based on available literature on standard or recommended clinical practices for diagnosis of SLD.

Procedure

A decision tree typically starts at one end of the sheet of paper-usually the left-hand side before extending in a series of branches or forks. Each fork represents a decision, which may further continue to expand into sub-branches, until it generates two or more results or nodes. The tree expands or grows until at least one branch leads to a decision node or a chance node. The attribute undergoes some test or evaluation at this node. Each possible outcome of such evaluation generates a branch and sub-tree. It represents uncertain outcomes under the mercy of external forces. The steps involved in drawing a decision tree begin with identification of all decisions and their alternatives to be made and the order in which they must be made. The chance events that can occur after each decision are also noted. Thereafter, a tree diagram showing the sequence of decisions and chance events is developed. The diagrammatic representation of diagnostic decision making for SLD is delineated across age levels, albeit with different nomenclature, diverse presenting complaints, varying inclusion/exclusion criteria for a given stage during the overall course or progression of this condition. To enable the construction of the decision tree, the following key questions were posed:

- What are the different names used to designate the condition?
- Which presenting complaints are usually associated with the condition?
- What inclusion/exclusion criteria are often invoked for diagnosis of this condition?
- What typical consequences result from non-identification of the condition?
- What longitudinal course will this condition take over age in such affected children?

Answers to these questions for each child presumably affected by the condition are likely to lead to a diagnosis which is relatively dynamic and ever changing. The condition of SLD is not static and neither such affected children are. Therefore, a case specific and age based fluid approach is adopted and recommended throughout the diagnostic decision making process based on answers derived for the above questions.

II. RESULTS

The findings are presented as different headings: (a) Nomenclature; (b) Presenting Complaints; (c) Inclusion/Exclusion Criteria; (d) Consequences; and, (e) Longitudinal Course before portraying a template of decision tree model for diagnosis of SLD.

(a) Nomenclature:

SLD is known by several names officially or unofficially and historically or contemporaneously. The term 'learning', or sometimes, 'specific' is prefixed to be suffixed with 'disability' and/or 'difficulty'. For example, in the United States, students are identified with 'learning disabilities' or 'learning disorders'. In some Australian states and territories, the term 'learning difficulties' are preferred for students struggling to develop numeracy or literacy skills. Difficulty refers to hardships experienced in acquiring knowledge and skills to the normal level expected of those belonging to the same age, especially because of a mental disability or cognitive condition. Several other suffixes are also proposed or used, such as, disorder, deviance, delay, disturbance, difficulty, differences, disability, impairment and handicap. A short glossary of these terms is outlined in Table 1.

Table 1: Glossary of Terms

Snos.	Term	Meaning
1	Disease	A professional understanding of pathophysiological process constituting certain signs/symptoms in conjunction with their etiology and pathology;
2	Disorder	Represents conjunction of syndrome with clinical course;
3	Illness	Family recognition, labeling and experience of these processes as abnormal or departure from wellness;
4	Deviance	A diverging from usual or accepted social standards;
5	Disturbance	An interruption or disruption, often temporary, of a relatively settled and peaceful condition;
6	Difference	This term highlights that some people simply learn differently than others do. This term has no legal protection for the individual;
7	Developmental Delay	A condition of a child being less developed mentally or physically for his age. It is not the same thing as developmental disability although it can become so if left unidentified or untreated;
8	Child-at-risk	A vulnerability, chance, possibility or probability, and not certainty, for developing a condition. Example: Delayed speech, pronunciation problems, difficulties in understanding directionality, positions, and poor fine motor coordination indications that the child may later develop a disability;
9	Impairment	Any visible structural or anatomical loss of physical or sensory organs in an individual;
10	Disability	Any functional inability of an individual to perform any activity in the manner or within the range considered 'normal' for any human being. It is usually as a result of an impairment;
11	Handicap	Any disadvantage usually resulting or consequence of impairment and disability but emanating from the environment that limits or prevents the fulfillment of a social role that is expected for the age, gender or cultural background of an individual. A person can face handicap without any apparent impairment and disability;

The term 'learning disability' has been often used synonymously or in conjunction with terms like 'specific learning disability', 'academic problem', 'scholastic problem', 'academic underachievement', 'scholastic underachievement', 'academic delay', 'developmental dyslexia, dysgraphia, dyscalculia, and dysarthria' as against 'acquired alexia, agraphia, agnosia, acalculia, and anomia'.

More terms like 'global development delay' against 'specific development delays including receptive-expressive speech delay, specific motor delay, specific articulation disorder, phonological disorder, developmental coordination disorder', 'central auditory processing disorder, sensory processing disorder' have been used. Further, phrases like 'Intellectual and Developmental Disability', 'Developmental Disorder of Scholastic Skills', 'Academic Skills Disorder', 'Non-verbal Learning Disability', 'Specific Language Impairment', 'Infantile Speech', 'Hyperkinetic Impulse Disorder' and/or 'Education Handicap' are used in some official communication. Above all, historical terms (although now defunct) are sometimes invoked, such as, dysorthographia, reading disability, writing disability, strephosymbolia, word blindness, word deafness, amentia, minimal brain dysfunction, retardates, dumb, spastic, fools, simpletons, cretins, idiocy, imbecility, feeble-minded, moron, etc.

(b) Presenting Complaints:

The presenting complaints most frequently attributed when such children are brought for clinical consultation are: 'poor in studies', 'disinterest in academics', 'lazy', 'inattentive in class', 'lacks concentration', 'restless or overactive in class', 'refuses to sit with books', 'over playful', and others. The locus of the problem is perceived invariably as the child. Rarely, it is also attributed to peers and/or school system. In few instances, the presenting complaints are camouflaged as 'aches and pains', 'vomiting', 'dizziness', 'loss of speech', 'stammering', 'itching', and/or even, 'fits' without organic involvement. Many complaints are listed as a series of problem behaviors either directed by the child towards self or others. Examples: bangs head, cuts or mutilates self, threatens to kill self, or harms others. A perusal of the presenting complaints brings out the core characteristics of children with SLD as:

- Average or above average level of general intelligence;
- Underperform by at least 2-grades across subjects between their sitting vis-à-vis performance level (IQ-achievement discrepancy criteria);
- Minimal or no improvements made or shown despite individualized remedial instruction given for a considerable period of time (response to intervention criteria);
- Functional neuropsychological profile of assets and deficits (idiometric or ipsative assessment criteria) especially in areas, such as, abstraction, visuo-spatial reversals, logical-deductive reasoning, and others;

(c) Inclusion/Exclusion Criteria:

The diagnosis of SLD is often based on clinical and psychometric observations of children who have poor in oral, reading, writing, listening, speaking, comprehension, reasoning, solving math, using vocabulary, language and communication despite adequate exposure to school or academics. At the same time, it excludes a host of characteristics within the child, school and/or their environment (Table 2).

Table 2: Inclusion/Exclusion Criteria

S.No.	Criteria
A	Child Related
1	Poor on cognitive processes like attention, perception, memory, auditory/ visual perception, discrimination, fine or gross motor coordination, reception, storage, processing, retrieval analysis of verbal and non-verbal information, and executive functions;
2	No apparent involvement of brain on advanced neuro-radiological findings;
3	No generalized intellectual or developmental delays and disabilities;
4	No physical, sensory deficits like refractory errors, partial or total blindness;
5	No minimal, high frequency, partial or total hearing loss;
6	Absence of motivation;
7	Emotional disturbances;
8	Defective study habits;
9	Poor examination taking skills;
10	Not a first generation learner without adequate tutoring or mentoring supports;
11	No acute or chronic health issues;
B	School Related
1	Poor teaching or insufficient instruction;
2	Poor or faulty teaching methods;
3	Stress on study of portions from a higher class for pupils in lower class;
4	Public insults of the student during open parent teacher meetings;
5	Use of pressure provoking tactics like frequent or surprise class tests;
6	Discriminatory practice owing to gender, language, religion, caste or color;
7	Non-availability of text books or teaching aids;
8	Missed schooling for long periods;
9	Meddling presence of troublesome peer group;
10	Fear of school, subjects or specific teachers;
11	Use of twin text books or simultaneous practice of two medium of instruction;
12	Frequent change of schools, stream of syllabus and/or medium of instruction
C	Environment Related
1	Home, familial, social cultural or environmental deprivation;
2	Child neglect;
3	Physical, emotional, and/or sexual abuse;
4	Traumatic life events, death or bereavement on onset;
5	Abrupt weaning of academic supports by previously supportive parents;
6	Use of foreign tools or tests to diagnose;
7	Exclude Autism Spectrum Disorder, Opposition Defiant Disorder, Attention Deficit Hyperactivity Disorder, Attachment Disorder, Adjustment Disorder, or Juvenile Delinquency;

(d) Consequences:

The next question pertains to its consequences. What happens to the child as a result of SLD or, alternatively, if they remain unidentified or fall outside the ambit of a clinical diagnosis? Observed or recorded consequences are academic failure, school dropout, stagnation or detention, emotional disturbances like aggression, depression, shyness, anxiety, school phobia, fears, and lowered self esteem, behavior problems like anti-social activities, school refusal, lying, stealing, and truancy. It can show as problems in attention-concentration, over-activity, and impulsivity. It can masquerade as communication disorders like stuttering, cluttering, psychogenic voice loss, and lisping. It may manifest as poor social-emotional adjustment and psychosomatic problems like fainting, vertigo, tinnitus, bed-wetting, soiling, over eating, obesity, etc.

(e) Longitudinal Course:

A rather relatively unexplored question about pupils early suspected, identified or labeled as 'at risk' or those with 'SLD' is on what happens to them over a period of time? It is a query related to origins, course and life span development of this condition. Beginning at kindergarten level, or even before, the children likely to be diagnosed as SLD in later life

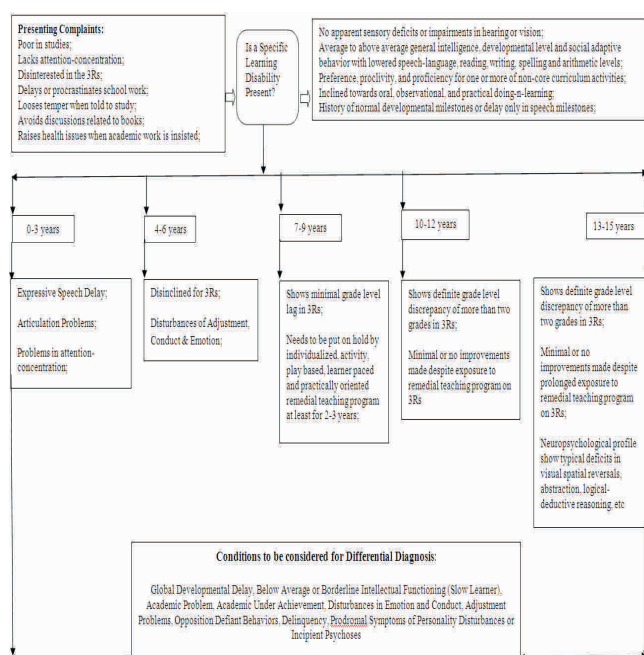
typically show expressive speech delays, before showing difficulty in pre-academic activities, especially writing, during preschool age. This is usually followed by mixed disturbances in reading, writing and spelling in primary school. The cumulative effect of these developments is academic delay and grade level discrepancy between where they are and how they are performing. The academic delays are often associated with disguised forms of emotional-behavioral problems during middle school. This is when the condition presents itself in disguised forms of externalizing or internalizing problem behaviors. Much later, during preadolescent/adolescent high school years, it manifest as neurotic disturbances like sadness, anxiety, obsessions, compulsions, and phobias, or as prodromal symptoms of newly shaping passive, aggressive, antisocial, or some such personality disorders (Venkatesan & Swarnalatha, 2013; Venkatesan & Purusotham, 2007). All this mean that there is no single-straight-line course of SLD. There is risk of misdiagnosis at every stage or age since their clinical presentations vary considerably in each case. When life span approach is adopted, it would then appear futile to search only for conventional text book descriptions of signs and symptoms of SLD across all ages, classes and/or stages in the life of affected children. In many instances, these gaps interfere in acquisition of academic concepts, thereby leading to emotional-behavior disturbances like inability to sustain attention-concentration, poor compliance for academic work, or being slow to expected speed, with general disinterest mainly for reading, writing and arithmetic.

(f) Decision Tree:

Based on the preceding, the prepared templates (Tables 3 & Figure 1) outline diagnostic decision making for SLD across ages or stages by presenting complaints and their behavior attributes. The presence of average to above average level of development, general intelligence and adaptive behavior without any sensory deficits is a common denominator across age levels. While speech-language delays is a major behavior attribute for children below three years and a little thereafter, difficulties related to writing, spelling and math are characteristic of children between four to six years. Insistence upon performance of such activities appears to manifest as poor attention-concentration and off-seat behaviors not seen when engaged in non-academic tasks. By seven-nine years, the academic delay seems to widen with concomitant increase in problem behaviors and affective disturbances. This is when, the presenting picture of must be understood as camouflage, communication or cry for help calling attention towards their underlying SLD. In the next stage between ten-twelve years, the academic delays increase so as to leave the secondary and high school student performing academically at primary grade level. However, their practical, mechanical, observational, seeing-doing skills remain intact even as they are disinclined for text book based rote learning. This is when their decade long struggle with theories and abstraction, curriculum directed and classroom oriented, or teacher dominated instructions fail, despite remedial instruction or response to teaching.

Table 3: Proposed Template for Diagnostic Decision Making of Specific Learning Disability based on Age, Stage, Presenting Complaints, & Behavioral Attributes

Age	Presenting Complaints & Behavioral Attributes	Possible Diagnosis	Exclude
0-3	Average to above average developmental levels No apparent sensory deficits as in vision and hearing Poor pointing skills for self, others, objects & pictures Does not follow commands Follows only familiar off-repeated 1-2 step instructions heavily accompanied by gestures Does not comprehend "w" questions like what, where, when, how & why Lacks speech to make narrations, summarize, paraphrase or convey messages across people Uses gestures, single word or 2-3 word level phrases to express Doesn't sit still in a place requiring attention or concentration till completion of an activity	Receptive-Expressive Speech Delay Specific Language Impairment Articulation Problem Disturbances in Attention-Concentration	Global Developmental Delay; Below Average Developmental Levels
4-6	Average to above average level of general intelligence No apparent sensory deficits as in vision and hearing Poor attention-concentration and off-seat behaviors for reading-writing activities Reduced comprehension for multiple instructions Inability to express through long 4-5 word level sentences Difficulties related to math and number work Prefers oral than writing work Grade level equivalence lower by two or more grades for 3Rs Restless and overactive for academic work Left to solitary activities since child does not appreciate turn taking and rule-based peer play	Academic Delay by 1-2 grades Child-at-Risk for Academic Problems Expressive Speech Delay	Academic Problem Academic Underachievement
7-9	Average to above average level of general intelligence No apparent sensory deficits as in vision and hearing Grade level discrepancy beyond two grades for reading, writing, spelling and math Prefers and good at oral one word answers or multiple choice questions than writing work Avoids attempting long sentence level answers Learning by direct or practical observation is better than from books or theory Problem behaviors like school refusal, truancy, lying, procrastination, delaying, angry outbursts, etc Emotional disturbances like anxiety, fears, social avoidance, shyness Behavior disturbances like stammering, body aches, vomiting, hand sweating, writer's cramp, etc	Academic Delay by 2-3 grades Behavior Disturbances	Academic Problem Academic Underachievement Emotional Disorder Conduct Disorder
10-12	Average to above average level of general intelligence No apparent sensory deficits as in vision and hearing Grade level discrepancy beyond three grades for reading, writing, spelling and math Academic delay persists despite individualized academic instructions for over two-three years Does poorly on timed writing tasks involving long answers, verbal or arithmetic reasoning Unable to solve tasks involving visuo-spatial reversals, abstract thinking and problem solving	Academic Delay with risk for Specific Learning Disability	Academic Problem Academic Underachievement Emotional Disorder Conduct Disorder
13-15	Average to above average level of general intelligence No apparent sensory deficits as in vision and hearing Normal or only speech-related developmental milestones affected Academic delay persists despite individualized academic instructions for over two-three years Poor attention-concentration, interest-motivation for academic activities More than ordinary interest, talent, and aptitude for extra curriculum activities Good at practical, mechanical, observational, seeing-n-doing skills Disinclined for text book based and rote learning	Specific Learning Disability	Emotional Disorder Conduct Disorder Opposition Defiant Disorder Delinquency Prodromal Symptoms of Personality Disorder

Figure 1: Template for Diagnostic Decision Making in Specific Learning Disability

III. DISCUSSION

There are various theoretical approaches to decision making. In the classical approach, the onus is left on decision maker. In naturalistic decision making paradigm, the stress is on rationality. Descriptive approach argues that rationality does not hold in the real world of judgment. Normative theories invoke statistical grounds for decision making. Prescriptive theories are directed toward future for forecasting. Social judgment theory is related to the environment. There are also decisions made on intuition and/or expertise. Since decision making is ubiquitous, it is assumed that diagnosticians would automatically acquire the skill by some means in the same manner as observation and case history. Available evidence suggest that it is not so. Diagnostic errors are frequent and underappreciated. An optimal decision making process has to pass through certain steps, such as, defining the objective, identification and isolation of the decision variables, identifying non-controllable factors, establishing a relationship between the factors, developing alternatives, evaluating alternatives, selection of the best alternative, implementing them, follow up and feedback (Croskerry & Nimmo, 2011).

Bhugra, Easter, Mallaris & Gupta (2011) found that no single approach to diagnostic decision making was used by psychiatrists. Many factors like level of clinical experience, time and availability of treatment influenced their diagnostic decision making. This is reiterated for behavior based fields like neuroscience and psychiatry (Meter et al., 2014; Lee, 2013). Use of decision tree to improve accuracy of diagnosis has been attempted in the field of nursing (Thompson, Dowding & McCaughan, 2004; Hamers, Abu-Saad & Halfens, 1994; Aspinall, 1979), school psychology (Barnard-Brak, Stevens, Robinson & Holt, 2013), psychiatry (Lee, 2013), clinical psychology (Garb, 2004) and counseling (Hill & Ridley, 2001). It has been also used to outline clinical pathways in assessment and management of children with ADHD (Magyary & Brandt, 2002). An actuarial approach to diagnostic decision making is shown as useful for children and youth with anxiety disorders (Meter et al., 2014). A critical set of diagnostic errors associated with failures in perception, failed heuristics, and biases; collectively called as cognitive dispositions to respond has been identified along with strategies to reduce them (Croskerry & Nimmo, 2011). Smith, Higgs and Ellis (2008) identified factors that typically influence clinical decision making, such as, incomplete dynamic information, change in decision making environments, time pressure, personal stress of multiple players, and relying on surrogate decision making. Meeks (1990) called attention to age bias in diagnostic decision making behavior of clinicians.

David and Balakrishnan (2011) used decision tree classification methods for rule generation and classification by invoking 16 attributes during data mining to diagnose children with SLD. Although the chosen list of attributes maybe contested as not being unique to the condition, the prediction of the condition in school aged children using methods for generation of a decision tree was shown with limited success. The decision tree based approach to identification and diagnosis of SLD offers a dynamic mapping background for prospective practitioners by

invoking a longitudinal life span perspective on changing presenting complaints, its causes, characteristics and consequences in given instances of such affected students. All this has relevance in the light of recent rights based legislations that is now happening in the country.

IV. CONCLUSION

In sum, a combination of life span approach, longitudinal historical analysis, argument mapping, cross-sectional concept or attribute analysis, and heuristic decision making is shown to be effective in partly unraveling the diagnostic enigma of SLD. Backed by decision theory as a conceptual tool, it can help the practitioner to holistically view all choices, clearly layout the problem, use inductive-deductive process and critical thinking skills to take the best decision for a specific case based on evidence based practice. The decision tree for SLD presented in this paper concisely summarizes substantial areas of practice in terms of progressive decision points, although not on an all-or-none basis. It can be used consistent with evidenced based practice by clinicians and practitioners to promote rigor in undertaking informed conclusions. However, as a conceptual tool, it still requires to be subjected to rigorous empirical testing awaiting appropriate research to prove it in the context of children with SLD in our country.

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