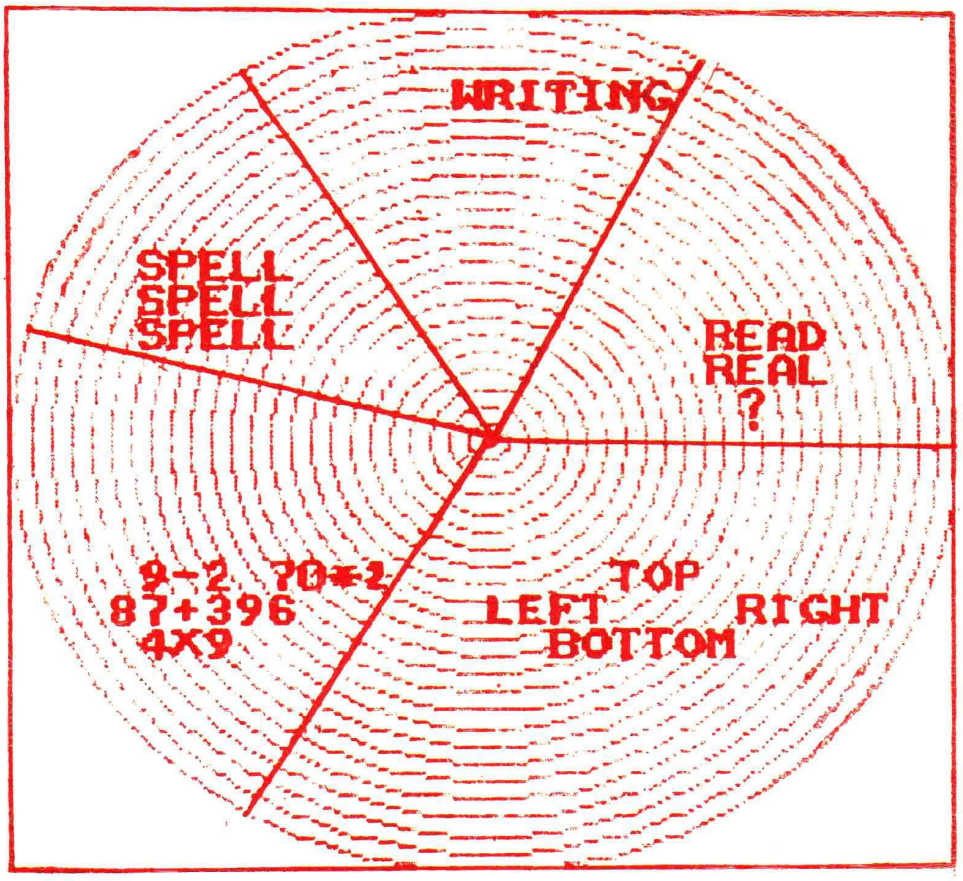
Handbook on Learning Disabilities

Dr. RAMAA S.
Professor



Regional College of Education, Mysore-570 006

[National Council of Educational Research and Training
New Delhi - 110 016]

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Nature of Learning Disability

1.1 Concept of Learning Disability :

The term 'Learninng Disability' indicates limited ability in learning. When a person is having inadequacy or limited ability in learning a wide variety of tasks involving different levels of intellectual functioning he can be considered to have general mental retardation. On the other hand if the limitation is restricted to certain areas of learning, especially language and number related areas, he can be considered to have learning disability. In order to differentiate the two kinds limitations, of the term "General Learning Disability" is suggested as a equivalent for mental retardation and the term "Specific Learning Disability" for disabilities observed only in certain areas of learning. The specific learning disabilities are usually indicated as reading disability, writing disability etc. However, in the Handbook the term "Learning Disability" is treated as synonymons to 'Specific Learning disability'.

The definitions given by various authors suggest that "Learning Disability" refers to a retardation, disorder, or delayed development in any one or more of the processes of speech, language, reading, spelling, writing or arithmetic. These problems are due to disorder or deficiency in any one or more of the basic psychological processes involved in understanding or in using spoken or written language. They do not include learning problems which are due primarily to visual, hearing or motor handicaps, mental retardation, emotional disturbance or to adverse environmental factors.

The child, thus can be considered as learning disabled if (i) he has considerable difficulty in understanding or using spoken language, reading, wrlting spelling and/or arithmetic during the developmental period (before 16 years of age), (il) he is free from visual, hearing or motor disability, mental retardation, severe emotional problems, and, (iii) he has adequate facilities, interest and motivation to learn.

1.2 General characteristics / Behavioural Manifestation of Learning disabilities :

Learning disabled children generally have normal or above average intellectual ability. That means they reach most of the developmental milestones at the appropriate age level or even sometimes earlier. They are benefitted by casual experiences in their life and acquired knowledge and skills essential for leading normal life. Usually they are not easily differentiated from normal population. They may go undetected till they experience continueous failure in academic skills. But a closer look at them reveal that they have certain characteristics which though observe among other children of same age and intelligence, are manifested in their behaviour to a significantly greater extent than others. These characteristics may be persistent for a longer time in their life time than others. The knowledge of such characteristics and their behavioural manifestation are useful in identifying the learning disabled at a very early stage itself.

Such an early identification helps in taking proper remedial measures at the right time, so that further problems can be either prevented or at least reduced considerably.

The table/below gives a list of most commonly observed problems among learning disabled children, the nature of such problems and a few illustrations indicating their specific difficulties.

TABLE—1

Nature of the problems and their behavioural manifestations among learning Disabled Children.

Kinds of Problems	Description	Examples of behaviour in which the problem is manifested.
1. Abnormal Activity level :		
a) Hyperactive	Constantly engaged in some form of motor (Physical) activity.	Restless tapping of finger or foot, jumping out of seat or skipping from one task to another before completing it.
b) Hypoactive	The opposite of hyperactivity. Fails to react to the environmental changes or seems to do everything in slow motion.	Do not show interest even in sports/games. When all the other children are engaged in some activity, may sit quietly. Takes more time to do even simple tasks.
2. Attention Problems :		
a) Short attention span-easily distractable.	Easily distracted by what is going on in the surroundings, for ex : lizard moving on the wall, running fan, foot step outside the classroom, etc. Unalbe to concentrate on any one tasks for the required amount of time.	In the classroom, may concentrate on what is being taught for a few minutes, then start doing something which he likes drawing some picture, looking outside, etc.
b) Preservation (too much over doing)	Attention becomes fixed upon a single task. That task will be repeated over and over even if it is unwanted. It may be a motor activity or verbal task.	If the child starts drawing a picture, he may repeat the same several times ; certain lines of a poem may be reproduced continously ; while playing with toys also

			same kind of act may be repeated. Exen after noticing that a particular way of solving a mathematical problem he is wrong, still try to do the same way.
3. Motor Problems :			
a)	Inadequate coordination.	Physical activities are generally clumsy or awkard. Lack adequate gross and fine co-ordination.	Day to-day activities are not done systematicly ; cannot handle utensils or instruments or play material properly. Finds difficulty in playing games appropriate to age ; cannot draw or paint properly, write legibly.
b)	Poor Tactile-kinesthetic discrimination.	Has difficulty in discriminating shapes, textures sizes only through touching. Lacks adequate visual–motor memory.	Experiences difficulty in identifying subjects by touching. Cannot write or draw spontaneously/automatically. This leads to poor writing and drawing derformance.
4. Visual Perceptual Problems :			
a)	Poor visual discrimination.	Unable to distinguish between visual stimuli that means cannot find out the similarities/ differences between objects, shapes, symbols only through seeing them.	Has difficulty in differentiating shapes which have some similarity-rectangle and a square, circle and an eliptic and symbols like + and X ; > and < ; b and d ; P and Q etc. Has difficulty in sorting out objects in terms of size, shape, colour, etc.
b)	Difficulty in Visual figure ground differentiation.	Unable to perceive a fore-ground figure against a back-ground. That means unable to attend to important visual stimuli by pushing all other visual stimuli into the back-ground.	While reading or writing may skip lines, unable to paint within the outline, interpreting pictures, stores, or social situations.
c)	Difficulty in visual closure	Cannot fill in missing parts when only part of a word or object is seen.	Has difficulty in identifying 'hidden' shapes or pictures, (the sort of puzzle given in popular magazines).

			Cannot complete the figures or letters written in dots. Has difficulty in identifying them missing parts in pictures of common objects.
d)	Poor visual memory visual recognition recall visual sequencial memory.	Have trouble in retaining or recalling visual experiences. Some children with such problems find it difficult to recognise visual stimuli (objects, persons, pictures, shapes, symbols) they have already seen. Others are able to recognise visual stimuli easily but are unable to retrieve (recall/ revisualise) visual image of this stimuli when they are asked to reproduce the figure, picture, letter number or symbol. Still others may recognise and revisualise but have difficulty in reproducing sequences of visual items from memory. Revisualization and visual sequential memory problems are more frequently noticed among learning disabled children.	Children with visual recognition problem cannot recognise objects, pictures, etc. When they are included in a group of other objects, pictures, etc. Children with revisualization (recall) problem cannot retrieve a visual image of the required letter, number or symbol from memory. That means they cannot write them by memory. But they may be able to read words which they cannot write. They can copy as long as the item remains visible. Children with visual sequartial memory may have difficulty in reproducing a series of acts in the same order after seeing them demonstrated, recognizing a series of colors, blocks, pictures after their order has been scrambled, reproducing letters/numbers in the required order.
5.	*Auditory Perceptual Problems :*		
a)	Poor Auditory discrimination.	Unable to distinguish one sound from another.	Cannot determine whether non-language sounds-horn sounds of vehicles for example are same or different. Has difficulty in distinguishing non-language sounds from language sounds. Unable to hear the differences or similarities in initial or final sounds of words, consonant blends or vowels.

b)	Poor Auditory Reception/Comprehension.	Unable to gain meaning from auditory symbols.	Has trouble in listening or attending to auditory stimuli (environmental sounds, verbal discussions) Unable to answer yes or no to a question containing one concept, for ex : can you sing ? Do trees walk ? etc. Finds it difficult to identify objects from verbal descriptions, attach meaning to words.
c)	Difficulty in Auditory figure ground differentiation.	Unable to attend to important auditory stimuli by pushing all other auditory stimuli into the background.	Cannot concentrate on verbal discussion for longe time, easily distracted by other environmental sounds.
d)	Deficiency in Auditory closure	Cannot fill in missing sounds when only part of the word/ sentence is heard.	Has difficulty in fill in the gaps when they miss parts of words or conversations, completion of words and sentences.
e)	Deficiency in Auditory memory-auditory recognition, reauditorization, auditory sequential memory.	Children with auditory memory problems often have difficulty in retainiug or recalling auditory experiences. Some children with this difficulty may find it hard to recognize auditory stimuli they have already heard. Some others can easily recognise but cannot retrieve (recall) the auditory signals needed to produce the desired sound. Reauditorization and auditory sequential memory problems are most frequently observed among learning disabled.	Persons with a reauditorization problem knows what he or she wants to say but is unable to recall from memory how the desired sound or word can be vocalized. They may substitute the sound produced by the animal or by the object for its name ("barking" for the word "dog") 'resort to gestures', pantomine (imitation), or drawing pictures to express their ideas, may wait several seconds before responding ; may write the word as a means of communication. Children with inadequate auditory sequential memory fails to learn songs, stories, rhymes, names of weeks, months, multiplication tables, etc.

6. *Language Problems :*		
	Delayed or slow development of speech ; Difficulty in formulation and syntax- unable to organise, words to from phrases, clauses, or sentences in the appropriate way.	The kinds of difficulties noticed in case of children with reauditorization, and auditory sequential memory deficits can be noticed here also. In addition to that defects in sentence structure can also be easily noticed.
7. *Faulty work habits.*		
	May organize work poorly, work slowly, frequently confuse directions, or rush through work carelessly.	Do not plan work properly, thus there is no systematicity in work ; may start drawing, painting or writing from a wrong direction.
8. *Social-emotional Behaviour Problems :*		
a) Inpulsive	Fails to stop to think about the consequences of behaviour.	Gives answers to questions without trying to see whether they are right or not (most often the answers are wrong) ; Fails to observe rules while playing ; cannot wait for his turn for anything.
b) Explosive	Displays rage reaction or exhibit temper tantrumes when needs are not met with.	Exhibit Physical or verbal aggression on others, may throw away objects.
c) Inadequate social competence	Often below average social competence for age and ability, lack social skills	Unable to accept leadership ; Fails to complete the responsibility accepted.
d) Difficulty in adjusting to changes.	Take more time than others to adjust to changes in place, time, persons, nature of task, programmes etc.	Routine things have to be done at a particular time ; things have to be kept or arranged in a particular place, change in class timings, sitting arrangement, change in classroom teacher all may upset them. Similarly change in type of questions objective type to short answer type vice versa, different kinds of

		strategies for solving a mathematical problem may disturb them.
e) Drastic change in mood.	Mood varies from hour to hour without obvious reason.	Quite obvious.

9. Orientation Problems :

a) Inadequate spatial organization.	Poorly developed concept of space ; distorted body image, trouble in judging distance and size, and difficulty in discriminating figures from ground, parts from the whole and left from right.	Cannot understand spatial concepts like top, bottom, inside, outside etc. Unable to point out left hand right eye etc ; cannot judge the distance between himself and the ball coming from the opposite direction while playing ; cannot understand concepts like more, less, some, several, widest, biggest etc.
b) Inadequate Temporal concepts.	Disoriented in time.	Experiences trouble in relating concepts like before and after, now and when, today and tomorrow etc.

10. Academic Disabilities :

	Problems in reading, writing spelling and arithmetic.	Difficulty in reading and writing letters, words, sentences correctly and with optimum speed. Has difficulty in fundamental arithmetic operations–number concepts addition, subtraction, multiplication, division.

Every learning disabled child does not obviously demonstrate all the above characteristics. Rather each exhibits a unique combination of such traits. Depending upon such a combination they experience different kinds of learning disabilities.

1.3 Types of learning disabilities :

Learning disabilities noticed among children can be broadly classified into various categories depending upon the major/primary problem experienced by them. Such major problems lead to other kinds of problems which are considered as the associated or secondary problems. It should be kept in mind, that, rarely these learning disabilities exist in isolation. The table below indicates different types of learning disabilities, the nature of those disabilities in terms of

major/primary problems and the possible causes for such problems as well as the kinds of remedial measures pertaining to each type of learning disabilities.

TABLE—2

Types of Learning Disabilities, Major Problems Encountered and Implications for remediation.

Types of Disability.	Major/Primary Problems and possible causes.	Implications for remediations.
1. Oral-language Disabilities :		
a) Dysphasia	Partial inability to comprehead the spoken word (receptive dysphasia) and to speak (expressive dysphasia) which is believed to be the result of injury, disease or maldevelopment of the brain.	Intensive training in language and speech development is required. This should be done in a clinical set up.
b) Aphasia	Loss of the ability to comprehend, manipulate, or express words in speech, writing or gestures. (Usually associated with injury or disease in brain centres controlling such processes.	
	Auditory aphasia refers to the inability to comprehend the spoken words. Formulation aphasia refers to inability to formulate sentences properly. Confusion occurs in relationships and tenses rather than in words themselves. (eg. Uma gives I flowers).	Same as in the case of dysphasia. But needs more intensive training than dysphasia.
2. Reading Disabilities :		
a) Dyslexia	Partial nability to read or to understand what one reads silently or aloud. Condition is usually, but not always associated with brain	Medical intervention to control sugar level in the blood, and to corect malnutrition and vitamin deficiencies.

LANGUAGE AND SOCIAL CHARACTERISTICS OF LEARNING DISABLED CHILDREN

Dr. Ramaa S

The learning disabled children exhibit various language and social skill deficiencies. The knowledge of these are essential in planning remedial educational programs for them. So these characteristics are discussed in detail below:

Language Characteristics

The specific difficulties noticed by learning disabled children (Thomas, 1989) in the area of language are discussed here.

I. Cognitive Deficiencies

1. Auditory - Symbolic Units (Speech sounds) - The ability to derive word structure from auditory stimuli constitutes the ability to comprehend or use those units. Learning disabled children often have problems in auditory perception which can be noticed in difficulty in sound blending. That means they cannot make words out of given speech sounds. While reading they may identify individual letters but fail to make words correctly.

For e.g. While reading the word `Komala' they may identify letters correctly but may read as `Kamala'.

2. Semantic units (words and Concepts) - The understanding of semantic units indicates knowledge of the precise meaning of familiar words as well as broad meaning of less familiar words. Many LD individuals have problems with concept formation and in the development of semantic units. That means they do not know the meaning of certain words properly and they cannot understand the meaning of certain words in the context.

3. Semantic classes (Word categories) - Individual words may be classified into groups or semantic classes according to some criteria. The ability to name the class name (super ordinate) when given names of class members constitutes one feature of understanding classes, and the ability to name class members when given a class name is another feature. LD children often experience difficulty in both forms of classification.

For e.g. Difficulty in giving examples for furniture, metals, cereals etc. Similarly cannot tell the class if you give the names of certain cereals, metals, etc.

4. Semantic Relations (word Relationship) - LD youngsters have difficulty in understanding the underlying sequences when

presented with such relations as comparison, spatial (corner, beyond, through etc.), temporal (one after the other, simultaneously, beginning, etc.) familial relationships (cousin, nephew, maternal uncle etc.).

5. Semantic systems (word problems) - In order to solve verbal problems, understanding the inherent relations in the problem and the processes involved in solving it are necessary. Many LD children have difficulties in reading comprehension and in mathematical, spatial (related to figures) and temporal (related to time) reasoning. They cannot solve these problems.

6. Semantic Transformations (Changes in Meaning) - The information transmitted by any word may vary, depending upon the context, role or significance of the utterance. The recognition of and ability to make changes in meanings of words reflected in understanding of semantic transformations (Wiig and Semel, 1984). Majority of LD children have difficulty in processing multiple meaning words, idioms and metaphors.

e.g. The boy is running; He is running a school. He is a Lion.

7) Semantic Implications (Implied meaning) - Considerable number of LD individuals have difficulty in understanding fables, myths and proverbs.

II. **Language Production Deficiencies**

According to Wiig and Semel (1984), language production may be facilitated by memory and retrievals as well as by affective behaviors (such as ideas, practices, standards, values) and psychomotor behaviors (Sensory perception and mental, physical and emotional set). As LD youngsters are deficient in these aspects their overall language production is adversely affected.

1. Convergent Production Abilities - LD children may exhibit deficits in this area. Their rate and accuracy on naming pictured objects or event and verbal opposites, completing verbal analogies, completing sentences, and redefining words and concepts are lower than that of non-LD youngsters.

2) Divergent Production Abilities - The fluency, flexibility, originality and elaboration with which language is produced constitute a person's divergent semantic abilities. Divergent production abilities are involved in the following tasks:

- Naming words and concepts
- Completing verbal associations and analogies
- Formulating ideas and verbal problems
- Reformulating concepts and ideas
- Formulating alternatives and solutions.

According to Wiig and Semel (1984), LD youngsters have relative strength in divergent production abilities. However, specific deficit was noticed in the rate and accuracy with which they name semantic units.

III. Deficiencies in Pragmatic Areas (Functional use of Language)

Bryan, Donohue and Pearl (1981) have noticed that LD children demonstrate more difficulty than non-LD children in such skills as asking questions, responding to inadequate messages, sustaining a conversation, and disagreeing with and supporting an argument.

Social Competence and Motivational Characteristics of Learning Disabled Students

Unlike the categories of mental retardation and behavior disorders, learning disability is defined exclusively in terms of academic incompetence. Only recently, a number of researchers and educators started showing interest in the social competence characteristics of LD children. The reason for such an interest is that children with LD are often poorly accepted by peers and consistently exhibit deficits in positive social behaviors relative to their non-LD counterparts (Gresham, 1988). Gresham (1988) believes that identification and remediation of social skill deficiencies as well as enhancing the acceptance of LD students by peers and teachers are the critical aspects of an appropriate education to such children. Learning Disabled students exhibit the following social characteristics :

- Less able to predict the consequences for their behavior.

- Misinterpret social cues more often; less able to adapt their behaviors to the characteristics of their listeners; perform certain inappropriate social behaviors at significantly higher levels.

- Get low social status scores; less preferred by teachers than non-LD students.

- Lower than the normative samples in their participation in activities, social involvement and their performance in school.

- Exhibit more immaturity, hostility - withdrawal, aggressiveness, and hyperactivity indicating severe behavior disturbance.

- Poorer in giving positive feedback, giving negative feedback, accepting negative feedback, resisting peer pressure, negotiating conflict situations, following instructions,

carrying on conversations and solving personal problems, in empathy.

- More negative conscious and unconscious self-concepts - higher anxiety levels, more negative perceptions of their intellectual abilities, school status and popularity, and more feelings of insecurity, inadequacy, guilt, impulsivity and immaturity.

- Believe that their intellectual, academic and physical characteristics are significantly inferior to those of their non-LD mates.

- Less friendly in comparison with non-LD mates.

There is a need to develop social skills among learning disabled children. This should be one of the important aims in any education activity.

PROBABLE CAUSES OF LEARNING DISABILITIES AND REMEDIAL MEASURES

Dr. Ramaa S

There are different causes for learning disabilities. The important ones are discussed below.

I Neurological Basis of Dyslexia

There are a variety of approaches to determine the neurological basis of dyslexia :

1) Behavioral psychometric approach : In this approach certain cognitive abilities of the dyslexics are assessed. It was noticed that dyslexics are invariably poor in semantic linguistic tasks. It has been inferred from these studies that these deficits are related to deficient neurological substrata. The performance of dyslexics on these tasks resembles that of brain damaged revealing minimal brain dysfunction. This approach suffers from severe inferential problems in terms of neural substrata.

2) The second approach employing more direct procedures such as computerized tomography (CT) scans, elecrophysiological (ECG) studies or post-mortem studies. The major findings of these studies are as follows :

   a) None of the CT scans evidenced any manifestation of brain damage. This implies that dyslexia is a developmental disability which is not manifested as gross pathology.

   b) There may be several morphological or neuroanatomical correlates to developmental dyslexia. In normal individuals there is an asymmetry between the two hemispheres. Usually the left hemisphere is slightly larger than the right one. There may be some variation in dyslexics. The majority of right - handed dyslexics may have normal asymmetry between both the hemispheres. Other populations most notably left-handed dyslexics or severely language delayed dyslexics may have normal asymmetry, or symmetrical posterior cortexes or reversed occipital asymmetries.

   c) Significant EEG abnormalities have been found to occur more frequently in children with severe reading problems.

   d) A number of studies employing event related potentials (ERPs) or evoked responses have demonstrated differences between dyslexics & normal, children with spelling

difficulties & normal significant differences exist among subtypes of developmental dyslexia.

e) The brains of nondisabled and dyslexics at rest did not differ in terms of the distribution of electrical activity. During reading & listening tasks, the brains of dyslexics showed less appropriate electrical activity in the regions hypothesized to be related to reading.

f) Dyslexics differed from young less fluent readers also in electrical activity suggesting pathology and not delayed neurocognitive development.

g) The post-mortem studies revealed that neurodevelopmental anomalies were associated with regions of the cortex known to be important in visual imagery, cross-modal integration and visual and auditory association.

h) There is more involvement of the anterior cortex over the posterior cortex; left more than right. The right hemisphere may also be involved in some subtypes of behavioral or developmental learning disorders including dyslexia.

i) There is a degree of involvement of the thalamus. Specifically the thalamus may play a major role in chanelling stimuli specific input.

II **Embryological Theory**

The embryological theory proposes that before the thirty first gestational week, the foetal brain of individuals with LD might be subjected to an unusual surge of the hormone testosterone, frequently in boys. As a result of this growth of the left hemisphere could be delayed while the right hemisphere remain unaffected.

The testosterone surge affects the development of thalamus which is necessary for normal immunological function. As a result Development of a normal immune system will be hindered.

The abnormal testosterone activity is likely to be controlled by gene complexes.

Genetic factors are responsible for familiar cluster of left handedness, immune disorders, (multiple food allergies, asthama etc.) and learning disabilities.

III) **Hereditary and Genetic Influences**

Genetic relationship was noticed for reading spelling and writing disabilities.

Two modes of transmission have been hypothesized.

1) Single gene disorders-autosomal dominant or autosomal recessive or sex linked.

2) Multifactorial (polygenic traits) - combined effects of genetic factors acting in concert with prenatal environmental factors.

It is believed that the majority of congenital disorders results from the interaction of genes and the intra-uterine environment.

Although many youngsters with sex-linked abnormalities are mentally retarded, some are learning disabled.

Extra X or Y leads to learning disabilities.

IV) **Teratogenic Influences**

Teratogenes are agents that produce or raise the incidence of congenital malformations. Exposure to critical periods during gestation, are important in leading to abnormality ; another factor is minimal amount of teratogen required. Threshold vary from individual to individual, depending on health, nutrition, genetics of mother, uterine environment as well as genetics of the foetus.

Some of the teratogens are alcohol, smoking, lead poisoning, N-Nitroso compounds which are pervasive in our environment, that is in cosmetics, polluted air and also radiation.

V) **Nutritional Influences**

Sugar and other foods: sugar in particular cane sugar leads to hyperactivity.

Milk, chocolate, cola, cane sugar, beet sugar, cereal grains, eggs, citrus products, beef, pork, foods containing additives and colouring should be avoided in the diets of hyperactive children.

VI) **Vitamin**

Vitamin deficiency may be a cause of learning and behavioral disabilities.

Increased doses of vitamins C, B3, B6, B12 & E have been given in megavitamin treatments for various disorders.

Deficiencies of essential fatty acids such as those obtained from cold - pressed vegetable oils (ex; Sunflower), plus associated deficiencies of vitamins and minerals may also lead to hyperactivity and disordered behavior.

Widespread systematic and nervous system illness, including hyperactivity and disturbed behavior can occur through colonization with candida albicans, a fungus in the gastrointestinal tract.

Patients should be put on a yeast free, sugar free diet with some restrictions of other carbohydrates as these promote candida growth.

Orally given Nystain-an antifungal agent may be needed to discourage candida growth.

Remedial Measures

Multidisciplinery approach is needed for treating learning disabilities. The principle- Education starts where Medicine stops, has to be adopted.

a) Medical Intervention

1) If possible excessive production of Testosteron should be checked.

2) Parents with learning disabilities can be sensitive to the possible problems in the children so that - early identification & early intervention is possible.

3) Hormonal treatment to those with extra X or Y chromosome.

4) Identification of nutritional deficiencies in children & prescription of Megavitamin Therapy and Balanced Diet.

5) Identification of food allergies & dietary restriction.

6) Treatment of Immune Disorders.

7) Detecting and checking growth of candida albicans.

8) Administration of psychotropic Medication to reduce hyperactivity and to overcome psychiatric disorders. The effects of these drugs should be discussed with parents and teachers.

9) Public awareness programs related to Teratogens and Nutritional Influences so that problems can be prevented as far as possible.

10) Detailed Medical check-up of preschool children and school going children with case study.

11) Establishment of child guidance centers with interdisciplinary team of experts in Hospitals.

12) Providing knowledge and skill to all the Medical students about Learning Ddisabilities so that Doctors in the PHC also should be in a position to help children with LD.

Psychological Intervention

1. Systematic exercices to develop the neuropsychological skills in which LD chidren are deficient. Perceptual motor training, and sensory integration training may be useful.

2. Guidance and counselling to children with LD.

3. Guidance and counselling to parents of children with LD.

4. Behaviour modification techniques to overcome hyperactivity and some other behaviour problems.

		impairment. May be also due to hypoglycemia (low blood sugar) or protein, vitamin and mineral deficiencies.	
		Familial dyslexia is a form of reading disability believed to be caused by hereditary factors.	
		It is assumed that boys with reading problems possess a type of delayed neurological and perceptual development arising from neurophysiological characteristics which they have inherited from their reading disabled fathers.	Systematic exercises to enhance neurological and perceptual development in the clinical set up.
		Dyslexia is mainly due to deficiency in visual-verbal association (relating visual feature of a stimulus with its name, for ex. letter and its name, symbol and its name, etc.) In addition they may have deficiency in visual and/or auditory, perceptual problems, word analysis and synthesis (analysing the word into its component sounds and blending the component sounds into words).	Remedial teaching to overcome reading and other associated difficulties.
b)	4. Alexia	Loss of the ability to read write or printed language.	Same as in the case of dyslexia. Development of underlying psychological processes-perception, word, analysis and synthesis should preceed remedial teaching.
3.	*Writing Disabilities :*		
a)	Dysgraphia	Dysgraphia refers to partial inability to write which is due to visual-motor integration disorder that interferes with the memory and execution of the motor patterns	Thorough training should be given to enhance visual motar integration. Remedial teaching to improve writing skill should be provided.

		needed to write or copy letters, words, and numbers. .	
b)	Agraphia	Agraphia refers to the total inability to write. It is the inability to copy which differentiates agraphic children from other disorders of writing. The conditions are usually associated with brain dysfunction.	
c)	Revisualization Problems.	It is the inability to revi sualise the image of letters or words. Children with this type of visual memory deficit can speak, read and copy, but have difficulty in writing the letters and words by memory,	Intensive training should be given to develop revisualisation skills. Till they develop these skills spelling and arithmetic should be tested through recognition type of questions.
d)	Formulation and syntax disorders.	Formulation disorders refers to the inability to organize the ideas into a clear, concise pattern of words. Syntax disorders refers to the difficulty in ordering the words to form phrases, clauses or sentences. Formulation and syntax disorders may involve both spoken and written language or may be limited to the production of written language.	Remedial teaching in formulation and syntax skills if it is confined to only written language. If it involves spoken language also, intensive training should be given to improve them.
e)	Spelling problems	Most of the learning disabled children have spelling problems. It is observed that spelling problems are secondary to reading and revisualization problems. Thus, as reading improves spelling improves and as revisualization improves, spelling improves.	Remedial teaching to improve reading and writing. In addition specific exercises should be given to improve spelling.

f)	Arithmetic Disabilities.	This refers to trouble in reading or writing isolated numerals or a series of numerals, reading and writing numbers whose names are not written the way they are spoken (twenty—one=21, not 201), recognizing the categorical structure of numbers (units, tens, hundreds, thousands), and doing computational operations. This disability may arise from disturbance of quantitative thinking or from language or reading disabilities. Anyhow, arithmetic disability mainly refers to difficulty in quantitative thinking. Acalculia denotes the inability to perform calculations. Dyscalculia is a form of acalculia which involves a partial inability to perform calculations.	Oral language and reading skills have to be developed first if any deficiency in them is noticed. Remedial teaching to improve arithmetic skills.

A group of 20 LD children identified* from among the children studying in one of the central schools, belonging to families of middle and high socio-economic status exhibited following characteristics features.

TABLE—3

Sample of cases illustrating differential performance in different academic areas of and certain characteristic features of Learning Disability.

Sl. No.	Teachers' opinion.	Opinion of the Investigator on the basis of Informal assessment.	Type of Learning Disability.	Grade on Raven's Coloured Progressive matrices (Intelligence test)
1	2	3	4	5
1	Very active, fluent in speaking and giving oral answers, very impulsive. If encouraged does the assigned work well (oral).	Uses crutches while solving mathematical problems. Is not good at solving problem (below average).	Arithmetic	I Intellecually superior

2	Poor in academic skills like arithmetic problem and spelling. But seems bright and interested in other activities. Left-handed.	No concept of subtraction. Has difficulty in solving arithmetic problems. Makes simple mistakes in spelling words.	Arithmetic and spelling.	III Intellectually average.
3	Poor in subjects like English and Arithmetic.	Very poor handwriting. Misspells common words. No concept of addition, and subtraction.	Arithmetic and spelling.	I Intellectually superior.
4	Poor in Arithmetic sktlls.	Confuses between addition and multiplication operations. Has no concept of subtraction.	Arithmetic	I Intellectually superior.
5	Weak in Mathematics.	No concept of multipcation and division which most peers can do easily.	Arithmetic	I Intellectually superior.
6	Poor at reading.	Knows the spelling orally, but makes mistakes while writing.	Reading	I Intellectually superior.
7	Poor in academic subjects like arithmetic.	Poor in arithmetic skills. Slow to comprehend and highly confused in subtraction operations, no concept of multiplication and division. Makes mistakes in spelling words.	Arithmetic and spelling.	II + Above average in intelligence.
8	Left-handed. Has difficulty in coping with arithmetic skills.	Poor concept of arithmetic operations.	Arithmetic	I Intellectually superior.

9	Lazy in doing class work except crafts, in which he is very much interested.	Not consistent in his work. Poor concept of operations like multiplication and division.	Arithmetic	-do-
10	Poor and inconsistent written work. Seems to be intelligent as gauged from various situations. Poor reading, speaking is average, special attention has been given but results are not very encouraging.	Poor in reading	Reading	-do-
11	Easily distracted, poor in written work and arithmetic operations.	Has difficulty in spelling words and also in mathematical operations.	Arithmetic and spelling	III + Average in Intelligence.
12	Poor in arithmetic operations.	Poor in arithmetic operation.	Arithmetic	I Intellectually superior
13	Poor in arithmetic operations.	Poor in arithmetic skills.	-do-	II Above average in Intelligence
14	Poor in Mathematics.	No concept of diviston.	-do-	I Intellectually superior.
15	Poor in Arithmetic skills and reading.	Poor in Mathematics and reading.	Arithmetic and reading.	-do-
16	Reading problem, poor in arithmetic skills.	Reading and spelling problems, difficulty with arithmetic operations.	Arithmetic, Reading and spellning.	-do-
17	Poor in Mathematics	Poor in arithmetic skills.	Arithmetic	II Above average in intelligence

18	Poor in arithmetic skills and reading.	Poor in arithmetic skills and reading.	Arithmetic and reading.	II + -do-
19	Poor in arithmetic skills.	Poor in arithmetic skills.	Arithmetic	I Intellectually superior
20	Poor in spelling words	Makes mistakes while spelling words.	Spelling.	-do-

*Nishi Mary Mathew, A Study of the Cognitive Development Status among Learning Disabled Children, an unpublished M.Ed. dissertation, University of Mysore, 1988 (worked under the guidance of the author).

From the above discussion it can be understood that oral language disabilities are more serious type of disabilities as they affect the day to day interaction of children with others. They lead to difficulty in overall academic performance of such children. However as the problem is quite obvious children with such disabilities can be identified at the early stage itself and proper remediation can be given so that further/additional problems can be reduced. Reading disabilities constitute another kind of serious disabilities which interfere with the academic performance of children. This kind of problems may not be noticed until children experience failure in the class-rooms. Knowledge about the possible causes of different types of learning disabilities imply that through medical examination and psychological testing of all the children at the pre-primary school stage itself or even earlier to that it may be possible to identify the probable learning disabled. Such an identification at the early stage itself followed by medical, psychological and educational intervention makes it possible either to prevent or reduce the majority of difficulties encountered by such children.

As learning disability is a complex syndrome rather than a unitary disability and also the behavioural symptoms exhibited by such children are also observed among children with other kinds of disabilities/difficulties a detailed diagnosis is necessary to determine that a particular child is a learning disabled and also to find out the factors contributing to/aggreviating the problems of the child. The chapter–II deals with the discussion about a comprehensive diagnostic programme of learning disabled children.

An overview of Diagnostic-Prescriptive Process

2.1 Diagnosis of learning disabilities at the Primary school stage :

The diagnostic-prescriptive process begins when a child is suspected of having a learning or behaviour problems, and continues until it has been determined that the problem no longer exists. The process consits of seeking answers to questions that exist regarding the child's suspected problems, the formulation and testing of possible solutions, and systematic follow-up (Faas, 1976).

Steps involved in the diagnostic process :

According to Kirk and Kirk (1971), the diagnostic-prescriptive process consists of the following five-steps :

1. Determining that a problem exists.

2. Determining the symptoms by behavioural analysis and description of the disability.

3. Determining the physical, environmental and psychological correlates of the disability.

4. Formulating a diagnostic hypothesis.

5. Organising a systematic remedial programme based on the symptoms, deficits and diagnostic hypothesis determined during the previous stages.

The child can be suspected to have learning disability at the very early stage itself, that is, before 3 years of age. This is possible if the child is closely observed and majority of the general characteristics discussed in the previous chapter (1.2) are noticed. However, the diagnostic-prescriptive process described here mainly refers to the primary-school stage and emphasises the role of the classroom teacher in such a process.

Step 1 : Determining that a problem exists :

This step of the diagnostic process should be initiated as soon as a teacher suspects that one of the children in his or her classroom may be experiencing learning or behaviour problem.

Answers to the following questions are helpful in determining that a child has a specific learning disability :

1. Does the clhild have a normal hearing ability ?

2. Does the child have normal visual ability ?

3. Does the child have the level of intellectual ability needed to perform at the expected level ?

4. At what level is the child performing in reading, writing, spelling and arithmetic ?

5. Is there an educationally significant discripancy between the child's estimated intellectual ability and actual level of academic performance ?

The information necessary to answer these questions may be gathered through observation of the student's performance, informal testing, and formal testing. The teacher has to observe a student's performance in various types of learning situations and gather work samples without bringing unnecessary notice to the child. Teachers can administer informal tests to the student as a part of the regular instructional programme. Such an informal evaluation might include.

1. Seat work exercises which emphasize one specific task.

2. Orally administered exercises.

3. Informal teaching of lessons which assess various skills.

4. Individually administered written assignments.

The teacher-administered informal evaluation can be made more systematic and reliable by using behavioural check-lists which cover most of the important symptoms frequently seen among learning disabled children. The teacher can carefully observe the child who is suspected to have learning disability to find out whether/he has most of the difficulties indicated in the check-list. One such behavioural check-list is given in Appendix-I. This covers behavioural symptoms exhibited by children with different kinds of disabilities.

Steps involved in using the behavioural check-list to determine the existence of learniug disability.

* Find cut whether the child who is suspected to have learning disability exhibits majority of the difficulties listed out for learning disabled children. This can be done through informal evaluation and systematic observation of the child in various situations.

* Collect enough data to verify whether the child experiences most of the difficulties exhibited by learning disabled children.

* Cross-check your observation with other teachers, and if possible, even with the parents of that child.

* Note down the kinds of difficulties demonstrated by the child and also the frequency of such difficulties (never, sometimes, frequently, often, always)

* If the number of difficulties are more and the frequency of occurrence of such difficulties are also considerable proper attempt should be made to find out whether these difficulties are only due to learning disabilities and not due to other handicaps like visual and auditory impairment, mental retardation, speech defect, physical handicap (brain injury).

* The child should be closely observed in various situations to find out whether he exhibits the symptoms which are indicative of other disabilities. The observed symptoms and their frequencies should be recorded then and there itself.

* The teacher can seek the help of other teachers and the parents of the child for this purpose. They should be properly guided to systematicaly observe the child and record/report the symptoms.

* If the number and frequencies of symptoms indicative of different kinds of disabilities are very less the child can be considered to have normal visual and hearing ability, intelligence and speech development. It also indicates that the child does not have severe brain damage. In such a condition, the learning and behaviour problems encountered by the child can be attribuied to learning disability only.

* On the other hand if the child has exhibited majority of symptoms indicative of any other handicap/s the child should be referred to personnel concerned. The suggestions given by the personnel should be strictly followed.

* If the child is confirmed to have either visual or hearing handicap, corrective measures-spectacles, hearing aids, have to be provided. Attempts should be made to bridge the gap in knowledge/skill that resulted due to visual or hearing disability. Even after such a corrective measure and academic assistance, if the child continues to exhibit the same kind of learning and behaviour problems he can be considered as learning disabled.

* If the child is confirmed to have mental retardation, depending upon his level of intelligence, special educational facility should be provided either in a special class or special school. In case of borderline mental retardation (slow learner), though the child is allowed to study in the regular classroom adequate academic assistance should be provided either in the resource-room or at home to help the child to achieve progress. To teach basic academic skils like reading, writing, arithmetic he can be clubbed with learning disabled children as both of them may be benefitted by the same kind of remedial teaching.

* If the child is noticed to have serious emotional disturbance, this problem should be tackled prior to providing academic assistance.

* The child with oral language difficulty needs more intensive training in a clinical set-up to overcome language difficulties in addition to specific help in acquiring academic skills and overcoming behaviour problems.

* The child with severe brain damage (cerebral palay) should be made to get special education facility in the special schools meant for such children.

* In summary, the child can be readily considered as learning if (1) he exhibits majority of symptoms indicative of Learning disability, (2) he does not have visual and auditory handicap, Mental retardation, Physical handicap (cerebral palsy), serious emotional problem.

On the other hand, if the child shows symptoms of visual or auditory problems and emotional disturbance, these problems should be corrected or reduced before confirming the child as learning disabled.

If the primary problem is mental retardation or cerebral palsy, it requires provision for special education in a special class or special school.

Since oral-language disability is also a kind of learning disability, the child

who has it can be considered as learning disabled. However, it requires thorough language therapy in addition to remedial teaching for overcoming academic difficulties.

Step 2 : Determining the symptoms by Behavioural Analysis and Description of the Disability :

The second step in the diagnostic-prescrptive process deals with the analysis and description of the way the child handles the learning tasks involved in the areas where his level of performance is significently below his ability. The details about this step are given in the chapters on diagnosis of academic disabilities.

Step 3 : Determining the physical, environmental and psychological correlates of the disability :

Correlates are those factors within the child or his environment which are frequently related to learning disabilities and their remediation (Kirk, 1972). For example, a sound blending disability may be related to an inability to learn words. As a result. sound blending is considered to be a correlate of the inability to learn to read (Faas, 1976).

Kirk (1972) has classified the correlates of learning disabilities into (1) Physical factors, (2) Environmental factors, and (3) Psychological factors. They are as follows :

Physical Correlates :

1. Visual defects.
2. Auditory defects.
3. Confused spatial orientation.
4. Mixed laterality (Preference for either left eye, right hand, left ear, right leg etc. instead of parts of only one side of the body).
5. Hyperkinesis (Hyeractivity).
6. Poor body image.
7. Underonurishment.

Environmental Correlates :

1. Taaumatic experiences.
2. Conditioned avoidance reactions.
3. Undue family pressures.
4. Bilingualism.
5. Seusory deprivation.
6. Lack of school experience.

Psychological Correlates :

1. Poor visual or auditory perception and discrimination.
2. Slow understanding and interp-relation of concepts.
3. Poor organizing and generalizing ability.
4. Inability to express concepts vocally or manually.
5. Defective short-term memory.
6. Minimal motor and verbal skills.
7. Poor closure and sound blending.

The kinds of correlates, reveal that diagnosis and remediation of learning

disabilities involves a team of experts–medical doctors, psychologists, neurologists, psycholinguists, special educators and classroom teachers, Such a kind of comprehensive assessment and intervention is a must in the case of a child with severe learning disability. However, the classroom teacher may be in a position to help a child with mild and moderate learning disability through procedures which are based on specific principles for teaching learning disabled, even in the absence of such a comprehensive evaluation.

Step 4 : Formulating a Diagnostic Hypothesis :

In this step the relevant observational and test data will be organised in such a way as to explain the inability of the child to learn. The examiner has to properly interpret the relationship among the symptoms and correlates which have been noticed during steps two and three. Such an interpretation should be stated in educational terms, that means, it should provide proper suggestions for educational intervention rather than medical or psychological treatment.

Step 5 : Organising a systematic Remedial Programme :

In this step, a systematic remedial programme should be set up, based upon the diagnostic hypothesis formulated during the previous step. The remedial procedures should be defined in terms of the learning tasks or behaviours which need to be increased and unlearned or decreased (Valett, 1970). For example, the proper procedure and materials might be suggested for increasing the child's proficiency in reading new words. The psychoeducational prescription might also suggest a strategy for decreasing the tendency to act impulsively.

2.2 Diagnosis of learning disabilities at the Pre–Primary School Stage.

The diagnostic–prescriptive process described in the previous section imply that identification and diagnosis of learning disabilities may be done only after the child has experienced considerable amount of failure in academic learning. This will have its own negative consequences like frustration, fear of failure, aversion towards schooling, aggravated problem in mastering academic skills, etc. This emphasises the need for early identification of the learning disabled and providing remedial facilities for them which will reduce their existing deficiencies and prevent further problems among them. Pre–primary school stage (age group 3–6 years) is more convenient for identifying learning disabled children as normally by this age children obtain preportional stage wherein they are adequately ready for thinking symbolically which pre–purpose language development and to acquire pre–reading, writing and arithmetic skills. In addition to that, children by this time are able to develop self management and social skills. Thus any significant difference between a particular child and other children of the same age, ability and apportunities for learning, in different rspects of child development reveal the presence of learning disability in the child. Moreover, it is easy to develop different neuropsychological abilities among children of below 6

years of age as the brain is plastic during this stage of development.

Steps involved in the diagnostic process :

The diagnostic-prescriptive process during Pre-primary school stage also involves all the five steps that are already discussed in connection with diagnosis during primary school stage. The objectives, specific strategies adopted during these stages are almost the same in both the phases. However, during this phase, the procedure for determining the existence of learning disability is slightly different from that of the primary school stage. Here, the data relating to various aspects of learning which may be expected during this stage are collected rather than concentrating only on academic learning. Similarly, the Step–2 includes analysis and description of general learning and behaviour rather than academic behaviour. This calls for the detailed study of the child with reference to various aspects of development which are basic and supportive to future academic learning.

Step–1 : During pre-primary school stage the existence of learning disability in a particular child can be determined by using the behavioural check–list which is already discussed. To find out whether the child who is suspected to have learning disability has the symptoms indicative of learning disability, select only those symptoms which are relevant to the age of child ; observe systematically and evaluate informally to examine the presence of those symptoms in the child.

The remaining steps to be followed while using the behavioural check–list are exactly similar to that of primary school stage.

Step 2 : One of the most important techniques useful for determining the symptoms of learning disabilities during pre-primary school stage is the rating scale. So, in step–2 of the diagnostic–prescriptive process, the analysis and description of the disabilitiy can be done by using the rating scale. The pupil Behaviour Scale, developed by Charles High (cited in Faas, 1976) is one of important screening devices. (a copy of the same is given in the Appendix–II).

The Pupil Behaviour Rating Scale :

This scale is used to assess areas of behaviour that cannot be measured by standardized screening tests.

This is a five point rating scale, points 1 to 5 are given. The point 1 indicates very poor ability, 2 poor ability, 3 average, 4 above average and 5 superior ability in the particular area of learning/ behaviour. The teacher is expected to rate each child on the following five areas of learning and behaviour.

1. Auditory comprehension and listening (The child's ability to understand, follow, and comprehend spoken language).

   a) Ability to follow directions.

   b) Comprehension of class discussion.

   c) Ability to retain orally given information.

   d) Comprehension of word meanings.

2. Spoken language (The child's oral speaking abilities).

a) Ability to speak in complete sentences using accurate sentence structure.

b) Vocubalry ability.

c) Ability to recall words.

d) Abitity to formulate ideas from isolated facts.

e) Ability to tell stories and relate experiences.

3. Orientation (The child's awareness of himself in relation to his environment).

a) Promptness.

b) Spatial orientation.

c) Judgement of relationships : big, little ; far ; close ; light ; heavy.

d) Learning directions.

4. Behaviour (The child's manner of participation in the classroom-self-discipline in relation to himself (i.e. ability to attend) as well as in relation to others).

a) Cooperation.

b) Attention.

c) Ability to organise.

d) Ability to cope with new situations : parties, trips, unanticipated change in routine.

e) Social acceptance.

f) Acceptance of responsibility.

g) Completion of assignments.

h) Tactfulness

5. Motor (the child's balance, general coordination and use of hands in classroom activities).

a) General coordination : running, climbing, hopping, walking.

b) Balance.

c) Ability to manipulate utensils and equipment : Manual dexterity.

The children whose ratings are 1 in majority of the components of these five areas can be considered to have severe learning disability and those whose ratings are specially 2 can be considered to have mild learning disability.

Step 3 4 & 5 :

The steps 3, 4 and 5 can be followed in the same way as in the case of diagnosis during primary school stage.

Diagnosis of Academic Problems

Dr. Rama. S, RIE, Mysore

In the chapter II a detailed discussion about a comprehensive diagnostic programme, involving medical, psychological and educational assessment was made. This chapter deals with analysis of behavioural symptoms relating to academic problems only.

As already understood, step-2 of the Diagnostic-Prescriptive process involves the determination of symptoms of specific learning disabilities through behavioural analysis and description of the disabilitiy. Such an exercise is very much essential for planning appropriate remedial programme for the learning disabled. The teachers should be aware of the various kinds of problems that are commonly observed among the learning disabled children while reading, writing or doing arithmetic. This knowledge helps him to find out the kinds of academic problems experienced by a particular learning disabled so that he can help the child to overcome them. The symptoms of different kinds of academic disabilities are discussed separately. However here, the problems associated with only milder levels of learning disabilities are dealt with.

3.1 Symptoms of Reading Disability :

The specific errors that are indicative of reading disability, though, vary from language to language, certain common kinds of errors/difficulties can be noticed among reading disabled (dyslexic) children, while reading. Thus these errors/difficulties can be considered as symptoms of reading disability. Brueckner and Lewis (1947) have listed the following behavioural symptoms of reading disabilities :

1. Slow rate of oral or silent reading.
2. Inability to answer questions about what is read showing lack of comprehension.
3. Inability to state the main topic of a simple paragraph or story.
4. Inability to remember what is read.
5. Faulty study habits, such as failure to reread or summarize or outline.
6. Lack of skill in using tools to locate information such as index and table of contents.
7. Inability to follow simple printed or written instructions.
8. Reading word by word rather than in groups, indicating short perception span.
9. Lack of expression in oral reading.
10. Excessive lip movement in silent reading.
11. Vocalization in silent reading, whispering.
12. Lack of interest in reading in or out of school.
13. Excessive physical activity while reading, as squirming, head movements.

14. Mispronounciation of words·

'a) Gross mispronounciations, showing lack of phonetic ability.

b) Minor mispronounciations, due to failure to discriminate beginnings and endings.

c) Guessing and random substitutes.

d) Stumbling over long, unfamiliar words ; showing inability to attack unfamiliar words.

15. Omission of words and letters.

16. Insertion of words and letters.

a) That spoil meaning.

b) That do not spoil the meaning.

17. Substitution of words in oral reading.

a) Meaningful.

b) Meaningless.

18. Reversals of whole words or parts of words, largely fau'ty perception (may be due to impulsivity or difficulty in sequential memory).

19. Repetition of words or groups of words when reading orally.

20. Character of eye movements (may be due to difficulty in reading).

a) Excessive number of regressive (backward) eye movements.

b) Faulty return sweep to beginning of next line.

c) Short eye-voice span.

d) Excessive number of eye fixations in a line,

From the above list of difficulties it can be understood that the problems are cumulative. If the children do not learn letter names and sounds properly, they can't recognise words. The recognisition of words depends upon letter knowledge and ability to analyse and synthesize words (word attacking skills.) The difficulty in recognising words lead to difficulty in reading sentences at an optimum speed. The slow rate of reading affects comprehension which in turn affects other skills of reading. Thus more importance should be given to development of word attacking, skills (letter knowledge, word analysis and synthesis) and automaticity in reading (optimum rate of reading). Then proper guidance and help can be given for the development of other higher-order skills of reading.

While diagnosing the reading difficulties the teacher can start with letter identification, word recognition, and sentence/paragraph reading. The kinds of errors committed at each level of reading should be noted down. If the child is poor in identifying the letters and recognising the words there is no need to go to sentence/paragraph level at all. The speed and accuracy of letter and word recognition has to be tested separately. If the child's performance reveal that he can read at the sentence/paradraph level, the following components have to be observed/assessed :

a) Specific types of word-recognition errors.

b) Comprehension ability.

c) Extent of the student's vocabulary.

d) Information relative to the student's rate of performance.

The following symbols are useful in recording the types of word recognition errors made during the paragraph reading selected appropriate to a particular child (Hallahan and Kauffman, 1976).

1. Unusual phrasing, or word-by-word reading.

   Example : A little black dog ran/ away/from home. (Noted but not counted as an error).

2. Omitted words, phrases, or word endings.

   Example : A little black dog ran away from home. He talked (and talked) to her. He talk(s) to her (counted as an error).

3. Substitutions :

   Example : Mary walked over (above) the bridge. Write the substituted word above (counted as an error).

4. Additions of words, phrases, or endings.

   Example : A little black doggy ran away from the home (counted as an error).

5. Repetitions :

   Example : ⌈A little⌋ black dog ⌊ran away from home. A line is drawn indicating the portion repeated (Noted but not counted as an error).

6. Mispronounciation of words.

   Write M above the word.

   Example : "The big (M) machine". The error is in placing the accent on the wrong syllable. Write out the errors (counted as an error).

7. Punctuation.

   The student continues to read through the punctuation marks.

   Example : A little dog ran away$_x$ He ran, etc. (Noted but not counted as an error).

8. Needs assistance.

   If the student hesitates more than five seconds, write P (Pause) above the word and pronounce it for the student (counted as an error).

9. Self-correction of errors.

   Example : She (was) ✓ (saw) a penny

   (Noted but not counted as an error).

10. Hesitations :

    Example : A little black dog ran (h) away.

If the student hesitates noticeably, put an h above the word (Noted but not counted as an error).

Each of the errors can be scored as indicated in the manual of a teacher made test or standardized test. Sometimes the teacher has to use his or her judgement in scoring. A good rule of thumb is to score as an error anything that changes or distorts the meaning or intent of the paragraph.

Some learner frequently substitute or add words in a paragraph but that does not usually interfere with the overall sense and meaning. As long as it does not interfere with the meaning of understanding of the content there is no need for undue concern. (Mann and Suiter, 1979).

Adequate practice is required for the teachers to listen carefully and record accurately errors made by the students.

The level of comprehension can be tested by asking questions relating to the paragraph as well as appropriate to the child. Though silent reading comprehension is not given for diagnostic purpose, it may be helpful to know the discrepancy between student's oral and silent reading. The kinds of errors noticed by Ramaa (1985) in her study which were committed by dyslexics while recognizing Kannada words are given in the appendix III.

3.2 Diagnosis of writing Disabilities :

Learning disabled children who have written Language disorders may have trouble with one or more of the tasks involved in writing and spelling. The development of writing skills follows the development of speech comprehension and use, and the attainment of proficiency in reading. The writer records his thoughts in the form of graphic symbols. The reader recodes these symblols to gain the message they contain.

The types of writing disabilities– dysgraphia/agraphia, revisualization problems, formulation and syntax disorders spelling problems, and the primary problems faced by the possessor of these disaabilities are indicated in the section 1.2.

Summarily, Dysgraphia and agraphia refers to difficulty in writing or copying letters, words and numbers. Dysgraphics have partial inability to write and agraphics have total inability to write.

Revisualization problems refers to the inability to revisualize the images of letters or words. Children with this kind of problem can speak, read and copy but unable to write the letter or word that has been dictated to them.

Children with Formulation Disorders cannot order ideas into a clear, concise pattern of words, whereas children with syntax disorders have difficulty in ordering words into phrases, clauses, or sentences.

The writing of children with syntactic difficulties is characterized by word omissions, distorted word order, and improper verb and pronoun ugage, word endings, and punctuation.

Chalfant and Scheffelin suggested (1969) that the following questions can be used in the informal evaluation of children's writing. These questions can be answered while working with the child and observing his performance of specific tasks.

1. Can he write spontaneously with a pencil ? With alphabet blocks ? With his eyes closed ?

2. Can he write from dictation ?

3. What kinds of spelling errors does he make ?

4. Can he copy from a visual model ? From handwriting ? From print ? From print into handwriting ?

5. Does he lose his sense of direction in forming letters ?

6. Can he copy geometric figures which are not symbols ?

7. Can he write in one language and not in another ?

8. Does he do mirror writing (b for d, p for q etc.) ?

9. Does the child profit from auditory or visual assistance ?

10. Does he exhibit gross and/or fine motor incoordination ?

11. Has he had opportunity to practice ?

12. Does he have a basic language deficiency ?

13. Does he understand what he sees and hears ?

The above questions cover various kinds of difficulties experienced by children with different types of writing disabilities. They also help to find out whether they have any deficiency in motor coordination and language abilities which are prerequisits for acquisition, the answers to some of those questions indicate whether the writing difficulties observed among the children are due to environmental deprivation or to generalized deficiency in comprehension.

The remedial programmes for writing disabilities will be planned on the basis of the symptoms demonstrated by the children which are revealed through the answers to the above mentioned questions.

Difficulties in Handwriting :

According to Mann and Suiter, (1979), difficulties in handwriting fall into two main categories :

1. Factors that are student based and (2) Factors arising from an inadequate instructional program.

1 Student based difficulties :

(a) Lack of readiness for beginning writing resulting in the motor dysfunction of the hands and fingers or poor eye-hand coordination.

(b) The student may have a visual acuity problem and need glasses.

(c) The student cannot grasp the pencil correctly or has an ackward writing position. He or she may have crippled hands or a spastic condition.

(d) The student may not have established a dominant hand. He or she may be switching from left to right.

(e) The student may have difficulty retaining visual symbols rather than having poor visual-motor co-ordination.

(f) The student may have an emotional problem that can easily show up in a deteriorating handwriting. He or she could also be physically ill.

(g) The student may have no interest in writing and be unwilling to practice. He or she may exhibit indifference to establish minimum standards.

2. *Program-based difficulties :*

(a) The student may have been started in a formal writing program before he or she was ready. Possibly the student is still undecided as to which hand to use.

(b) There could be insufficient interest on the part of the student due to undifferentiated group drill. The wrong positioning of paper might be a factor.

(c) Not enough care taken with initial teaching may have been a factor. The student may have been allowed to practice errors. Too much practice done without supervision can cause difficulties.

(d) A poorly planned transitional program from manuscript to cursive writing may be the cause of the problem in older students.

Handwriting Screen :

Visual-motor skills generally develop early in most students and to be sequential. Three primary problem areas are evident in students exhibiting handwriting difficulties (Mann and Suiter, 1979).

1. Poor quality or illegible.

2. Acceptable quality but below minimum standards, when pressured by the requirement of speed.

3. Extremely slow rate but acceptable quality.

Mann and Suiter, (1979), suggested that the teacher must identify early in the school year those students whose handwriting is illegible and of poor quality under normal daily conditions. Samples of the students' "best", "fastest" and "usual" handwriting can be used for diagnostic purposes.

1. Usual sample : A sample of the student's usual work should be taken under conditions that are not fatiguing.

2. Best sample : Ask the student to write the sample three times by taking his own time and to do his level best. There should not be time limit.

3. Fastest sample : Student should be asked to write as fast as he can write. About three to five minutes should be given to write the sentence as many times as he can.

While giving the above kind of exercises materials that contain a vecabulary that is familiar to the students should be given so that they do not have much difficulty with spelling or comprehension. Sentences that contain all the letters of the alphabet can be included. For example, "the quick brown fox jumps over the lazy dog".

The following should be considered in evaluating handwriting :

1. Can the student copy accurately ?
2. Does the student align letters properly ?
3. Dhes the student have an unorthodox joining of letters in cursive writing ?
4. Does the student use neo-graphisons or squibbles that are not really letters ?
5. Does the student use the same hand consistantly for writing ?
6. Does the student have poor spacing of letters and words ?
7. Does the student write from left to right ?
8. Are the student's letters of irregular size ?
9. Does the student's work show fatigne ? For exampie, last line may be noticeably poorer than the first one.
10. Does the student exhibit poor letters formation.
11. Is the student unable to recall or retrieve the motor act of writing as a form of expressive language ?

Handwriting for the older student :

According to Mann and Suiter, (1979), students in the second grade and higher experiencing difficulty with either manuscript or cursive writing need a slightly different approach. In addition to collecting handwriting samples of those students, the following questions have to be asked.

1. Was handedness changed at any time ?
2. How much difficulty did the older student experience with beginning writing or cursive ?
3. Is the student extremely nervous or emotional ? Has the handwriting become either much larger or much smaller ?
4. What is the student's general physical condition ? Has the student been ill or suffered a seizure ?
5. What is the student's ability to draw, colour and cut ?
6. Does the student have difficulty in some other basic subject, such as spelling or reading ?

7. Does the student have a negative attitude toward some or all school work ?

The overall objectives for good handwriting are legibility and ease of writing. There are a number of rules relating to legibility (Jarman, 1979, 1988 ; Alston, 1990 ; Alston and Taylor, 1990 ; Taylor, 1990).

The rules can be divided into four groups is concerned with letter formation, shape and alignment :

1. All tetters except 'd' and 'e' start at the top.
2. Round letters should be round and closed.
3. Straight letters should be straight and parallel.
4. The relative height of letters should be uniform.
5. Letters should align to the baseline correctly.

The second group is concerned with space :

6. The space between letters should be even.
7. The space between words should be even.

The third group is concerned wtth joins :

8. Letters which end on the baseline join diagonally.
9. Letters which end on the mid-line join horizontally.

The fourth group is concerned with punctuation :

10. A sentence begins with a capital letter and ends with a full stop.

These rules can be used in a number of ways. They can be :

- Used by the teacher to define areas of weakness.
- Incorporated into a self-evaluation check-list.
- Incorporated into teaching strategies.
- Used to monitor progress.

There are three stages in the develpment of this knowledge :

1. The ability to match letter with letter.
2. The ability to recall the letter name/sound when shown a given letter.
3. The ability to match a letter to the given letter name/sound.

Self-evaluation check-list :

Taylor (1991) has given an example of a self-evaluation check-list. A check-list incorporating a number of statements relating to handwriting performance is drawn up.

The check-list is divided into three sections ; the first section is concerned

with posture, paper position and tool hold ; the second with the formation of small and capital letters, their slant and alignment, spacing between letters and words, the formation of joins and numerals and the use of punctuation ; lines are provided in the third section on which the pupil can list areas requiring practice.

Each statement is presented in a positive manner, e.g. 'I sit correctly'. This is followed by Yes [ ] and No [ ] boxes for the pupils response.

Student Self Evaluation Check List :

Name..... Date

I sit correctly.	Yes	No
My non-writing hand is placed on the paper correctly.	Yes	No
My paper position is correct.	Yes	No
I need to use a pencil grip.	Yes	No
My letter formation is correct.	Yes	No
My tall letters are the correct height.	Yes	No
My letters with tails are the correct length.	Yes	No
My midzone letters are the same size.	Yes	No
The straight lines of my letters are correct.	Yes	No
My letters sit correctly on the line.	Yes	No
The slant of my letters is regular.	Yes	No
The spacing between my letters is even.	Yes	No
The spacing between my words is even.	Yes	No
I use capital letter correctly.	Yes	No
I use full stops correctly.	Yes	No
My numerals are formed correctly.	Yes	No
My horizontal joins are correct.	Yes	No
My diagonal joins are correct.	Yes	No

I need to work on :

The objective of the check-list is for the pupil to be able, with the help of the teacher, to define both the positive aspects of performance and to highlight the areas of difficulty. Taylor (1991) has suggsted the following practical guidelines.

Once the check-list has been completed satisfactorily, the teacher should encourage the pupil by making positive comments to all the 'Yes' responses. The pupil may be quite surprised and encouraged to see how many 'Yes' responses he or she has made. Frequently, there are only one or two points which are giving rise to difficulties.

The pupil may need guidance to decide on the order in which he or she should

work. Goals should be set that can be attained. Some direct teaching will be needed so that the pupil is able to effect an identifiable change in his or her writing as quickly as possible. Accordingly, only one or two tasks should be specified and practised at any one time.

The teacher may observe a response which is incorrect. Such a response may indicate that a pupil is unaware of the implication of the statement, For example, the pupil may indicate that all his or her letters with descenders are the correct length when in fact he or she writes the letter j as a tall tetter. The teacher may not wish to intervene immediately, but to raise the issue in a teaching situation.

Monitoring Progress :

The self-evaluation check-list can be used periodically to evaluate progress. The frequency with which it is used will depend on the speed with which the pupil manages to effect the change in the stated areas of practice.

3.3 Diagnosis of Arithmetic Disability :

As already noticed in section 1.2 Dyscalculia (arithmetic disability) refers to difficulty in reading or writing isolated numerals or a series of numerals, reading and writing numbers whose names are not written, the way they are spoken (twenty—one=21, numbers) (units, tens, hundreds, thousands) and doing computational operations (chaltant and schette in 1969).

The following diagnostic questions were raised by Wallace and Kanfmann (1973) as a basis for planniug remediation of arithmetic problems :

1. Has the child mastered the skills prerequisits for arithmetic achievement ?

a) Does the child discriminate between different sizes, shapes, and quantities ?

b) Does the child understand one-to-one correspondence ?

c) Does the child have difficulty in counting ?

d) Does the child understand groups or sets ?

2. Has the child mastered basic computational skills and time and money concepts ?

a) Does the child understand place value ?

b) Does the child have difficulty with fundamental operations of addition, subtraction, multiplication and division ?

c) Does the child understand fractions ?

d) Does the child experience difficulty in telling time ?

e) Does the child understand monetary values ?

3. Has the child developed problem-solving skills ?

a) Does the child understand arithmetical terms and signs ?

b) Does the child have difficulty in the analysis of story (word) problems ?

Ramaa (1990) developed a Aritmetic Diagnostic Test for primary school children which is a criterian reference one.

The tables below cover the list of the criterian measures - basic understandings and skills and also the serial number of the corresponding test items which assess them, as included in the final form of the test.

TABLE 4.1 : Basic Understandings and Skills relating to number concepts and the serial numbers of the items which assess them.

Sl. No.	Criterian measures	Sl. No. of the test items
1.	Counting	1 (a) & (b)
2.	Knowledge of numbers and place value -	
	(a) Reading : (i) Integers (upto 4 digit numbers)	2 (a), (b) & (c)
	(ii) Fractions (Limited to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and mixed fractions involving these fractions).	2 (d)
	(b) Writing (Integers)	3
3.	Sequential reproduction of numbers (Upto 4 digit numbers)	4 (a) to (d)
4.	Concept of 'Lesser than' and 'greater than'.	5 (a) & (b)
5.	Seriating the numbers in ascending order	6 (a) to (d)

TABLE 4.2 : Basic understandings and skills relating to Addition and the serial numbers of the items which assess them.

Sl. No.	Criterian measures	Sl. No. of the Test items
1.	Adding single digit numbers	I (a) to (d)
2.	Adding Multidigit numbers according to correct sequence of places :	
	(i) Without carryover	I (e), (g)
	(ii) With carryover	I (f), (h), (i), (j) to (p)
3.	Meaning of sign '+'	II (a) to (e)
4.	Addition of fractions.	II (c)
5.	Adding according to place value.	II (a), (b), (d) and (e)
6.	Seriating given sums in ascending order.	III
7.	Solving simple problems involving	
	(i) Verbal and numerical relations.	VI 1 (a) & (b) 2 (a) & (b)
	(ii) Verbal, numerical and spatial relations.	3 (a) & (b)
	(iii) Spatial and numerical relations.	4 (a) & (b)

TABLE 4.3 : Basic Understandings and Skills relating to subtraction and the serial numbers of the items which assess them.

Sl. No.	Criterian measures	Sl. No. of the test items
1.	Subtracting single digit numbers.	I (a) & (b)
2.	Subtracting Multidigit numbers according to correct sequence of places :	
	(i) Without transfer	I (c), (d), (g) & (h)
	(ii) With transfer	I (e), (f), (i) & (j)
3.	Meaning of Sign '—'	II (1) to (10)
4.	Subtracting according to place value.	II (1) to (6)
5.	Subtracting fractions.	II (7) to (10)
6.	Seriating given sums in descending order.	III
7.	Mixed addition and subtraction requiring appropriate categorization.	IV (1) to (5)
8.	Checking equality and inequality between sums.	V (1) to (5)
9.	Solving simple problems involving :	
	(i) Verbal and Numerical relations.	VI 1 (a) & b), 2 (a) ((b), 4 (a) & (b)
	(ii) Vernal, Numerical and Spatial Relations·	3 (a) & (b)
	(iii) Spatial and Numerical Relations.	5 (a) & (b)
	(iv) Numerical relations only.	VII (a) to (f)

TABLE 4.4 : Basic understandings and skills related to Multiplication and the serial numbers of the items which assess them.

Sl. No.	Criterian measures	Sl. No. of the Test items
1.	Meaning of sign 'X'	Throughout the test of this sections
2.	Multiplying single digit numbers by single digit numbers.	I (a) to (c)
3.	Multiplying Multidigit numbers according to correct sequence of places by (i) Single digit numbers.	I (d), (f), (g) (h), (i) & (l)
	(ii) Multiple digit numbers :	
	(a) with '0'	I (e)
	(b) without '0'	I (j), (k) & (m)
5.	Seriating the given sums in an ascending order on the basis of products.	II
5.	Mixed addition, subtraction and multiplication requiring appropriate categorization.	III (1) to (6)
6.	Solving simple problems involving –	
	(a) Verbal and numerical relations.	IV 4 (a) and (b)
	(b) Verbal numerical & spatial relations.	IV 1 (a) & (b) 2 (a) & (b) 3 (a) & (b)
7.	Checking equality and inequality between sums.	V

TABLE : 4.5 Basic understanding and skills relating to Division and the serial numbers of the items which assess them.

Sl. No.	Criterian Measures.	Sl. No. of the Test Items.
1	Meaning of signs ÷ and) (	Throughout the test of this section.
2	Dividing numbers which can be perfectly/ clearly divided by the given diviser.	I (a), (b) & (c)
3	Dividing numbers which cannot be clearly divided by the given diviser.	II (a) (b) (c) & (e)
4	Dividing where deviser is larger than the relevant components of the divident.	II (b) to (e)
5	Mixed addition, subtraction and division requiring appropriate categorization.	III 1(a) & (b) to 6 (a) & (b)
6	Solving simple problems involving verbal and numerical relations.	IV I (a) & (b) to 4 (a) & (b)

The above tables clearly reveal that due weightage and adequate representation is given to almost all the criterion measures that are appropriate to all the four grades of the primary schools.

The above arithmetic diagnastic test was administered (Ramaa, 1990) to a group of 251 children who were normal in reading and writing. They exhibited the following types of Inappropriate Inadearate responses.

TABLE : 5 General tendency of Inappropriate/Inadequate to Responses whill doing Arithmetic sums and the frequency of children who showed such responses.

Sl. No.	Inappropriate/Inadequate response.	Possible reasons	Number of children who showed such responses.
1	Difficulty in in htgher order tasks relating to each area of arithmetic tested.	Unfamiliarity of the tasks.	118
2	Inconsistant, response to similar kinds of tasks.	Lack of adequate exercise.	45
3	Difficulty only in the recently introduced arithmetic operations.	Lack of sufficient exposure.	23
4	Failure to perform lower order tasks even though capable of handling higher order ones.	Carelessness.	25
5	Incomplete without obvious reason.	Lack of perseverance.	25
6	Consistant failure even in most basic skills.	Disability to learn Arithmetic.	15

The above table learly indicates only in 15 out of 251 cases the arithmetic difficulty exhibited by the children could be attributed to disability in arithmetic, that is, dyscalculia. Those 15 children were considered as dyscalculics. Thus the prevalence of dyscalculics who are free from dyslexia and dysgraphia is 6% in the population studied. This figure is exactly same to that noticed by Kose (1974).

A detailed analysis of the errors committed by those dyscalculics was done. On the basis of the analysis of the difficulties faced by all the 15 dyscalculics the following inferences were drawn by Ramaa (1990).

a) Dyscalculics differ among themselves in acquiring certain most basic concepts and skills. Some of them can learn them whereas others cannot. But anyhow it is not possible to find out sub-categories in terms of arithmetic difficulties.

b) Majority of them experience difficulty in reading and writing integers with more than 2 digits.

c) Difficulty in sequential reproduction and seriation of numbers with more than two digits can be considered as indicators of Dyscalculia.

d) Dyscalculics do not find difficulty in adding single digit numbers even in the lower grades of primary school. Adding multidigit numbers without necessity for carryover differentiates dyscalculics of II and III grades from that of Grade IV as majority of the latter find them easy. Performing tasks involving carryover seems to be difficult to dyscalculics of even Grade IV.

e) Solving simple problems of addition involving verbal and numerical relations appears to be difficult to dyscalculics of grades II and III, whereas dyscalculics of grades IV are able to do them. It appears that minimum skills of addition is sufficient to solve such problems in the case of dyscalculics who are normal in reading.

f) Only minimum level of skills relating to subtraction can be noticed among dyscalculics of grade IV whereas even that is absent in the case of dyscalculics of grades II and III.

g) Solving simple problems of subtraction involving verbal and numerical relations seems to be difficult to some dyscalculics of even grade IV indicating that dyscalculics vary in mastering problem solving skills involving different kinds of arithmetic operations.

h) Dyscalculics have extreme difficulty in fraction terminology and basic operations (addition/subtrction) involving fractions. They also experience serious difficulty in acquiring even simple multiplication division skills. This finding supports the conclusion drawn by McLeod and Armstrong (1982) that learning disabled youth of secondary age also have difficulty in the above mentioned skills.

i) Dyscalculics in general have difficulty in understanding and applying algorithms relating to different arithmetic processes.

j) Considerable number of dyscalculics find difficulty in solving simple problems involving verbal, numerical and spatial relations eventhough they are capable of solving problems without spatial relations. This indicates that some dyscalculics are deficient in spatial relations.

k) Almost all the dyscalculics of the present study failed to solve problems involving spatial and numerical relations and only numerical relations. This may be attributed to deficiency in prequi. site skills mainly.

In addition to the analysis of the arithmetic difficulties experienced by dyscalculics Ramaa (1990) was also further attempted to find out the common types of errors committed by them. The table-6 shows the types of errors, examples and also the number of dyscalculics who committed such kinds of errors which were observed by her.

TABLE 6 : Types of errors, examples and number of dyscalculics who committed them.

Sl. No.	Types of errors.	Examples	No. of dyscalculics who committed such mistakes. (N=15)
1	Rotation of numbers	5=ƨ 9=ρ	1
2	Reversing the digits.	12=21 16=61	2
3	Reading digitwise (lack the concept of place value	1008 as one, zero, zero, eight.	9
4	Writing the numbers as we say.	Four hondred and fifty as 40050.	9
5	Lack the knowledge of carryover.	24 37 511	9
6	Subtracting lower number from the higher number irrespective of the place (simplification of the task).	72 45 33	10
7	Multiplication of numbers in a wrong sequence/writing the product in a wrong place.	125 × 21 2410 125 2535	7

		125 × 21 125 2410 14910	
8	Multiplying in between dividing (Lack of concept of division)·	283 7 ⟌ 473 28 283	8
9	Bizzare errors.	15 — 7 = 1	8
		21 × 7 47	7
		10110101 3 ⟌ 95 30 65 30	7

The first type of errors committed by a child of grade IV. This may be due to deficient visual memory. The second type of errors was observed in the children of grade IV. This can be attributed to deficiency in visual sequential memory and also to lack of concept of place value.

The frequency of dyscalculics who committed the remaining types of errors (3–9) are almost same. They imply that majority of the dyscalculics have diffIculty in understanding and remembering the rules that govern different arithmetic operations. On the basis of the above observation Ramaa (1990) has recommended that there is a need for enablieg dyscalculics to become consciously aware of those rules and providing enough opportunity to apply them. Mere drill work may not help them in any way. Verbalization of the relevant principles by the teacher while teaching arithmetic may be more effective than simply showing the method of operating. That means teachers have to enable the children not only to understand how a particular operation is done but also to make them understand why it has to be done in such a way only.

Biey N.S and Thorntori AC (cited in Grearheart, et. al 1986) have made an attempt to explain the specific difficulties faced by the arithmetic disabled children in terms of their cognitive deficits. The knowledge about the relationship between specific cognitive deficits and also specific difficulties in arithmetic would help in providing remedial teaching to dyscalculics. The table 7 gives a summary cf such a relationship.

TABLE 7 : Cognitive–Processing Factors Related to Students' Mathematics Disabilities.

Cognitive Processes	Behavioral Manifestation
Attention	
Impulsivity	Rapid guessing and incorrect and unstable responses. Careless computational errors. Attention to extraneous details in problem solving.
Distractibility	Off task and unable to complete assigned work within prescribed time. Inability to complete one problem or arithmetic example prior to proceeding to next problem. Difficulty sequencing and completing multistep computational tasks.
Perseveration	Overattention to task-works slowly and reviews work several times. Inability to switch from one operation to the next (adition to subtraction).
Perception	
Visual spatial	Inobility spacing manipulatives into patterns and sets. Problems copying shapes and writing examples in straight columns on paper. Directional problems are noted in vertical computation (addition) and horizontal regrouping (subtraction), in aligning numbers in multiplication and division computation, in appropriate placement of decimal point, and in using number line.
Visual figureground	Loses place on worksheet and is unable to complete problems on page. Difficulty with place value and reading multidigit numbers.
Visual discrimination	Difficulty differentiating between numbers, coins, operational symbols (+, —, ×, ÷), and hour and minute hands on the clock.
Visual motor	Difficulty copying and writing numbers with speed and accuracy.
Auditory temporal	Difficulty with before and after concepts and telling time. Inability to follow auditory number patterns and to count in a sequence. Difficulty sequencing and writing numbers from dictation.

Memory

Sequential	Difficulty counting rationally. Inability to complete sequential steps in multistep computation examples and word problems. Inability to remember math facts on a short-term and long-term basis. Forgets meaning of operational symbols (+, —, ×, ÷) and other mathematical symbols (=, >, <). Difficulty remembering steps and rules in an algorithm.

Source : Gearheart R. Bill, et. al 1986.

From the above table it is very much clear the child's problems like impulsivits, distractalisty and perserveration should be controlled in order to improve their mathematical performance. In addition to that the specific principles of remedial programme in arithmetic should compensate for the cognitive deficit among the children with dyscalculia.

[Source : Ramaa. S (1992), Handbook on Learning disabilities, RIE, Mysore]

General Principles and Strategies for Remediation of Learning Disabilities :

Dr. Ramaa. S RIE, Mysore

The remediation of learning disabilities depends upon the type of learning disability, behavioural symptoms exhibited by the child in the particular area of disability, various correlates/causes of the problems encountered by the child, as discussed in the chapter II. The table 2 given in the chapter I and section 1.2 indicates the different types of learning disabilities, the possible causes and also the implications for the remediation. From these discussions it can be understood that objectives of the remediation of learning disabilities are of three fold :

1. Correcting underlying biological defects/deficiencies whenever possible through medical intervention.

2. Developing the neuropsychological processes (perception, memory, reception, association) which are essential for mastering oral language, reading, writing and arithmetic skills, in which the child is deficient. This can be achieved through series of systematic activities involving multi-sensory stimulation. To begin with, exercises will be given to develop individual abilities and integration of these abilities would be attempted at the later stage. Development of these abilities will be linked with specific academic skill at the final stage. This approach can be termed as Deficit-Oriented Approach.

   Though, most of the curricular, co-curricular activitis performed in the class-room develop the abilities indirectly, such a process is too slow and inadequate. So, deliberate and intensive attempts should be made for the development of the basic abilities. If such attempts are successful in developing the abilities in which the child is deficient, he will become on par with the normal children as far as learning abilities are concerned. In such a case there would not be any need to adopt special methods to teach academic skills to him. Thus the procedure appears to be ideal. But, it suffers from serious practical difficulties. It requires predominantly individualised instruction in a resource room setting. It consumes lot of time and energy. That is why usually deficit-orinted approach is adopted only in the case of severely learning disabled, who cannot be taught academic skills without developing basic abilities.

3. Developing academic skills through strength oriented approaches involve programmes which are developed on the basis of specific principles to teach learning disabled, nature of the skill to be developed, the specific difficulties experienced by the child in the area of the skill. Though the programme considers the strengths

and weaknesses of the child in the basic neuropsychological processes essential for mastering the skill, it is predominantly a strength-oriented approach, in the sense the strengths of the children are utilized to develop the academic skills, rather than attempting to develop the abilities in which they are deficient. As the abilities are not developed through this approach the child has to be dependent on special programmes and procedures only to acquire different academic skills. Thus it is inadequate by itself. But this is the most feasible technique which can be adopted in the case of children with milder degrees of learning disabilities who are studying in the schools meant for normal children and where in resource-room facilities are not available. It is economical in terms of time and energy.

The classroom teachers can provide this kind of remediation to the learning disabled during leisure time by alotting some time in the time-table for this purpose only. In addition, the teachers can involve the parents or any other able members of the child's family or even bright senior students for providing remedial teaching to the learning disabled child.

Usually, the deficit oriented approach and strength-oriented approaches are together called as psychoeducational procedures. Both these approaches imply the need for knowledge about the strengths and weaknesses of the child on the part of the teachers. It is highly difficult for the regular classroom teachers to assess the neuropsychological processes of the children, and decide which approach of teaching is better in the case of a particular child. In order to save the teacher from such a burden, the remedial programmes based on multisensory approach and also the approaches which are electric in nature (considering the salient features of different approaches for achieving an objective) are recommended. Through these kinds of programmes the teachers can teach learning disabled children, even in the absence of data about neuropsychological strengths and weaknesses of them.

Int he handbook it is attempted to introduce the basic principles and specific strategies that are aimed at :

1. Remediating the academic difficulties and
2. Overcoming the behavicur problems.

among learning disabled children.

The discussion relating to the remediation of oral language disorders which are possible only through intensive training on one-to-one basis) individualized instruction) is beyond the scope of this book. However, the strategies that may be useful for developing certain basic concepts and comprehension skills are discurred as they are also part and parcel of academit learning and which can be easily achieved in the regular classroom.

[Source : Ramaa.S (1992) Handbook on Learning disabilities, RIE, Mysore]

Development of Basic Concepts and Comprehension Skills

Dr. Rama.S. RIE, Mysore.

5.1 Development of Basic Concepts :

Sufficient mastery of basic concepts by children is essential to understand and follow the directions used in instruction. Boehm (1970) has observed that nearly 60% of the children entering kindergarten have not yet attained certain concepts. Further he has noticed that the pupil who starts out behind not only tends to remain behind, but also the gap between good and poor achievers tends to become wider and wider over time.

A concept is a symbolic construction that represents some common and general feature or features of objects or events. In otherwards it is a general idea about objects, animals, events etc. Infact most of the nouns in our vacabulary are names of concepts ; the only exceptions are proper nouns.

Normal development with regard to concept formation depends upon the abilities to differentiate, abstract, generalise, and categorize.

The ability to form concepts enables us to divide things into classes. Since concepts are ways of classifying the diverse elements in the world around us, they are convenient tools to use in thinking about the world and solving problems.

Types of Concepts : There are different ways of classifying the concepts. The Broder ones are as follows :

A. *Simple Concepts :* Represent single property, feature, or attribute. (Ex : Red, length)

Complex Concepts : Concepts which represent several common properties.

B. *Concrete Concepts :* Which can be shown, demonstrated and picturised easily.

Abstract Concepts : Which can not be easily concretized, can be made clear through analogies, verbal descriptions and illustrations.

Intervention Principles :

On the basis of the observations of normal developmental patterns in acquiring word meanings and of the characteristics of semantic deficits among LD Youth Wiig and Semel (1984) have suggested certain principles for invertention. A few of them are as follows :

1. Unfamiliar or unestablished word, concepts, or relational terms should be introduced in sequences that follow normal developmental patterns and sequences.

2. Unfamiliar words, concepts and relationships should be introduced in their most familiar semantic and referential contexts (for example : "the balloon goes up"). The range of application of the words and concepts should then be extended to include less typical semantic and referential contexts.

3. Semantically related words and concepts should be taught in sequences that introduce words wiih features that are more general or semantically less complex before words with features that are more specific or semantically more complex (big/tall/wide and "give/pay"/ trade").

4. Antonyms should be introduced in sequences in which the unexpected member that denotes a change from the most common use is presented first (for example, "Turn the light on"). The expected opposite should be presented next ("Turn the light off").

5. Sentences used to feature unfamiliar or unestablished words, concepts, and relationships should be rather short and simple.

6. Materials and methods should feature real life or pictorial referents and relationships wherever possible.

7. Unfamiliar or unestablished words, concepts, and relationships should be introduced in several familar, typical, and at different contexts. Pictorial representations of meaning should be featured along with the spoken labels. Features providing verbal definitions and elaboration of meaning should be given for the concepts in each of the different contexts.

8. The range of application of new concepts should be extended to less familiar and typical and more specific semantically complex and abstract semantic contexts in a number of examples. A variety of task formats should be established to increase the opportunities to generalize.

9. Descriptive communication tasks and role-playing activities should be scheduled to extend the range of application and control of specific concepts to subjects such as mathematics and the sciences.

One of the important intervention principles states that the teaching of unfamiliar concepts should follow normal developmental pattern and sequence. Thus there is a need to understand the normal course of development of basic concepts, expecially spatial and Temporal concepts. Such an understanding helps us to identify the concepts within each of the above mentioned categories of concepts and to group them on the basis of the relatedness. Further, it provides guideline to arrange these groups of concepts in appropriate sequence which leads to cumulative learning, and to teach them accordingly. In addition it also helps in detecting the difficulties/delays that may be there among the probable L.D children in attaining specific areas of development.

1. *Development of Spatial Concepts :*

Kephart (1971) pointed out that children must have stable spatial cancepts to deal successfully with the group as objects in space and the grouping phenomena involved in mathematics. He viewed the development of a stable spatial world as the most complicated of our reading skills.

Developmental Sequence

Our spatial concepts are learned through our experiences with the things that surround us. The development of spatial concepts begins when infants *learn to locate* objects by reaching out and touching them. These movements involve a variety of muscle and joint movements which can produce a different physical sensation. After considerable practice of these movements, children learn to associate these different sensations with the directton and distance each object is located from their bodies.

As children grow older they start following their hands with their eyes. This results in the first experiences with *visual–motor* match. Children's eyes are being led by their hands at this point.

Later on children learn to fix their eyes upon an object and then move their hands to the point in space where the object is located. This shows that children's visual–spatial development has reached the point where their eyes are leading their hands.

Definition of the space within reach of the child's fingertips is followed by projection of these concepts of space to objects which are located beyond the reach of his or her fingertips. This requires the child to determine the location of objects safely on the basis of the size of the image which appears on the retina of his or her eye or to move his or her entire body to a point where the object can be touched. The movement of eye muscles required to focus upon objects at different distances gives the child a basis for projecting spatial concepts beyond the fingertips.

Position in Space

Children first learn to relate single objects in space to their own bodies. Frostig (1961) referred to this one-to-one relationshis as position in space.

Spatial Relations

The development of the concept of position in space is followed by the development of what frostig calls spatial relations. Spatial relations involve the relationship of two objects to our body and the relationship of these two objects to each other.

Dimensions of Space :

Euclidian Spatial System :

Our spatial concepts are based upon height, width and depth, the three dimensions of the Euclidean Spatial System. These three dimensions divide space vertically (up and down), horizontally (left and right,) and fore and aft (Kephart, 1971)

The Point of Origin

Each person's concept of space is based upon a point of origin, which can be conceived as a vertical line running through the center of the body from head to foot, dividing the body into a left and a right half and a front and back half. This point of origin is referred to as the midline of the body.

Each of us subconsciously develops a spatial gird to explain the space around

us. The midline of our own body serves as the point of origin on this gird.

Vertical Dimension :

The vertical dimension of this spatial gird is defined by drawing horizontal lines which cross the midline of the body. These lines make it possible to indicate the height of objects.

Horizontal Dimension :

The horizontal dimension defines space in terms of the distance of an object to the right or left of the person's midline. The concept of right and left develops within the body and is then projected to objects beyond the fingertips. This internal concept of horizontal space is called *laterality*. The projection of the horizontal dimension into the space beyond the fingertips is called *directionality*.

The *third dimension* of space involves definition of the area which lies behind and in front of the midline of the body.

II. *Development of Temporal Concepts :*

The fourth dimension of space is time, the temporal dimension makes it possible permanently to locate objects in space by indications where the object was located yesterday, where it is today and where it will be tomorrow. The three dimensions of Ecludian space (up and down, left and right, and fore nad aft) describe objects as they currently appear. These three dimensions fail to tell us where the object was yesterday or where it will be tomorrow.

Kephart (1960, 1971) pointed out that four factors are involved in a stable concept of time ; Simultaneity, rhythm, pace, and sequence.

Simultaneity : Simultaneity means that two events happen at exactly the same point in time. This lack of an interval between events serves as a point of orgin from which time intervals are differentiated.

Practice of motaric activities which promote the development of coordination is helpful to children who are experiencing trouble learning the second act. This interval serves as the basis of rhythm.

Rhythm : Rhythm consists of a series of intervals which are of equal length. This series of equal time intervals makes up a temporal scale. The primary requirement for creating a scale is consistency from unit to unit. Rhythm supplies these consistent units.

Rhythm can be observed motorically in acts which require a series of movements which involve equal time intervals.

Pace : Pace refers to variation in the size of temporal elements that occur within a rhythmic unit. The smaller the elements, the more rapid the pace, the longer the temporal units, the slower the pace.

Sequence : Sequence is the organizing factor in the development of stable temporal concepts. It shows the order in which the rhythmic units appear on a temporal scale.

III. *Development of Quantitative Concepts :*

Seriation and conservation are the two operations which are related to development of quantitative concepts. The

ability to seriate will be followed by ability to judge conservation. The different aspects of seriation are length seriation, Area Seriation, Volume Seriation, Weight Seriation. Boerlara (1974) suggested that number and discontinuous quantity, space and substance would be developed between 7 and 8 years of age, with weight being conserved between 8–9 years of age.

Development of other categories of concepts and classes

The development and concepts relating to actions, state of objects, and living things, as well as common instruments are mainly dependent upon the opportunity available to learn them. There may not be any definite pattern or sequence of developing them. However they can be graded in terms of extent of familiarity in a particular culture, complexity involved in learning them, finer discriminations involved in them, knowledge in pre-requisite concepts, etc.

Development of classes dependent upon the mastery over the basic concepts as well as the ability to categorize.

IV. Categories of the Concepts :

The various basic concepts can be classified into the following categories on the basis of the developmental sequence discussed above.

I. Spatial (location, direction, orientation dimensions)

a) *Vertical Dimension*

Up, Down
On, Above, Over
Below, Under, Beneath
Top, Bottom

b) *Horizontal Dimension*

Infront, Behind
Left, Right
Towards, Away from
Next to, Near (Close), Far
Nearer, Farther
Nearest, Farthest
Row

c) *Both the Dimensions*

In, Out
Inside, Outside
Corner, center
Between, Middle
Separated, Together
Around, Allover, Nowhere
Inorder, Not Inorder
Through

II. Temporal Concepts

a) Simultaneity :
At the same time/together
One after the other

b) Rhythm :
Rhythmic Non-Rhythmic

c) Pace :
Fast Slow
Faster Slower
Fastest Slowest

d) Sequence :
First, Second, Third, Last
Beginning, After, End

III. Quantitative Concepts

More Less Equal
Whole Half
Small Big
Short Tall
Young Old
Every one/ Each one
All Several

A Few	Some	Most	Almost
Long	Tall	Wider	Big
Longer	Taller	Wider	Bigger
Longest	Tallest	Widest	Biggest
	Light	Heavy	
	Single	Pair	
Nothing	None	Nobody	

IV *Actions*

bake
buy
blow
carry
climb
comb
cook
cut
dance
distribute
draw
paint
drive
ride
clean
dust
sweep
wash
wipe
pour
add
mix
hide
travel
shut
open
close
arrange
add
swim
divide

sail
weigh
destroy
spoil
dig
plough
stitch
tear
wear
chase
steal
skill
grind

V *States of objects & Living Things*

dry
wet
clean
dirty
empty
full
hurt
injured
broken
torn
rotton
spoiled
sick
healthy
strong
weak
old
young
sleep
awake
dead
alive

Common Instruments and devices (Uses)

knife, Scissors, Nail, Screwdriver, Saw, Axe, Needle, hammer, measuring jar, Scale, tape, clock, sewing machine, typewriter, stethoscope, telephone grinder, physical balance, radio, T.V., Taperecorder, Umbrella, Camera, ladder.

VI *Classes*

Human beings/people

animals	things
birds	furniture
plants	seasons
fruits	nature
vegetables	vehicles
cereals	Household utensils
insects	musical instruments
flowers	dresses
leaves	jewels

Group teaching procedures may be used when an entire class is found to experiencing difficulty with a certain concept or group of concepts. Usually, a more individualized approach will be required when working with learning disabled children. In addition to that, learning disabled need more repetition in variety of situations to develop any concept or skills. In order to ensure such an opportunity to them the following suggestions may be helpful :

1. The teacher can verbalize any classroom activity-drawing, demonstration of certain activities, children's play situations etc.

For Ex : While writing a diagram, say, a parrot on the blackboard, the teacher can describe the location colour, size of the different parts of it, etc. Similarly when he is conducting an experiment, he can describe the shape and size of the apparatus used, the order of arrangement, the sequence of various steps involved in it etc.

2. The teacher can make the children describe the diagrams, apparatus, events by asking simple questions.

3. The teacher can distribute these kinds of questions in such a way that both learning disabled and normal children will get almost equal chances to answer them.

4. The questions can test both respective and expressive aspects of the concept development. For example :- How are the children standing ?

   Arrange them in a row, etc.
   Where are they located ?
   What is there in the corner ?
   How many items are there ?
   Which is having more weight ?

5. Preparing certain charts which indicate the meaning of the concepts and display them in the classroom. For example Map of the School indicating the directions, picture of a garden indicating the locations of various components of it, pictures depicting the quantitative concepts/temporal concepts. The pictures should as far as possible depict natural situations rather than artifical ones.

The development of basic concepts among young L D children can be facilitated through the use of instructional materials/manuals. Such materials are especially useful to parents/resource teachers or any other persons who can provide individualized instruction to L D children. Some of the guidelines given below may be of use while developing such instructional materials/manuals. There is a need to develop such materials in each language separately.

Certain Guideline for preparation of Instructional Material for developing Basic concepts among Learning Disabled children :

1) The material should help both in diagnosis and intervention. Thus it should follow a diagonstic–prescriptive teaching approach.

2) The concepts have difficulty in which Learning Disabled children should be selected and attempted to develop the same among them.

3) The intervention principles already suggested should be duly taken into consideration.

4) Certain important principles which are suggested for teaching reading to Learning Disabled children may be also useful in teaching concepts to them. They are as follows :

Variety of situations, familiarity of vocabulary used, clarifying sensory experiences, active involvement of the child in the learning process, meaningfulness of the learning experience, multi-sensory stimulation, verbalization, use of nemonics, developing and sustaining motivation, immediate feed back, therapeutic approach (for details see Chapter VI).

In order to avoid negative transfer children should be helped to identify both similarities and dissimilarities among different concepts While teaching concepts which represent opposing attributes (for Ex : Top-Botton, Left-right) and also which have only finer discriminations (Baking-cooking, riding-driving) Caution should be taken to see whether children have attained mastery level in one concept before introducing the other concepts.

6) The concepts should be presented through the use of concrete materials and specifically labeling the concepts. They should be used in several concrete situations so that the label does not become tied to one object or situation.

7) Life situations and various activittes should be made use of for developing the specific concepts. The activities should involve manipulation of materials–rearranging, redrawing or reorganising.

8) The pictures which depict single concept and combinations of concepts

should be large, vivid and well spaced on the page.

9) The depth and scope of concepts usage can be fostered by using concepts in combinations focusing attention on opposites and on degree.

10) The relevent information (essential attributes) should be made available to the learner at the same time, instead of providing only a piece of information at a time.

11) To begin with activities and pictures representing a single concept should be presented followed by pictures representing increasing number of concepts and different categories of concepts. They should come in a meaningful combination. A single activity or situation may be helpful in teaching several concepts.

For Ex : 1) Preparation of Lemon Juice : The mother *cutting* the lemon, taking water in the vessel, *squeezing* lemon in to the water, *adding* sugar to the lemonoid water, *mixing* them together.

2) The cat has jumped *over* the table. The Ink bottle *fell down*, the bottle *broken*, the room has become *dirty*.

The sequence of activities/events should be clearly illustrated.

12) The concept of different colours and shapes can be taught by describing the objects/pictures that are used to teach other concepts. Similarly the concepts of common instruments can be taught along with action-related concepts.

13) The child's receptive and expressive vocabulary should be developed. Suitable questions should be asked for this purpose. Conversational technique should be adopted.

14) The child should be made to describe a particular object/picture/event which illustrates a particular set of concepts (listing out the essential attributes). The child may be even asked to name the object which has a set of attributes.

For Ex : The object which is round in shape, small in size, coloured differently, made out of glass, children use them for playing. The child should identify such an object as marble.

The child should also be expected to differentiate this from other set of attributes relating to the concept of a ball.

5.2 Improving Comprehension Skills :

Here, the term comprehension refers to comprehending information provided through different sensory modalities and answering the questions relating to the topic of discussion. The responses may be as simple as naming the attributes of an object or picture or may be as complex as giving explanation to a particular phenomenon. Thus the exercises included in the remedial progyammes meant for development of comprehension skills not only develop receptive, integrative and expressive aspects of comprehension but also can help the child in overcoming

formulation and syntax difficulties (vide chapter 1, section 1.2) with reference to spoken language. In addition, they can also improve the general level of comprehension about various aspects of life. Since learning disabled children have average or above average intelligence, they can be made to involve in discussion about wider variety of situations.

Teachers and parents can use life situations as aids for developing comprehension skills. Certain activities suggested by Cruickshank et al (1980) (cited in Srivastava and Srivastava, 1983) for slow learners may be of use in the case of the learning disabled also. The activities are as follows :

a) Choose an object such as an item furniture, an animal or a book of comics. Try to involve the children in discussing about the properties of these objects. Specific questions should be asked about each property.

b) Take the children to a special room of the school, such as library or laboratory or sports room. Engage the children in discussion about the objects present in those rooms in the same way as suggested above.

c) Take the children to a special outdoor areas, such as the playground, garden, market, etc. Ask questions relating to the specific characteristics of the area.

d) Buy or make a picture book of items that are in the children's immediate environment. Let the children look at the item pictured in the book and then point to the red item in the room. Let the child tell their names and also verbalize the size, shape, colour, texture etc. of those items.

e) Have the children close the eyes and try to recognize everyday objects by the sound they make ; for example, windows opening and closing, writing on the blackboard/slate. Let the child verbalize the sensory experience.

f) Choose a set of objects that can be identified by one of the senses acting alone ; the smell of oil, the taste of a fruit, the feel of an ice cube. Deprive the children of their other senses by blind folding, holding their nose ; then let them attempt to identify the objects by using only one of their senses, and label/describe the sensory experience.

Questioning — Technique has been considered as an important tool of mind sharpening among slow learners by Srivastava and Srivastava (1983). The same technique can be adopted among learning disabled to develop receptive, integrative and expressive aspects of comprehension, develop proper formulation and syntax skills ; and also to improve the level of general comprehension among them. While asking the questions the following points (Srivastava and Srivastava 1983) have to be kept in mind.

a) The question should be as specific and brief as may be possible.

b) The question should be stated clearly and in a direct manner. Do not put a long introduction to a question.

c) A question should be relevant and connected with the concerned topic or material.

d) The question should be appropriate to the age and mental ability of the child, context in which a question is being posed, local and family elements of the child and the quality of responses by the child in earlier attempts.

Depending upon the objective or expected behavioural outcomes the questions can be classified into following major types (Srivastava and Srivastava, 1983) :

i) Comparison type question to find out likeness and differences in various items. These are identified through reflective thinking.

Eg : What is the difference between a fair and a market ?

ii) For and against type question — Do you think it is correct to get up early in the morning.

iii) Using new situation type question —Suggest ways for keeping the school premises clean.

iv) Classification type question–Classify the given objects into different groups.

v) Cause and effect type question— What happens if you eat out fruits selling roadside ?

vi) Illustration type question-Describe a situation where you helped your friend.

vii) Statement of aim type-question— Why do you come to school ?

viii) Criticism type question—Why did you get less marks in the last test ?

ix) Inference type question—What happens if there is no rain for one year ?

x) Discussion type question—Discuss the importance of school uniform.

xi) Outline type question—Outline the activities of the class-leader (monitor).

xii) Explanation type question—Explain how boiled water is better than unboiled water.

xiii) Recall type question—What are the important places you have seen during your excursion with your parents ?

xiv) Summary type question—Tell the story of the children's movie you have seen.

xv) Observation type question—How many pairs of wings and how many pairs of legs are there in the butterfly ?

xvi) Question—initiating type question —What questions occur to your mind after listening to this story ?

The teachers/parents may be benefitted by the following guidelines while adopting questioning as a technique for improving comprehension and spoken language skills among learning disabled :

1. The question should be related to an interesting and easily assimiable topic. The major purpose of questioning in the case of learning disabled is not to sharpen the mind. Rather to facilitate development of—

a) *Inner language :*

i) Establish verbal imagery for sounds, words concepts, etc.

ii) Use the complex maze of skills needed in the logical thinking process.

b) *Auditory comprehension and listening :*

i) ability to follow direction.

ii) comprehension of class discussion.

iii) ability to retain orally given information.

iv) comprehension of word meanings.

c) *Spoken language :*

i) ability to speak in complete sentence using accurate sentence structure.

ii) vocabulary ability.

iii) ability to recall words.

iv) ability to formulate ideas from isolated facts.

v) ability to tell stories and relate experiences.

2. The teachers and parents have to prepare a series of questions which fall under each major type of questions. It is better to analyse the expected answers in terms of key concepts and sequences of ideas and sentence structure. This kind of exercises help in verifying whether the children have attained mastery over them. In addition, they also help in providing adequate repetition through variety of situations.

3. Picture stories and verbal stories can be used as the basis for discussion in addition to personal experiences of the children.

4. Feedback should be provided so that he knows whether his response is correct or not. The correct responses have to be reinforced immediately and clearly. Mistakes have to be corrected then and there itself.

[Source: Ramaa. S (1992) Handbook on Learning Disabilities, RIE, Mysore]

Remediation of Reading Disability

Though certain amount of mastery over oral communication skills are essential for learning reading skills, attempt to correct the difficulty in the later can be made simultaneously. At certain stage attainment of oral communication skills and reading skills would be complimentary to each other. The symptoms of reading disability (vide chapter III and section 3.1) imply that, initially reading disabled (dyslexics) children have to be helped to develop word-attacking skills (letter knowledge, word analysis and synthesis skills) and automaticity in reading (optimum rate of reading). After sufficient mastery over these skills, training should be given in developing higher-order skills of reading.

6.1 Specific Principles for Teaching Reading to Dyslexics :

The remedial reading programmes for dyslexics have to be based on the following specific principles suggested by various experts like Tanslay (1967), Newton (1980), Richardson, et al 1971) and Stauffer (1951) :

1. Dyslexic children need to over-learn information so that it is not forgotten. Therefore, considerable amount of time should be devoted to revision of earlier work.

2. Because the dyslexic child forgets quickly new material should be presented frequently and in a number of ways. Thus

   learning appears to be optimal after the following stages have been followed :

   recognition
   recall
   relearning
   recall

3. Remedial help should refer to the precise skill to be learned rather than to an assumed gross deficit. Thus, b/d, confusions may well be a product of directional confusion, but it is more productive if the child is trained specifically on b/d discirminations, rather than on general directions.

4. In selecting the child's beginning reading vocabulary, it should be made sure that the words are within the student's range of experience and different with reference to sound and visual configurations.

5. Learning must be guided, controlled and made explicit in the early stages. This implies that training may be needed to clarify sensory experiences.

6. Treatment must be consistent and regular.

7. The child must be actively involved in the learning process, rather

than passively assimilating. The child should be allowed to discover the rule if possible and then define it.

8. The child should be continuously busy at a 'meaningful' task during the remedial session. Immediate feedback is essential for the child to evaluate the adequacy of this response. Also, the teacher should either prevent, or immediately correct, spelling errors to ensure continuous reinforcement of correct spelling patterns and thus aid assimilation and memory.

9. Multi-sensory attack should be made using visual, auditory tactile and kinaesthetic links supported by spoken language, nemonics and verbalizations.

10. Because, the dyslexic child has had a lot school failure, it is possible that he has become very undermotivated then he is presented with the written word. To help him become more motivated the following tactics may be helpful :

i) The initial part of the remedial session should involve activities on which the child should achieve success as easily as possible, since this will act as a motivator.

ii) The learning task should be divided into subskills so that the child can master each of them easily and keep himself highly motivated throughout learning the task.

11. A more therapeutic approach is needed, that means, teaching must inspire the non-reader to new efforts and increased confidence. The establishment of good teacher-child relationships which encourage cooperation, hopefulness, renewed interest and enthusiasm, and a will to succeed is absolutely essential. The teacher must establish a 'partnership' with the child in teaching what is in essence a problem for both of them.

In addition to the aforementioned principles, the remedial reading programme should also take into consideration the salient features of the scripts of the particular language which has to be taught to the child. In the case of most of the Indian languages, each letter of a particular script denotes a distinct sound of that language. One important advantage of such a system is that it is possible to coin a number of different words with a given set of letters so that sufficient practice can be given to learn them adequately. As there is considerable similarity among scripts of different Indian languages with reference to regularity in correspondence between grapheme and phoneme, the specific strategies adopted in the remedial reading programme relating to one language can be applicable to that of other languages also. Thus, the description of the salient features of the remedial reading programme for dyslexics of Kannada language (Ramaa, 1985) given below may provide sufficient guidelines for developing remedial reading programme in the case of the other Indian languages also.

6.2 Salient features of a Remedial Reading Programme for Teaching Kannada to Dyslexics.

The remedial programe was based on the neuropsychological strengths and weaknesses of the dyslexis, kinds of reading errors committed by them, relevant learning principles as well as on the salient features of the script of Kannada language. The programme mainly constitutes teaching of Kannada alphabet, 'Kagunitha' (consonent & vowel combination), and other accssory forms and to give practice in word analysis and synthesis through a number of lessons.

These lessons have the following characteristic features :

1. Each lesson has two specific objectives –
   a) providing opportunities to establish association between particular grapheme and phoneme.
   b) giving practice in analysis and synthesis of particular words.
2. Each lesson except the first one introduce only one grapheme at a time ; the first lesson has two letters to be learnt.
3. The order of teaching grapheme does not follow the conventional sequence. Teaching of these letters which occur less frequency sometimes follow that of teaching 'Kagunitha' (symbol system representing consonant & vowel combinations) and other accessory forms representing CCV combinations.
4. Each lesson includes a number of words that could be coined out of graphemes taught in that lesson, as well as those in the previous lessons. The number of words in each lesson may vary from 2 to 15. Thus there is a provision for cumulative learning and practice.
5. The lessons are arranged in a particular order, which allows sufficient revision and evaluation of the previous learning as well as practice for the present learning. So, the lessons should be taught in the same sequence.
6. By learning only one new letter, the child can read and write the remaining words of each lesson. Thus, the motivation of the child can be maintained at a higher level.
7. If the child can read the first word of any lesson on his own, it suggests that he can read and write all the remaining words of that lesson. In that case there is no need to teach that lesson through special efforts.
8. The lessons not only help for remediation but also to find out what the child knows and doesn't know and also to diagnose specific difficulties. The programme thus helps for diagnostic – prescriptive teaching.
9. The lessons need to be taught individually and allow each child to learn at his own pace.
10. The important feature of the programme is, it neither follows an alphabetic approach nor a whole word approach completely. It follows an eclectic approach. Since the

lessons are cumulative in nature, there is adequate opportunity for the child to practice and learn new letters. The child can make use of his letter knowledge and word analysis and synthesis ability in recognising and writing new words. There is also scope for practicing certain words, which might be a part of the child's sight vocabulary. The child can make use of memory of words and word analysing ability in recognizing individual letters. Thus learning of individual letters and words occur simultaneously and are mutually complementary. Moreover there is no need for every child to learn one particular set of sight vocabulary. There is also provision for each child to remember one or more words which he finds easier to remember. Thus, through these lessons it is possible to teach different types of dyslexics who actually have to be taught through different approaches.

The programme so developed was tried out on a group of 6 dyslexics with deficiency in auditory discrimination and sequential memory or visual discrimination and visual memory or both of them. The programme was found quite effective in all these cases in improving letter and word recognition. Irrespective of the initial level of performance all these cases attained almost remedial treatment. However, the rate of reading was quite slow even after remediation. The improved level of word recognition contributed to improvement in reading comprehension also. The tables given below indicate the overall effectiveness of the remedial reading programme.

Table : 4

Pretest-Posttest Performance of the case 1 on the Reading Tests

Tests	Expected Score/Max. Score	Pretest Score	Time taken	Post test score	Time taken	Average time required by normal readers of grades III and IV
Letter Recognition Test in Kannada	100	53	5 mnts.	92	6 mnts.	2.5 mnts.
Word Recognition Test in Kannada	100	22	13 mnts.	85	30 mnts.	4.2 mnts.
Kannada Oral Reading Test	50-60 Words/ Minute	8	1 mnt.	13	1 mnt.	1 mnt.
Reading Comprehension Test in Kannada	28	6	—	19	—	—

Table : 5

Pretest–Posttest Performance of the case 2 on the Reading Tests

Tests	Expected Score/Max Score	Pretest Score	Time taken	Post test score	Time Taken	Average time required by normal readers of grades III and IV
Letter Recognition Test in Kannada	100	35	14 mnts.	94	7 mnts.	2.5 mnts.
Work Recognition Test in Kannada	100	2	38 mnts.	83	30 mnts.	4.2 mnts.
Kannada Oral Reading Test	40–50 Words/ minute	1	1 mnt.	9	1 mnt.	1 mnt.
Reading Comprehension Test in Kannada	28	0	—	8	—	—

As noticed in the above tables, it can be understood that as the speed and accuracy of word recognition improves, the level of reading comprehension also increases automatically among many dyslexics. However, they need specific training for the improvement of reading comprehension. The following suggestions may be useful for the purpose :

a) The exercises which facilitate word meaning, comprehension of sentence, paragraph, whole topic and whole lesson have to be provided to the children. The objective type of questions–match the following, multiple choice, multiple response, can be used to test whether the child has comprehended or not.

b) Individual units of topics have to be arranged in the increasing order of difficulty. The topics should be interesting to the children. They should be of optimum level of difficulty. That means the children should not feel them as either too easy or too difficult.

c) The child should be helped to—

i) give definitions to words, and also synomyms.

ii) use words in own sentences.

iii) paraphrase meaning of a sentences.

iv) understand the main idea in a paragradh and to put in a sequence various ideas of a paragraph.

v) grasp main ideas contained in lesson, to understand over all structure of a lesson and to give a summary of the lesson.

d) The questioning-teachnique discussed in the previous section for the development of oral communication skills can be effectively used to develop reading comprehension skills also.

e) Before asking the child to read the passage the theme can be orally discussed with the child.

f) The set of questions the child is expected to answer after reading the passage should be made known to him before he reads it. This makes the reading purposeful/ intentional to the child and also creates appropriate mental set which will enable him to concentrate on all the details of the passage.

g) The child has to be guided in a more systematic way. This requires proper planning on the part of the parents and teachers well in advance, However, there should be some flexibility in the specific strategies adopted. This has to vary along with the specific needs of the children.

Remediation of Writing Disability

As already discussed in sections 1.2 and 3.2 there are three types of writing disorders, namely, dysgraphia, deficient revisualization and formulation and syntax disorders. The types of difficulties faced by children with writing disability are also discussed in detail in the section 3.2 systematic attempts should be made to correct those difficulties.

The following sequence of six steps was described in 1969 by Chalfant and Scheffelin as the developmental hierarchy of writing, the knowledge of which are very much essential for remediating writing disorders.

Step I :

Scribbling—The child must know how to manipulate his fingers and how to grasp the pencil to perform the random pencil movements involved in this step. Many dysgraphic children must be taught how to hold and manipulate a pencil. Children should be instructed in how to position their paper on the desk and in correct writing posture during this prewriting step.

According to Hallahan and Kauffman (1976) the task of holding the pencil correctly could be broken down into the following steps :

1. Grasping the pencil with the thumb in opposition to the index and middle fingers, the shaft of the pencil forming an angle of approximately 45° with the thumb.

2. Placing the thumb and fingers approximately one inch from the point of the pencil.

3. Curling the fingers naturally towards the palm of the hand.

4. Resting the fourth finger and outside edge of the hand on the paper.

Step II :

Tracing—The child is introduced to tracing activities after mastering step one. Proficiency is first developed by tracing connected letters or figures. This is followed by practice in tracing disconnected letters or figures.

Step III :

Copying—The child who develops skill in tracing is ready to move on to copying. Copying should start with reproduction of a visible model. This task should be followed by reproduction of the model from memory. Copying of symbolic and non-symbolic figures (e.g. scribbles) should follow :

Step IV :

Completion of Tasks—The child who has mastered the pencil control and manipulation required for copying figures

is ready for practice in completing these same figures when portions of them are missing. Transfer from the tracing to the completion task can be accomplished by gradually removing portions of the line. Dashes can be followed by dots and then entire sides of the figure can be omitted.

Mastery of figure completion can be followed by word and then sentence completion. Letters or words which have been omitted from a word can first be identified through multiple choise responses and then by recall.

Step V :

Writing from Dictation—This step involves the following four types of tasks :

i. writing letters as they are spoken
ii. writing words and sentences
iii. supplying missing words
iv. supplying missing sentences

Step VI :

Propositional writing—Exercises related to steps I to IV are helpful in overcoming difficulties faced by dysgraphics.

The principles which are helpful in teaching word recognition skill among learning disabled are also helpful in developing writing skills among children with revisualization problems.

The development of reading and writing skills are complementary to each other. So in the case of children who have both reading and writing problems or have writing problems because of reading problems, the remedial programme based on the six steps suggested by Chalfant and Scheffelin (1969) and the specific principles discussed in chapter V will be quite effective.

In order to facilitate the administration of the remedial programme to teach Kannada reading and writing to learning disabled children, a manual has been prepared for teachers and parents by Ramaa (1989). This manual includes the actual remedial Reading Programme developed for dyslexics (Ramaa, 1985) (discussed in chapter V) and additional exercises suit to the needs of children with dysgraphia and revisualization problems. The general instructions for admiuistering the whole programme as well as the specific instructions for teaching each lesson are given (for details see Ramaa S : Appropriate procedure to teach Kannada reading & writing to Learning Disabled and Educable Mentally Retarded Children – Teachers' and parents' manual', Regional College of Education, Mysore, 1989)

The work of Staats and his colleagues (Staats, Brewer & Gross, 1973) has shown that teaching writing skills consists essentially of modifying an imitative motor skill. In their work (cited in Hallaham, and Kauffman, 1976) young culturally deprived children approximately four years old were taught to write the letters of the alphabet. The teacher began by showing the child how to hold a crayon (and, later in the program, a pencil) and trace a line. Next, the child was shown how to trace large letters. After he learned to trace letters, he was taught, through instructions and models, how to copy them, beginning with very large letters that were gradually reduced in

size to primary size type. Appropriate imitations (i.e., tracing or copying the model letters correctly) were positively rainforced (rewarded). The tasks gradually increased in difficulty, and a greater accuracy of imitation was required in order to get whatever reward he wanted to get.

Rayek and Nesselroad (1971) have used even more explicit procedures to teach writing to young handicapped children, and they have obtained good results (cited in Hallaham & Kauffman 1976). This programme includes giving and fading both verbal and visual prompts and rewarding the responses which are close to the terminal goal. Verbal prompts include instructions regarding how to form a letter, and visual prompts includes forms to be traced (e.g., lines, which are gradually faded by changing them to dots). The terminal goals include both manuscript and cursive writing. The programme combines the use of a number of behaviour principles, first, writing is taught by shaping (modifying/gradual improving) procedures. It is the gradual shaping (correcting) of a motor skill to the point where the response resembles a specific model to the maximum possible extent. Second, letters are made up of stroke elements. The least complex motor responses are the horizontal and vertical lines. Slanted lines and curved lines are more complex. For maximum programme efficiency, letters containing common elements are grouped into formalities and taught together. For instance all letters using straight lines. According to the task analysis, letters within a given family are ordered according to their difficulty and assigned in that order. The stroke elements and the letters and numbers which include them are given in the appendix IV similar attempt has been made by Ramaa (1985) to analyse the letters of Kannada alphabet, which is indicated in the appendix V. Third, copying a letter from visual models precedes writing a letter from dictation. This procedure is used to assure that the child is equipped to make the appropriate strokes prior to writing from dictation. Fourth, writing is functional when it is used in practical ways such as writing one's name, words, or stories.

Loritt (1973) has taught typing skills to learning disabled children. Typing is more advantageous than handwriting, especially for individuals who experience difficulty in the visual motor skills required for writing.

The remedial procedures which are suggested (cited in Faas, 1976) for helping children who have formulation and syntax problems are :

1. Having the child read and analyse syntactically correct sentences of the type of child is expected to write.
2. Having the child practice formutating and dictating meaningful, syntactically correct sentences into a tape recorder, if available.
3. Playing these sentences back to the child so that he can practice writing them from dictation.
4. Reading what the child writes back to her and helping her identify the types of errors he is making.
5. Placing each word of a simple sentence on a card and then

placing these cards in scrambled order on a table top and having the child organize them into a syntactically correct sentence.

6. Having the child practice writing meaningful sentences using the past, present, and future tenses of a verb.

The exercises of the sort discussed in the section 4.2 for developing spoken language abilities are also helpful in overcoming formulation and syntax disorders with reference to written language. Development of spoken language abilities are complementary to each other.

Cloze technique which is used for testing reading comprehension is also helpful for improving reading comprehension as well as formulation skills among children. Exercises which include graded passages can be used for this purpose. The words can be randomly eliminated from the passage and the child is expected to write the missing words. The words that are expected to be supplied by the children should represent different syntactical features. Due weightage should also be given to cover important ideas of the passage.

Spelling Problems :

As already mentioned, the improvement in reading and writing leads to improvement in spelling also. Certain suggestions recommended for dealing with spelling difficulties (Faas, 1976) are as follows :

1. Placing a chart in the classroom or on the child's desk which contains all the lettets in the alphabet, for use by those who forget the appearance of letters.

2. Use of sandpaper or beaded letters and words which permit the child to feel as well as see a word.

3. Having children identify or change the incorrect letters in a miss-spelled word or fill in missing letters.

4. Having children choose the words they want to learn to spell.

5. Having children learn to spell words that they use every day.

6. Use of word families (eg. man, can, fan, etc.)

7. Having children identify and circle all the little words contained in a larger word.

8. Children who are unable to revisualise the visual images needed to write spelling words that are dictated should be given multiple-choice spelling tests.

Augur (1989) has given the following guidelines which helps in teaching spelling of English words.

I) In every English word there must be a vowel or the letter y acting as a vowel ; similarly in every syllable of every word.

2) No English word ends with v, you must use ve.

3) No English word ends with j-after a short vowel use dge. e.g. badge, bridge, otherwise use 'ge', e.g. cage forge.

4) On the end of a longer word is usually spelt–age, e.g. village, postage. There are however a few exceptions.

5) No English words end with i, you must use y.

6) The letter y has three sounds. Where it comes at the beginning of a word and in compound words such as 'farmyard' it is a consonant and says (y) as in yet. When it comes in the middle or the end of a word it is a vowel and has the same sound as the vowel i–that is (i) as in lynx and (i) as in fly.

7) q is never written alone—always qu ; qu never ends a word-always que.

8) ck, ll, ff, ss, tch, dge never start English words. They always follow short vowels.

9) c followed by e, i and y has the sound (s) as in celery, city, cyst.

10) g followed by e, i and y has the suond (j) usually as in germ, giant, gypsy.

11) all, full and till joined to another syllable have only one l, e.g. all+most= almost, hope+full=hopefull, un+till= until.

12) One syllable words ending with one vowel and one consonant double the final consonant before adding a vowel suffix, e.g. clap+p+ing=clapping, scrub+ b+ed=scrubbed.

13) Vowel—consonant—e words drop the e before adding a vowel suffix, e.g. hope+ed=hoped, like+ing+liking.

14) Words ending with a consonant and y change y to i before adding a a suffix, e.g. happy+ness=happiness, beauty=ful+beautiful.

15) Words ending with a vowel and y just add both vowel and consonant suffixes straight on, e.g. pay+ment= payment, joy+ ous=joyous.

16) The past tense suffix ed has three different sounds : (id) as in patted, (d) as in filled, (t) as in jumped.

Remediation of Arithmetic Disability

The most fundamental arithmetic skill is counting. Staats and collegues (cited in Hallahan & Kauffmann, 1976) have shown that learning to count involves learning three distinct performances : (1) the visual-motor skill of touching or moving objects one at a time and in order, (2) the verbal skill of saying the numbers in sequence, and (3) the skill of combining or coordinating the visual-motor and verbal performances. Touching or moving objects in order without the appropriate verbal accompaniment cannot be considered counting. On the other hand, the verbal behaviour of saying numbers in order without the corresponding visual-motor performance is (at first) meaningless. In meaningful counting, moving or touching each object is a signal to say the next number, and saying each number is a signal to move or touch the next object. However, once such a coordinated visual-motor-verbal reportoire is learned, the verbal component alone can be extended meaningfully. For example, after a child has learned to count ten objects, his verbal response alone of counting to twenty may be meaningful.

Staats and his co-workers taught young children to count by systematically developing each of the three skills involved. In the beginning the teacher showed the child a card with pictures one or two objects on it, and prompted the child to say "one dog", "two fish" and so forth. When the child could discriminate and label numerosity for one and two objects, a third object was introduced. When "three" was mastered, the pictures were changed to geometric forms. Net, the child was taught to count dots as the teacher uncovered them with her hand. The correct counting performance was modeled by the teacher, and the child was rewarded for imitating. When the child could count four dots, the teacher arranged objects in a row and modeled the behaviour of touching and counting them in order. Later, objects were pulled from a row and counted in order. Still later, objects not arranged in order were moved one at a time from a pile and extended through verbal modeling and imitation.

The specific principles suggested for teaching reading and writing to learning disabled children are also helpful in teaching arithmetic to them.

The essential considerations for teaching arithmetic to learning disabled children are as follows :

a. Overcoming any difficulty in reading and writing atleast to the minimum extent is a prerequisite to enable the children to understand written instructions relating to arithmetic performance.

b. Development of quantitative concepts is a must for arithmetic learning.

c. Concretizing the situation as far as possible.

d. Discouraging mechanical way of doing arithmetic and stressing the needs for internalizing the principles underlying those operations.

The learning of numbers is predominantly governed by memorizing Spatial (Visual) and temporal (auditory) orders of numbers. The numbers and digits within numbers should come in a particular order only. Reading and Writiug the numbers should be taught in the established sequence only ; there is no alternative. Once the child understands place value he can independently read and write multi digit numbers. But in order to understand place value knowledge of numbers (atleast upto 4 digits) is highly essential. Dyscalculics as observed in many studies write the numbers as we say. For example one hundred and twenty one as 10021. This may be because they remember 100, 20 and 1 easily, but find difficulty in memorizing the sequence 121. If that is the case the method of teaching sequence of numbers should compensate the deficiencies they have in VSM and ASM. Following suggestions have been given by Ramaa (1990) for providing remedial instruction to dyscalculics :

1. Teaching 1 to 10 through drill work.

2. In order to reduce the burden due to deficiency in VSM children should be instructed to write 1 to 9 in a sequence and go on adding 1 behind each number. The child is thus applying his number knowledge upto '9' and perceiving the similarity in the numbers from 11 to 19. Ofcourse here they have to memorize the auditory counterparts of these numbers in an order only. Learning this particular sequence (11 to 19) is complicated by two features. Firstly there is no similarity between the numbers 11, 12, 13 and 15 in the way we read them, eleven, twelve, thirteen and fifteen respectively. There is no clue to the child to remember them. Secondly in the second set of numbers 14, 16, 17, 18 and 19 the digit only in the unit place is stressed. That is, we read them as *four*teen, *Six*teen, *Seven*teen, *eight*een. Since the child listens/recalls these digit/ first he may write them in the first place (left to right). This procedure is similas to that which is adopted while readingr writing the words. There is one to one correspondence between spatial and temporal sequences. This may confuse the children especially with deficiencies in sequential memory when they have to write digits from right to left sequence. In addition to these complications the way we read the numbers 12, 13, and 15 share commonality with 20, 30 and 50 respectively. That means *twe*lve is similar to *twe*nty, *thir*teen similar to *thir*ty and *fif*teen similar to *fif*ty. Deliberate attempts should be made to enable the children to learn these numbers by overcoming all the factors which inhibit them. Making the children to become aware of the factors which inhibit them in learning the numbers verbalizing the similarities and differences between the way we write and read the numbers and the sequence of numbers may be useful in enabling them to function against the inhibiting factors. As the dyscalculics are of average or above average inteligence their ability to discriminate and

generalize should be utilized rather than providing a mechanical drill work. It is quite interesting to know that the dyscalculics of the present study who learnt to read the numbers in Kannada also reversed the digits. Infact in Kannada the numbers 11 and 12 are read differently as in the case of English. But however the temporal order is same as that of spatial order. From 13 to 18 there is a kind of similarity. The suffix 'teen' is having a counterpart in Kannada 'Hadhi' but it is a prefix. From 21 onwards it is similar to English. This suggests that distinct linguistic features ('names of numbers') themselves are not responsible for the difficulties faced by the children. They may be predominantly attributed to deficiency in VSM/ASM.

3. After helping the children to overlearn these numbers through meaningful and varied experiences the numbers from 20 onwards can be taught without much difficulty. Only thing the teacher has to do is to make the children perceive the similarities between the numbers within a particular set, the way we read and write them. For example 21, 22, 23 as —twenty-one, twenty-two, twenty-three ; 31, 32, 33—thirty-one, thirty-two, thirty-three etc.

4. Exercises should be given where the children are expected to write the missing numbers in a particular sequence. This is also a way of firmly establishing the sequence tn their mind also to facilitate the recall of relevant component of the sequence automatically.

5. Learning to recall and reproduce the numbers in a particular sequence should go along with the understanding that the numbers represent increased quantity of entities along with the sequence ; the numbers below a particular number represent lesser value and above that represent greater value.

6. Automatic recall of particular set of numbers in a sequential order, knowledge of the relative quantity of entities denoted by these numbers act as prerequisites for seriating the numbers in an ascending/descending order. The difficulties noticed by the dyscalculics of the study in seriation can be attributed to deficiency in these pre–requisite skills.

7. The tendency of dyscalculics to write the numbers as they read can be corrected through simple strategies. For Example—If the child writes one-hundred and twenty-six as 100206, he can be asked to write them one below the other as follows :

100
20
6

They should understand the correct place where they have to write the numbers. After that they should be asked to replace '0' by the numbers below them. Thus the next steps would be

100	100	1(0)(0)
2(0)	26	26
6		

After giving sufficient practice, children should be helped to do such exercises, at the mental level itself, and write the numbers in the expected form.

8. Memorizing multiplication table would certainly be quite challenging to dyscalculics becacuse of their severe deficiency in VSM and ASM. There is no wonder if they fail to reproduce the multiples of numbers even at higher grades of schooling. Allowing them to keep open the multiplication table and refer to it whenever necessary including during examination. Probably is the only method feasible in their cases.

9. The difficulties demonstrated by these children in dealing with operations involving multi-digit number suggest that deficiency in VSM and ASM also affect to considerable extent learning and recalling of the set of rules which govern each kind of operations. The implication is that there should be greater opportunity for the dyscalculics to realize and generalize these rules.

10. As the dyscalculics develop concrete operational stage at later ages (9.0 years) in comparison with normal children, the procedures for teaching arithmetic to them should foster cognitive development as well as arithmetic skills simultaneously.

In addition to the general guidelines given above, some of the specific strategies in overcoming certain difficulties among dyscalculies are discussed below.

0	–	–	–	–	–	–	–	–	–
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	89	20
21	22	23	24	25	26	27	28	29	30
31									40
41									50
51				Fill up the gap					60
61									70
71									80
81									90
—	—	—	—	—	—	—	—	—	100
—	—	—	—	—	—	—	—	—	200
—	—	—	—	—	—	—	—	—	300
—	—	—	—	—	—	—	—	—	400

a. Simple devices which facilitate the process of arithmetic operations as well as the devices which can compensate for the deficit sequential memory among them have to be utilized.

For eg. : The child can be asked to keep a chart of the sort indicated above, which helps him to do addition and subtraction quickly.

The child should be given enough practice in using the chart. When the child has to add any to numbers, say, 8 and 7, he should be asked to point out '8' in the chart and then should be asked to move '7' digits forward. He gets 15, which is the sum of 8 & 7. The child should understand that while adding the value increases.

When the child has to subtract one number from the other, say '2' from '6' the child should be asked to point to '6' and then to move '2' digits backward. He gets '4' as the answer. The child should be made to understand that while subtracting the value decreases.

While adding or subtracting more than one digit numbers, say 25 and 27, instead of trying to locate 25 and moving 27 digits further, the numbers have to be added place value wise, that is, units separately, tens separately and so on. Thus the child has to add '5' and '7' first in the way described above and then has to add '2' and '2' and the number carried from the previous (unit) place. The number to be carried should be noted down on the page, so that it will not be forgotten.

The chart replaces the primitive methods of counting (using fingers or dots) which are common in the case of normal children in the early stages, but persistant in the case of older LD children which consume excessive amount of time. Thus facilitates the process of adding and subtracting.

The chart also helps the child in tracing the order of numbers in the sequence-ascending and descending order ; to get the number which follows or preceedes a particular number.

Through the chart, the child can be made to understand the meaning of multiplication table-what is meant by two-tows are four, two-eights are sixteen etc. They can also understand that while adding, one has to move continuously forward, where as while multiplying one has to move group-wise or cluster of number wise. Similarly while subtracting one has to move backward continuously, and in the case of division there will be group-wise movement (skipping) backwards.

For Example, in 2) 24 (,

(1 2)	(3 4)	(5 6)	(7 8)	(9 10)
(11 12)	(13 14)	(15 16)	(17 18)	(19 20)
(21 22)	(23 24)	(25 26)	(27 28)	(29 30)

The child has to locate the set which includes '24' then skipping backwards till he gets the set which has '2'. He has to count the number of skipping. It will be '12'. If we have to adopt the usual procedure, the child has to divide 2 by 2, that is skipping only once, and then 4 by 2, skipping two items.

The child can understand that addition and subtraction, multiplication and division are opposite functions/reversible processes.

A simple device like the chart described above helps the child to learn number concept, order of numbers, odd numbers and even numbers, meaning of multiplication table, meaning of arithmetic processes, etc.

Depending upon the need different charts can be prepared. The teacher can help the child to prepare those charts by himself. While preparing the chart, the numbers can be coloured differently and grouped into meaningful units. The numbers can be written on thick cards and a transparent paper can be pasted over it, so that it can be used for longer time. Several cards can be tagged together in an order. The child should understand which card is useful for what purpose.

b. The child can be made to understand place value through following kinds of illustrations :

3 0 0 0	0 0 0 0
0 4 0 0	0 0 0 0
0 0 5 0	0 0 0 0
0 0 0 6	3 4 5 6

Let us assume that there are 4 rows of chairs, 4 in each row. The boy with roll number '6' comes first and sits in place as indicated in the diagram. The boys with roll numbers '5', '4', '3' come and occupy the places as shown in the diagram, 'Zero' represents vacant chairs. The teacher will be wondered why children are sitting in different rows and requested all of them to sit in a single row. The children were particular about their seats. Each one started telling let others come and occupy vacant chairs in my row'. Then the teacher convinced them to follow one simple rule–they can sit in different rows on different days. He told please come and occupy I row, tomorrow you can sit in II row, day after in III row, afterwards in IV row. Children found it quite amusing. They did like that for four days and then realized that there will be greater fun if all of them sit together. Then they started exchanging their chairs within a particular row and enjoyed each others company.

Different positions of the number can be illustrated and written on the black board. The children can be asked to write themselves. They should be made to read and write combinations of numbers 6, 50, 400, 3000, 456, 3000, 3456. Similar exercises should be given by altering the positions of numbers. The children should be made to understand two things–same digit/number in different places acquire different values (multiples of 10) and different numbers will give different values to a particular place (5, 6, 7 ; 50, 60, 70 ; 500, 600, 700 etc).

11) Learning disabled children find it

more difficult to workout word problems than more number problems This may be due to difficulty in understanding the written material and also to decide which arithmetic process they have to do to solve them. So, the word problems should have simple sentences. The children should be trained to analyze the problems.

In addition to the specific principles and strategies that can be adopted to teach specific skills, the following suggestions are useful in meeting the common special needs among learning disabled ;

a) Inspite of accuracy, disabled children will remain slow compared to normal children in academic matters. The teachers should not insist the children to read, write or do sums quickly. The child should feel free to work at his own pace. During the examination also, more time should be given to such children. They should be allowed to use certain aids-the chart with numbers, letters, multiplication table etc which facilitate their mental process. Whether the child has understood the basic principles underlying the processes, whether he can apply the knowledge in new situation that should be the major focus of testing rather than taxing him to recall the content.

b) Because of difficulty in reading and writing, the learning disabled may remain backward in other content areas like science and social studies if he has to depend on the books for acquiring knowledge. The teachers while teaching science and social studies should use lot of learning aids so that the children can understand in the classroom itself. Since learning disabled are average or even above aaerage in intelligence, understanding the content is not difficult to them. The teacher can pair up a learning, disabled with a normal child and ask them to study together. In addition, the parents can also help the child.

c) In the examination, if possible, testing can be done orally, where in more weightage is given for testing at the understanding and application level. Written examinations should include objective type of questions wherever possible.

d) In the case of the severely learning disabled child, he can be exempted by learning more than one language as a compulsory subject. During discussion in the classroom or while answering in the examination he should be allowed to do so in the language in which he is having the facility.

e) Though the learning disabled child is allowed to use certain aids as 'crutches' for his mental process, he should be encouraged to become as independent as possible, especially, at the later grades.

f) The teacher should be very careful n handling some negative consequences of the special advantages that will be provided to learning disabled children. Other children should not think that the teacher is favouring those children. Rather, they should be made to realise that some of the advantages provided for learning disabled are like 'crutches' to physically handicapped children ; a man without crutches can walk faster than the man

who is using it. Thus doing multiplication with the help of arithmetical tables take more time than doing without them. Similarly, learning more than one language is always beneficial than being exempted by that. The teacher should help the learning disabled to overcome the complexes whatever they may develop because of their inability to do tasks like other children.

Strategies for Overcoming Behavioural Problems Among Learning Disabled Children :

Learning disabled children exhibit difficulty in self-discipline in relation to himself as well as in relation to others. More specifically, they have deficiency in the ability to cooperate, to pay attention, ability to organize, ability to cope with new situations, social acceptance, ability to accept responsibility, completion of assignments and tactfulness.

The above mentioned abilities/skills are highly essential for one's adjustment with the physical and social environment which form basis for success in any field of life. Children have to be trained to develop these skills adequately. The development of these skills are dependent on the opportunity for the children to exercise whatever ability or skill they have at a particular stage of development. That means strengthening of the skills that are possessed by the children by providing appropriate opportunities to to make use of them and by reinforcing the desirable/appropriate/adequate act on the part of the child should also be one of the important concern of parents and teachers while helping their learning disabled children.

The following suggestions may be useful in developing these skills among learning disabled children :

1. Observe carefully how the child behaves while undertaking an individual or a group work, and see whether the child has adequacy in the required personal and social skills to successfully complete the task. Make noie of the strengths and weaknesses of the children in behavioural skills.

2. To begin with create situations which enhance the possibilities for application of a particular skill or set of skills. For example to increase the level of attention on the part of children, avoidance of distractors, assigning the task which is on par with obility and interest of the child, reinforcement of the correct behaviour are useful.

3. To develop ability to organize the child should be helped to analyse the task in hand into different sub-tasks and to mentally organize them keeping in mind the sequence of the sub-tasks, materials required, availability of time and space to carry out them. The child should be guided properly to execute the plan.

   There is no need to provide separate exercises for development of organizing ability. The child should be trained to carry out the day-today activities in a systematic way.

The amount of guidance provided should be gradually decreased and the child should be encouraged to become more and more independent.

The child should be helped to develop an internal standard for evaluation of his own task rather than seeking approval from others for each and every task.

4. The child should be made realized that there is pleasure in accepting the responsibility and carryout it successfully. If the task is of optimum level of difficulty, if the child is successful in completing it and gets proper reinforcement, he will be motivated to carry out the task assigned to him.

5. The social skills like cooperation and tactfulness can be developed through group activities and social situations that will be there in the normal course of life within and outside the school. While forming the group, the teachers should carefully see that each group consists of children with average and above average abilities. The learniug disabled children with inadequacy in these skills can be grouped with other children.

Each member of the group should be clear about the specific role he has to play or the task he has to perform so that he can contribute to the successful completion of the work assigned.

A heterogenous group like this has its own merits and demerits. The leaening disabled children get a model for appropriate behaviour from other children. Similarly even other children will learn to tolerate the learning disabled child who is non-cooperative, less tactful in the beginning. Anyhow, the teacher has to closely observe the interaction among these children and try to help them in overcoming the specifie problems that may arise during such interaction. The children should gradually learn to eliminate the strategies which are not opproved by the group and select those which are appreciated.

Since learning disabled children are inadequate in certain social skills they will be rejected by the classmates and agemates. As the child develops these skills through proper training and guidance they will be accepted by others easily.

6. In order to enhance the meaningful and active participation of learning disabled children in parties, excursions, etc it is better to discuss about these programmes in the class-room in general and with learning disabled children in particular. They should be helped to prepare themselves mentally for taking part in these kinds of programmes. The ways through which they can contribute to the success of these can also be discussed with them and if needed some training can be given.

7. Development of cognitive skills (concept development, comprehension, perception, memory, integration analysis and synthesis), academic skills (reading writing, arithmetic) and social skills (coorperation, tactfulness, acceptance of responsibility, completion of assignment, adjusting to new situations, social acceptance) need not be achieved in isolation. Rather it is possible to achieve many of

these skills through same kinds of situations, activities, programmes. The teachers should be sensitive to various elements of a particular situation/ activity and make deliberate attempts to make use of them for the development of various skills among them.

8. The routine activities – Cocurrilar and extra-curricular activities can be made use of for the development of various abilities. The plays/games are especially useful in this direction. Instead of letting the children to play themselves teachers should also involve themselves in the games and give directions to the children. The children need not know the additional objectives, they have to enjoy the play as play. But the teachers should make conscious efforts to develop various skills in an indirect way. The play materials used also should be analyzed in terms of the additional learning outcomes.

   By utilizing the routine activities properly the teacher can develop various skills among learning disabled in an economic way in terms of time, energy, effort, etc. They also provide enough scope for employing the important principles like overlearning, repetition with variety of situations, regularity, immediate feedback, reinforcing appropriate behaviour sustaining motivation, therapeutic approach, etc. Thereby it is possible to strengthen the skills among the children.

9. Suitable adaptations can be made in the traditional games and plays as well as play materials so that they can be made useful to develop certain skills among learning disabled children.

   For example : Games like 'Anthyakshari' (singing the song which starts with the last sound of the last word of the preceeding song), can be used for developing word analysis, word recall abilities. The children of the group consisting of both learning disabled and normal children can be asked to recall three-lettered, four lettered words that start with the last letter of the preceeding word. This is more useful in the case of Indian language which are highly phonemic/syllabic in nature. That means each letter of a particular language represents a distinct sound/ syllable of that language. The group leader has to prepare the list of words that were recalled by all the children of that group. Each child can write down the words uttered by himself. Later on they can cross-check whether they have written the words properly and can correct their mistakes. All the children should get a chance to become the group leader.

   Certain activities can be conducted throughout the year. The children can be asked to collect pictures from old magazines and paste them on cards or on pages of a note-book. They can also collect certain objects like feathers, pebbles, coins, stamps, etc. Everyday at least 15–20 minutes can be devoted for the descriptions of these pictures or objects. Each

child has to describe the pictures or objects he has collected. The description should cover all the physical attributes (colour, shape, size, material, texture, etc.) the general category to which the particular item falls (for eg : birds, dicot plants, carnivarous animals, etc. depending upon the knowledge level of children), functions/uses, or any other additional information.

Such activities can develop various skills – cognitive, academic, social psycho–motor. The children will have a sense of accomplishment. – when his collection is appreciated by majority of children.

The pictures and objects collected by the students can be used as teaching aids to teach various concepts that fall under different academic subjects. This facilitates the teaching–learning process in the classroom. The children will be motivated to collect more materials and to learn about them.

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APPENDIX—I

Behavioural Checklist for Identification of the Disabled Children

1. Name
2. Age
3. Sex
4. Class in which Studying
5. Name of the School
6. Name of the Class Teacher
7. Nature of Handicap(s)
8. Mentally Retarded/
   Learning Disabled/
   Visual Handicap/Auditory
   Handicap/Speech Handicap/
   Oral-Language Difficulty
9. Any other

Date :

Signature of the Class-teacher

Special Education cell, Regional College of Education, Mysore-570 006.

CHILD WITH ORAL—LANGUAGE DIFFICULTY

You may have a child with difficulty in understanding and expressing oral-language. If you closely observe him, you can see most of the deviations indicated below :

1. Having relatively less word-knowledge compared to the children of same age-group.
2. Confused among words : knife for scissors, swallow for drown.
3. Finds it difficult to recall words automatically and hence speaks slowly or utters often 'then' ..... 'then'.
4. May correct the words wrongly used ; often says 'no' 'no' 'it is not like that' etc
5. Lowered intelligibility of speech due to defective grammar or syntax.
6. Unable to understand certain grammatical structures and understand the same idea if it is told through other structures.
7. Unable to grasp various meanings attached to a word depending upon the context.

CHILD WITH PHYSICAL HANDICAP

You may have a child with some physical (motor) handicap. If you closely observe such a child you can see most of the deviations indicated below :

A. 1. Involuntary contraction of muscles when they are suddenly stretched.

2. Lack of voluntary control on fingers or toes and they will be on constant motion.

3. Lack of control all over the body. Unable to co-ordinate the movement of two or three parts of the body.

Ex : While playing difficulty in moving hands and legs simultaneously/or moving hand or bend up the body to a particular direction.

4. Widespread continuous muscle tension or stiffness.

5. Rhythmic, involuntary, uncontrollable motions limited to certain muscle groups.

B. 1. Generalized seizure with tensing of muscles and or twitching and tremors with loss of consciousness.

2. Brief lapse of consciousness (3–10 seconds), sometimes rhythmic 3-second blinking.

3. Sudden generalised jerk or loss of tone without detectable alteration of consciousness.

4. Rhythmic movement of one part of body, stationary or progressing to other parts.

C. 1. One or both feet turned downward and outward at ankle.

2. Lateral curvature of spine; body thrown out of alignment resulting in growth and deformities.

3. Congenital amputation or malformations of the extremities (Lacks hands or legs or fingers or toes or some deformity from birth).

4. Deviations in the running pattern-such as failure to alternate sides automatically, jerkiness, whipping of the leg or the foot in or out.

5. Deviations in standing or sitting patterns, such as weight shifted more to one side than the other or one part of the body twisted (e.g the trunk) with regard to the rest of the body.

6. Throwing or catching deviations such as loss of balance while throwing or catching, inability to control the object, inability to adjust to different speeds or heights in catching the object.

7. Loss of limb or extremities for one or the other reason (surgical operation, accident).

LEARNING—DISABLED CHILD

You may have a child in your class with learning difficulty. But such a child i.e does not have sensory problem, mental retardation or any emotional problem. He may show interest in studies also usually he exhibits a severe discrepancy between achievement and intellectual ability. If you closely observe such a child you can see most of the deviations indicated below :

1. Difficulty in academic subjects. Sometimes the student is deficient in only one subject and or a combintation of subjects.
2. Has difficulty in telling time, remembering order of days, months and seasons.
3. Specific errors in writing-persistent errors such as reversal (writing 'p' for 'q' 'b' for 'd') Omissions (here 'for where').

   Writes letters either very close or apart.
4. Poor handwriting compared with peers.
5. Poor drawing compared with peers.
6. Reads more slowly than peers. May read 'here' for ('where' (omissions) 'No' for 'on' (reversal) 'dug' for 'bug' (letter confussion).
7. Cannot follow written directions which most peers can follow.
8. Does not seem to listen or understand daily classroom instructions or directions (often asked to have them repeated where as the rest of the class goes ahead).
9. Cannot correctly recall oral instructions when asked to repeat them.
10. Difficulty with Arithmetic. e.g. confuses 'b' and 'g', has substantial difficulty in addition or substraction compared to peers.—may begin to add in the middle of the subtraction problem.
11. Excessive inconsistency in the quality of performance from time to time—seems to be bright in many ways still does poorly in school.
12. Is slow to finish work.
13. Gets easily distracted from school work even by slightest disturbance.

14. Has difficulty in remembering directions—left and right.

15. Over active compared to peers, can't sit still in the classroom even for a short duration.

16. Appears to be careless and does everything in a haphazard manner.

17. Appears to be not interested in any kind of work and sits simply.

18. If at all he starts some work/activity keeps on doing however inappropriate and unwanted it is. For ex: Keep on writing though asked to stop writing and start reading. Continue with the same strategy however inappropriate it is.

19. Delay in language development.

20. Finds it difficult to recollect words automatically and form correct sentences.

21. Appears to be too impulsive, jumps into action, doesn't wait even to think about the consequences.

    Ex: Answers as soon as questions are asked and most often such answers are not correct.

22. Cannot control emotions. Loses temper immediately, easily get irritated.

23. Appears to be socially immature, careless, irresponsible, fails to complete the work undertaken properly.

24. Finds it difficult to get adjusted to routine changes.

    Ex: finds difficult to attend morning class/special class well in time, difficulty in adjusting to new teachers, new place etc.

25. Demonstrates variation in mood without appropriate reasons calmness to irritatibility, enthusiasm to dryness etc.

MENTALLY DEFICIENT CHILD

You may have a child in your class with below average intelligence. If you closely observe him you can see most of the deviations indicated below :

1. Unable to recognize common shapes–such as round and square curved and straight.
2. Remains 2–3 years behind in school subjects – having difficulty both in grasping and retaining.
3. Slow in physical activities and does not show any interest on his own. Finds it difficult to develop fine motor skills like drawing, painting and even handwriting.
4. Slow in mental activities and does not show any interest on his own.
5. Seems to take at least twice as long as the other children to learn most of the concepts.
6. Finds it difficult to concentrate on any kind of activities.
7. Gets easily distracted by sounds or objects in the surrounding.
8. Has difficulty in attending to group activities for more than five minutes at a time.
9. Unable to participate in the play of their own age group.
10. Prefers the companionship of children younger than him.
11. Feels shy in group activities, for instance answering questions when asked in the class room.
12. Engages himself for much of the time in a day in disruptive behavious like tantrums, fighting, screaming etc.
13. Spends most of the time in trying to get attention from adults.

HEARING IMPAIRED CHILD

You may have a child in your class with hearing impairment. If you closely observe him you can see most of the deviations indicated below :

A. (1) Any speech impairment particularly difficulty in pronouncing high frequency sounds such as 'S' 'Sh' Z, Ch.

(2) Frequently omitting certain speech sounds completely or substitute one sound for the other while taking.

Ex : Past-pat, chair-care

(3) Unable to express the emotion behind the words that means speaking in a monotone (without varying the quality of voice) or mumbling (appears to talk about himself)

(4) Habitually speaking too loudly or too softly.

(1) Habitual turning, 'cocking' or cupping an ear toward the speaker.

(2) Complains of earache, ear discharge, buzzing or ringings in ears etc.

(3) May be hyperactive and do excessively so in an noisy environment.

(4) A strained or bewildered expression on face for no apparent reason.

(5) More than normal use of hands in conservation.

(6) Difficulty in maintaining balance particularly in the dark.

C. 1. Appears to be not attentive in the class-room.

2. Gives inappropriate or irrelevant answers as he cannot understand questions properly.

3. Frequently requests to have directions and questions repeated.

4. Not participating in class-room discussions.

5. Seems to be irritated if something is told to him or bends forward to listen it.

6. Exhibit tendency to watch a speaker's face or lip movement with unusual intensity.

7. When dictation is given or certain things are dictated try to copy it from others or write down wrongly or sit simply.

8. Remains backward in school achievement.

9. Has difficulty in location the direction of sound or speaker.

10. Frequently interfers with others conservation without realizing what others are talking seems to be disinterested in casual conversation.

SPEECH-IMPAIRED CHILD

You may have a child in your class with defective speech. If you closely observe him you can see most of the deviations indicated below :

1. Substitutes one letter for another.
   (wabbit for rabbit ; thop for stop)
2. Omits sounds for words or adds unnecessarily (is for this etc ; everary for every)
3. Lacks distinctness of noice, mumbles.
4. Lacks sufficient volume to be heard (speeks very softly)
5. Repeats initial sounds
   (for top-totop ; cat-cacat etc)
6. Tries hard but no sound comes out.
7. Shows excessive eye blinking, gestures, grimaces and other body motion while talking.
8. Displaces sounds within words
   (initial-Itinial ; adopt - atopd)
9. Does not inflect voice appropriately, that is, fails to express the emotion behind the words, speeks montonously.
10. Lowered intellibility or speech due to misarticulation.
11. Speech unpleasant to the listener.
12. Has spontaneious change of inflections and pitch.

VISUALLY IMPAIRED CHILD

You may have a child in your class with visual impairment. If you closely observe him you can see most of the deviations indicated below :

1. Red-rimmed, bloodshot watery eyes.
2. Encrusted swollen eyelide.
3. Frequent rubbing of eyes.
4. Excessive blinking.
5. Blocked tearducts.
6. Frequently complains of dizziness, blurring, double vision.

7. Frequently complains of headaches, pains in the eyes, nausia.
8. Strabismus-cross eyes, lack of alignment of eyes.
9. Nystagmus – rapid, rhythmic side to side movement of the eyes.
10. Frequent sties.
11. Limited peripheral vision – staring at point finds difficulty in recognising object on either side of the eyes.
12. Appears to be day dreaming.
13. Lack of normal curiosity regarding objects visually presented.
14. Lack of response to facial expression of others.
15. Ackwardness in activities involving eye-hand co-ordination. (ex : difficulty in copying also)
16. Tilting of head to one side.
17. Difficulty in estimating distance. Ex : While crossing a ditch, while catching ball.
18. Unable to distinguish colour differences. (Two or three colours may appear same)
19. Distortion of face while seeing something-frowning, squinting, or closing of one eye.
20. While observing cold objects at an unusual distance. (keeping books far away while reading).
21. Fails to see, or runs into objects not in his direct line of vision.
22. While walking falls, hesitates or stumbles.
23. Finds it difficulty to work in less or more intensity of light.
24. Overly dependent on other senses-likes to hear, or touch than seeing.

APPENDIX—II

Name.....No..... School.....Grade.....

Sex.....Date..... Teacher.....

Pupil Behavior Rating Scale

1	2	3	4	5
I. Auditory comprehension and listening				
Ability to follow directions				
Always confused ; cannot or is unable to follow directions	Usually follow simple oral directions but often needs individual help	Follows directions that are familiar and/or not complex	Remembers and follows extended directions	Unusally skillful in remembering and following directions
Comprehension of class discussion				
Always inattentive and/or unable to follow and understand discussions	Listens but rarely comprehends well ; mind often wanders from discussion	Listens and follows discussions according to age and grade	Understands well and benefits from discussions	Becomes involved and shows unusual understanding of material discussed
Ability to retain orally given information				
Almost total lack of recall ; poor money	Retains simple ideas and procedures if repeated often	Average retention of materials ; adequate memory for age and grrde	Remembers procedures and information from various sources ; good immediate and delayed recall	Superior memory for both details and content
Comprehension of word meanings				
Extremely immature level of understanding	Fails to grasp simple word meanings ; misunderstands words at grade level	Good grasp of grade level vocabulary for age and grade	Understands all grade level vocabulary as well as higher level word meanings	Superior understanding of vocabulary understands many abstract words

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Name..... No. ..... School..... Grade.....

Sex..... Date..... Teacher..... .....

Pupil Behaviour Rating Scale

1	2	3	4	5
II. Spoken language				
Ability to speak in complete sentences using accurate sentence structure				
Always uses incomplete sentences with grammatical errors	Frequently uses incomplete sentences and/or numerous grammatical errors	Uses correct grammar ; few errors of omission or incorrect use of prepositions, verb tense, pronouns	Above-average oral language ; rarely makes grammatical errors	Always speaks in gramatically correct sentences
Vocabulary ability				
Always uses immature or improper vocabulary	Limited vocabulary including primarily simple nouns ; few precise, descriptive words	Adequate vocabulary for age and grade	Above-average vocabulary ; uses numerous precise descriptive words	High level vocabulary ; always uses precise words to convey message ; uses abstraction
Ability to recall words				
Unable to call forth the exact word	Often gropes for words to express himself	Occasionally searches for correct word but adequate for age and grade	Above-average ability ; rarely hesitates on a word	Always speaks well ; never hesitates or substitute words
Ability to formulate ideas from isolated facts				
Unable to relate isolated facts	Has difficulty relating isolated facts ; ideas are incomplete and scattered	Usually relates facts into meaningful ideas ; adequate for age and grade	Relates facts and ideas well	Outstanding ability in relating facts appropriately
Ability to tell stories and relate experiences				
Unable to tell a comprehensible story	Has difficulty relating ideas in logical sequence	Average ability to tell stories	Above average ; uses logical sequence	Exceptional ability to relate ideas in a logical meaningful manner

Name..... No. ..... School..... Grade.....

Sex..... Date... .... Teacher.....

Pupil Behaviour Rating Scale

1	2	3	4	5
III. Orientation				
Promptness				
Lacks grasp of meaning of time ; always late or confused	Poor time concept ; tends to dawdle ; often late	Average understanding of time for age and grade	Prompt ; late only with good reason	Very skillful at handling schedules ; plaus and organizes well
Spatial orientation				
Always confused ; unable to navigate around classroom or school, playground or neighborhood	Frequently gets lost in relatively familiar surroundings	Can maneuver in familiar locations ; avera ge for age and grade	Above average ability ; rarely lost or confused	Never lost ; adapts to new locations, situations, places
Judgement relationships : big, little ; far, close ; light, heavy				
Judgements of relationships very inadequate	Makes elementary judgments successfully	Average ability in relation to age and grade	Accurate judgements but does not generalize to new situations	Unusually precise judgments, generalizes them to new situations and experiences
Learning directions				
Highly confused unable to distinguish directions as right, left, north, and south	Sometimes exhibits directional confusion	Average ; uses R vs, L, N-S-E-W	Good sense of direction ; seldom confused	Excellent sense of direction

Name.....No..... School.....Grade.....

Sex..... .....Date..... Teacher.....

Pupil Behavior Rating Scale

1	2	3	4	5
		IV. Behavior		
Cooperation				
Continually disrupts class-room ; unable to inhibit responses	Frequently demands spotlight ; often speaks out of turn	Waits his turn ; average for age and grade	Cooperates well ; above average	Cooperates without adult encouragement
Attention				
Is never attentive ; very distractable	Rarely listens ; attention frequently wanders	Attends adequately for age and grade	Above average ; almost always attends	Always attends to importannt aspects ; long attention span
Ability to organize				
Is highly disorganized ; very slovenly	Often disorganized in manner of working ; inexact, careless	Maintains average organization of work ; careful	Above-average ability to organize and complete work ; consistent	Always completes assignments in a highly organized and meticulous manner
Ability to cope with new situations : Parties, trips, unanticipated changes in routine				
Becomes extremely excitable ; totally lacking in self-control	Often over-reacts ; new situatious disturbing	Adapts adequately for age and grade	Adapts easily and quickly with self-confidence	Excellent adaptation, utilizing initiative and independence
Social acceptance				
Avoided by others	Tolerated by others	Liked by others ; average for age and grade	Well liked by others	Sought by others

Acceptance of responsibility				
Rejects responsibility ; never initiates activities	Avoids responsibility ; limited acceptance of role for age	Accepts responsibility ; adeqaute for age and grade	Enjoys responsibility ; above average ; frequently takes initiative or volunteers	Seeks responsibility ; almost always takes initiative with enthusiasm
Completion of assignments				
Never finishes, even with guidance	Seldom finishes, even with guidance	Average ability to follow through on assignments	Above-average ability to complete assignments	Always completes assignments wiihout supervision
Tactfulness				
Always rude	Usually disregards other's feelings	Average tactfulness ; occasionally socially inappropriate	Above-average tactfulness ; rarely socially inappropriate	Always tactful ; never socially inappropriate

Name.....No..... School.....Grade.....

Sex.....Date..... Teacher.....

Pupil Behavior Rating Scale

1	2	3	4	5
		V. Motor		
General coordination : running, climbing, hopping, walking				
Very poorly coordinated ; clumsy	Below-average coordination ; awkward	Average coordination for age ; outstanding but not graceful	Above-average coordination ; does well in these activities	Exceptional ability ; excels in this area
Balance				
Very poor balance	Below-average ; falls frequently	Average balance for age ; not outstanding but adequate equilibrium	Above-average ; does well in activities requiring balance	Exceptional ability ; excels in balancing
Ability to manipulate utensils and equipment ; manual dexterity				
Very poor in manual manipulation	Awkward in manual dexterity	Adequate dexterity for age ; manipulates well	Above-average mannual dexterity	Almost perfect performance ; readily manipulates new equipment

Student Screening Profile

Date of birth.....

Name..... Sex..... Date.....

School..... Grade or level..... Teacher.....

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I. Auditory comprehension and listening

A. Ability to follow directions
1 2 3 4 5 — A. .....

B. Comprehension of class discussion
1 2 3 4 5 — B. .....

C. Ability to retain information
1 2 3 4 5 — C. .....

D. Comprehension of word meanings
1 2 3 4 5 — D. ..... Total I .....

II. Spoken language

A. Ability to speak in sentences
1 2 3 4 5 — A. .....

B. Vocabulary ability
1 2 3 4 5 — B. .....

C. Ability to recall words
1 2 3 4 5 — C. .....

D. Ability to formulate ideas
1 2 3 4 5 — D. .....

E. Ability to tell stories
1 2 3 4 5 — E. ..... Total II .....

III. Orientation

A. Promptness
1 2 3 4 5 — A. .....

B. Spatial orientation
1 2 3 4 5 — B. .....

C. Judgement of relationships
1 2 3 4 5 — C. .....

D. Learning directions
1 3 3 4 5 — D. ..... Total III .....

IV. **Behavior**

A. Cooperation
1 2 3 4 5 — A. .....

B. Attention
1 2 3 4 5 — B. .....

C. Ability to organize
1 2 3 4 5 — C. .....

D. Ability to cope with new situations
1 2 3 4 5 — D. .....

E. Social acceptance
1 2 3 4 5 — E. .....

F. Acceptance of responsibility
1 2 3 4 5 — F. .....

G. Completion of assignments
1 2 3 4 5 — G. .....

H. Tactfulness
1 2 3 4 5 — H. ..... Total IV ... .

V. **Motor**

A. General coordination
1 2 3 4 5 — A. .....

B. Balance
1 2 3 4 5 — B. .....

C. Manipulative skills
1 2 3 4 5 — C. ..... Total V .....

: APPENDIX III :

: Types of Errors committed by Dyslexics while Recognizing Kannada words :

I. Word Substitution Errors :-

Stimuli		Responses
ಒಳಗೂ	—	ಒಳಗೆ
ಇಲ್ಲ	—	ಇಲ್ಲಿ
ಬರುವರು	—	ಬರುವಳು
ಅಕ್ಕ	—	ಅಕ್ಕೆ

a) Word substitution errors due to difficulty in letter and Kagunitha identification :

ಒಡಿಸು –	—	ಓದಿಸು –
ತೊಲ = –	—	ತೋಳ = –
ಏತರ – *	—	ಎತ್ತರ – *

b) Word substitution Errors due to difficulty in blending the sounds :

ದೂ....ಡಿ	—	ದುಡಿ
ಪಾ....ದ....ರ....ಸ	—	ಪದರಸ
ಮೆ....ಲ್ಲು	—	ಮೇಲು

II. Sound Blending Errors :

Examples :-

a) Conversion of short vowel in to long vowel and vice versa

ಪದ	ಪಾದ
ಪಾಠ	ಪಠ
ವಾಹಕ	ವಹಾಕ
ಬಹುಮಾನ	ಬಹುಮನ
ಟಿಲಕ	ಟೀಲಕ
ದೂಡಿ	ದುಡಿ
ಗೆಲ್ಲಲು	ಗೇಲ್ಲಲು

b) Errors committed when Nasal Sounds are Present

i) *Nasal sound omission*

ನಂಬು	ನಬು
ಅಂದವಾಗಿ	ಅದವಾಗಿ
ಬಂಡಿ	ಬಡಿ
ತುಂಬೆ	ತುಬೆ
ತಂಗಿ	ತಗಿ

ii) *Nasal sound additton :*

ಸತಾಯಿಸು	ಸಂತಾಯಿಸು
ಲಕಲಕ	ಲಂಕಲಂಕ
ಮಾಸಲು	ಮಾಂಸಲು
ಇಹಪರ	ಇಹಂಪರ
ಪದ	ಪಂದ

iii) *Nasal sound substitution :*

ತಂಗಿ	ತವ್ಗಿ
Tangi	Tamgi
ಚೊಂಗು	ಚೊವ್ಗು
Chongu	Chomgu
ಬಂಟ	ಬವ್ಟ
Baṇta	Bamta

iv) *Omission of nasal sound and addition of stress :-*

ಬಂಟ	ಬಟ್ಟ
Baṇta	Batta
ಬೊಂಬೆ	ಬೊಬ್ಬೆ
Bombe	Bobbe

v) *Omission of stress and addition of nasal sound :-*

ಕತ್ತಿನ	ಕಂತಿನ
Kaṭṭina	Kanṭina
ಎತ್ತಿನ	ಎಂತಿನ
Eṭṭina	Enṭina

c) No response :-

ಕಾ....ಸು

ಬ....ಂ....ಟ

ವಿ....ತ....ರ

ಲ....ಕ....ಲ....ಕ

ಪಿ....ಸು....ಮಾ....ತು

d) Omission or addition of stress :-

ಅಕ್ಕ	ಅಕ
akka	aka
ನಿಲ್ಲು	ನೀಲು
nillu	nīlu
ಗೆಲ್ಲಲು	ಗಲಲು
gellalu	gelalu
ಚಿಲಕ	ಚಿಲ್ಲಕ
Chilaka	Chillaka
ಹಳೆಯ	ಹಳ್ಳಿಯ
haleya	halleya

e) Producing different word or noword

A		B	
ಠಕ್ಕರು	ಟಗರು	ಹೆಣ್ಣು	ಹಣ್ಣು
ರಸ	ಅಗಸ	ಕಾಲು	ಕಲ್ಲು
ತಾಡು	ಅವಳು	ಕಾಸು	ಕೂಸು
ಮೆಣಸು	ಅವನ	ದೂಡಿ	ದೊಡ್ಡಿ
ಜಗಳಗಳು	ಚಮರ	ಏತರ	ಎತ್ತರ
ಕುರುಂಡ	ಅವೆರಡ	ಗುಡಿಗಳು	ಗೂಡಿಗಳು

III. Addition or omission of Sounds :-

Examples :

ಇಹಪರ	ಇಪರ
ಜಗಳಗಳು	ಜಗಳಗಗಳು
ಕಾವಲುಗಾರರು	ಕಾವಲುಗರು
ಅಂಗಗಳು	ಅಂಗಳು
ಅಂದವಾಗಿ	ಅಂದರವಾಗಿ

IV. Reversal Errors :

Examples :

a)	ರಸ	ಸರ
	ಲಕಲಕ	ಲಕಲಕ
	ಯಜಮಾನ	ಜಯಮಾನ
	ಇವರು	ಇರುವ
b)	ಕೈಚಳಕ	ಕೈಚಗಳ
	ಐರಾವತ	ಐಬರತ

APPENDIX—IV

Elements and Families

Elements	Letter Families Letters and Numbers
— |	i | + T I L H F E 1 4
/\	7 Zz N Vv Ww A M Yy Xx Kk
( ) O	Oo Q Cc G D P R B 2 3 5 6 7 8 9 a e d q b p
J ſ	Jj g f
Uu	Uu
n	r n h m
Ss	Ss

Source : Mann and Suiter, 1979

APPENDIX—V

Common Visual Features among the Letters of Kannada Alphabet

Sl. No.	Common Visual Features	Letters
1	ಲ	ಲ ಅ ಆ ಅಂ ಅಃ
2	ಉ	ಉ ಊ
3	ವ	ವ ಏ ಐ ವ ವ ವಂ
4	ಪ	ಪ ಫ ಪ ಷ ಪ
5	ಡ	ದ ಧ ಢ ಟ ಧ ಢ
6	ಒ	ಒ ಓ ಬ ಜ ಔ ಚ
7	ಯ	ಯ ರಳ ಹ
8	ಳ	ಳ ಶ
9	ಖ	ಖ ಖಂ ಖೂ
10	ಣ	ಣ ಣ
11	ರ	ರ ಗ ಠ ಈ ಕ
12	ನ	ನ ಸ