CHAPTER II

THEORETICAL OVERVIEW

2.1 LEARNING DISABILITY

2.2 DYSCALCULIA
THEORETICAL OVERVIEW

“If I cannot learn the way you teach, will you teach me the way I can learn?”

Fig. 2.1 A Dyscalculic Child

2.1 LEARNING DISABILITY

Disability is the lack of ability relative to a personal or group standard or norm. It is the functional consequence of an impairment or change in the body or human functioning. It can be genetic or physiological and it may include physical impairment, sensory impairment, mental disorders or various types of chronic diseases. Disability can be divided into a number of categories like mobility and physical impairments, orthopedic impairments, mental illness, brain disability, visual disability, hearing disability, speech handicap, cognitive
or learning disabilities, emotional disturbance, autism and attention deficit hyperactivity disorder.

**Fig. 2.2 Percentage of Special Education Students by Disability Category**

Children with learning disability constitute the largest and fastest growing population of special needs in children in schools. The area of learning disability continues to be a dynamic discipline, responsive to advances in education and changes in society. The condition of learning disability is perplexing since it causes a lot of obstacles and difficulties in the path of learning. In schools teachers come across certain children who have diverse learning abilities and special learning needs. Some of the learners achieve high and some may lag behind in their learning. Despite being normal, some have difficulty in learning or remembering the school
subjects. This difficulty is observed mostly in academic areas such as reading, writing and arithmetic. Although they are not visually impaired, they may not perceive things as normal students do, they may not see as normal students do. Although they are not hearing impaired, many do not listen or hear normally, although they are not retarded in mental development, they do not learn. So what happens is that there arises a distinctive gap between their potential and actual educational development. Many of these students exhibit other behaviour characteristics that make them disruptive in classroom and home.

2.1.1 History of Learning Disability

The field of learning disability is the most recent addition in the category of special education. The concept of learning disability did exist, but was not recognized and so remained hidden for centuries. The initial work in this area was done by Franz Joseph Gall, a Viennese physician. Gall in 1802 related certain brain parts to specific tasks performed by individuals. He observed patients, who after a brain injury were unable to express feelings and ideas in spoken language. By 1990, efforts in this direction showed that, mental retardation may not be the real cause for poor academic performance, it can be learning disability. Later on more researches were conducted in the field of mental deficiency. As such, a group investigated the area of mental retardation and other directed its
attention to brain-injured persons. The latter path, eventually, led to learning disability.

The term learning disability was coined by Kirk (1963), in a parent’s meeting held in New York City to describe children who inspite of normal or near normal intelligence had a puzzling array of learning and behavioural problems. A few years later, the professionals, officially recognized the term by forming the Division for Children with Learning Disabilities (DCLD) of the Council of Exceptional Children (CEC). Kirk suggested the word learning disabilities to describe all the child’s behavioural symptoms that arise from dysfunction of the central processing mechanisms. This term describes a group of children who had disorders of development of language, speech and reading and associated communication skills needed for social interaction. Children with sensory impairments, mental retardation and emotional disturbances are excluded from this category.

2.1.2 Learning disability – Concept and Definitions

Learning disability is found across all ages and in all socio-economic classes. The global concept of learning disability includes problems in listening, concentrating, speaking, thinking, memory, reading, writing, arithmetic and social skills and learning disabilities are specific, not global impairments. The term learning disability is used to refer to a range of neurological conditions that affect one or more of the
ways that a person takes in, stores or uses information. Learning disabled are those who function at average or above average intellectual level but have significant specific academic problems coupled with an executive processing deficit.

National Joint Committee on Learning Disability (1981) defines learning disability as a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to central nervous system dysfunction and may last across life span. Even though a learning disability may occur concomitantly with other handicapping conditions, it is not the result of those conditions or influences.

To sum up,

1. Learning disabilities are a heterogeneous group of disorders.

2. The problem is intrinsic in the individual.

3. The problem is thought to be related to a central nervous system dysfunction.

4. Learning disability may occur with other handicap conditions.

The Federal definition of learning disability contained in 1975 legislation, which became effective in 1977, continued in 1986
reauthorization without change. This definition has become the basis for federal and most state definitions as well as for many school programme. According to this definition, specific learning disability means a disorder in one or more of the basic psychological processes involved in understanding or in using language spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell or to do mathematical calculations.

From the second part of the federal definition we can make out that if a student has specific learning disability he cannot achieve according to his age and intellectual ability even if appropriate learning experiences are provided. There will be discrepancy between achievement and intellectual ability.

The three main criteria in defining learning disability can be identified as

1. Discrepancy Criterion
2. Severeness Criterion
3. Resistance Criterion

Discrepancy Criterion stipulates that diagnosis of learning disability is justified when there is a great discrepancy between scholastic achievement and general performance or intellectual ability. Some researchers say that this extent of discrepancy has to be at least as big as $2\sigma$ between chronological age of children and level of achievement. But
others say there should be a two years lag between general achievement and level of scholar skills. A child with discrepancy between his IQ score and his Mathematics achievement may have a mathematical disability, but many children with mathematical disability may not meet this criterion.

A second criterion is **Severeness Criterion**. Geary (2004) uses the cut off criterion of the 15\(^{th}\) percentile but warrants that only children who have scores across successive academic years beneath this cut-off may have a diagnosis of mathematical disabilities.

The third and last criterion that can be found in definitions of learning disability is the **Resistance Criterion**. Authors who defend on this criterion argue that core learning disability can be diagnosed only after a period of remediation is offered.

### 2.1.3 Some Eminent People with Learning Disability

Nelson Rocke Feller, who served as Vice President of The United States and Governor of the State of New York, suffered from learning to read. In describing his feelings about growing up with a learning disability he agreed that he had a hard time in reading.

As a child, Thomas Alva Edison, the ingenious American inventor, was called abnormal, addled and mentally defective. He was thrown out of school when he was twelve as he was thought to be dumb. He was
noted to be terrible at Mathematics, unable to focus and had difficulty with words and speech.

Auguste Rodin, the great French sculptor, was called the worst pupil in his school. Because his teachers diagnosed Rodin as uneducable, they advised his parents to put him out to work, although they doubted that he could ever make a living.

Woodrow Wilson, the scholarly twenty-eighth president of the United States, did not learn his letters until he was nine years old and did not learn to read until the age of eleven. (Thompson, 1971)

Albert Einstein, the great mathematical genius, could not speak until age three and he was dyslexic. His search for words was described as laborious and until he was seven, he formulated each sentence, silently with his lips before speaking it aloud. School work did not go well for young Albert. One teacher predicted that “nothing good” would come of him. Einstein’s language disabilities persisted throughout his adult life. It was said that he found the words dancing in front of him. He was very slow in speech and shyness made his friends think that he was stupid and the teachers considered him a misfit and advised him to attend a trade school.

Wernher Von Braun, the father of rocketry, flunked 9th grade Algebra. Being a gifted child, he had to suffer strange childhood
incongruencies in his development. He had Dyscalculia in his early school days and later on he could overcome it and rise high in life.

Leonardo Da Vinci was also believed to suffer from a number of learning disabilities including dyslexia and attention deficit disorder. He overcame his disabilities by funneling his creative talents to visual depictions of his thoughts.

Winston Churchill, the famous British Prime Minister, who received Nobel Prize in Literature, was academically disadvantaged. He failed class eight and was poor in Mathematics and so he generally hated school.

2.1.4 Categorization of Learning disability

Learning disability can be categorized on different basis. Two types of such categorization are discussed here. First one is based on Information Processing and the second one is based on Specific Disability.

2.1.4.1 Based on information processing

The National Dissemination Centre for Children with Disabilities states that learning disability fall into four broad categories based on the stages of information processing used in learning: input, integration, storage and output.
1. **Input:** It refers to the information received through senses. These difficulties can cause problems with recognizing the shape, position and size of item seen.

2. **Integration:** This is the stage during which perceived input is interpreted, categorized, placed in a sequence or related to previous learning.

3. **Storage:** Problem with memory can occur with short-term or working memory or with long term memory.

4. **Output:** Information comes out of the brain through words, that is, language output or through muscle activity, such as gesturing, writing or drawing. It may create problem with spoken language and written language.

2.1.4.2 **Specific learning disabilities**

Based on the specific difficulties faced by children learning disability can be classified into the following categories

1. **Dyslexia**

   It is a language-based disability in which a person has trouble in understanding written words. Etymologically speaking dyslexia means ‘dysfunction with words’. It is a reading disability or reading disorder which is neurological in origin. It is characterized by difficulty in learning to read inspite of average or above average intelligence and
regular exposure to reading instruction. It is a brain based dysfunction that is often genetic and lifelong.

Fig. 2.3 Normal and dyslexic brains

2. Dyscalculia

A mathematical disability in which a person has difficulty in solving arithmetic problems and grasping Mathematical concepts. Dyscalculic students can have difficulties in both reading and Mathematics. Children with Dyscalculia often require a long time to carry out even simple arithmetic tasks.
3. Dysgraphia

Dysgraphia is a writing disability in which a person finds it hard to form letters or write within a defined space. These children usually will have extremely poor handwriting and have sequencing problems.
4. *Dyspraxia*

Dyspraxia is a learning disability that causes difficulty with patterns of movement. The word dyspraxia comes from the Greek word ‘dys’ which means impaired or abnormal and ‘praxis’ which means actions or deed. It is also called motor learning disability.

![A child with Dyspraxia](image)

Fig. 2.6 A child with Dyspraxia

5. *Dysphasia*

Dysphasia is a learning disability that causes difficulty in speaking and understanding. It is a language disorder which causes impairment of speech and comprehension of words. The symptoms of dysphasia include inability to comprehend language, to pronounce, to speak spontaneously, to form words and to name objects. Dysphasia means trouble in speaking. Aphasia means one cannot speak at all.
6. Dysnomia

It is the inability to retrieve names or recall appropriate words for oral or written language. This may affect speech skills, writing abilities or both. Such students may have auditory memory problem. They are not able to remember what they hear. Some have problem with
remembering what they see or experience. They take longer time to complete tests.

7. Dysarthria

It is a motor speech disorder resulting from neurological injury characterized by poor articulation. Dysarthric speech is due to some disorder in the nervous system. It is due to weakness or non-coordination of muscles.

Fig. 2.8 A student with Dysarthria

8. Sensory Processing Disorders

It is a sensory disability wherein a person has difficulty in understanding language despite normal hearing and vision due to deficiency in the processes of recognizing and interpreting information taken in through the senses. The two most common areas of processing
difficulty associated with learning disabilities are visual and auditory perception.

Fig. 2.9 Sensory Processing Disorders

9. Nonverbal Learning Disabilities (NLD)

Children with this disorder are unable to recognize and translate non-verbal cues, such as facial expressions or tone of voice into meaningful information. This cause the children to be mislabeled as
emotionally disturbed because of their inappropriate responses to nonverbal stimuli.

Fig. 2.10 A student with Nonverbal Learning Disability

2.1.5 Psychological and Behavioural Characteristics of Learning Disabled Children

1. Perceptual, Perceptual-Motor and General Co-ordination problems
   a) Visual Perceptual Disabilities: There are many studies indicating that reading-disabled children are more likely to exhibit visual perceptual problems (problems in organizing and interpreting visual sensory stimuli) than children who are average or above average readers.
   b) Auditory Perceptual Disabilities: Although fewer in number there have been some investigations of the auditory perceptual disability of children with learning disabilities. These studies
indicate that auditory perceptual difficulties are more often found in learning-disabled than in normal children.

c) Perceptual-Motor and General Co-ordination Problems: It has been observed clinically that learning disabled children often have difficulty in physical activities involving the use of motor skill. The difficulties assigned to them involve both fine motor (small motor muscles) and gross motor (large motor muscles) skill. Fine motor skills often involve the co-ordination of the visual and motor systems.

2. Disorders of attention and hyperactivity

Many investigators have documented the attention difficulties of learning disabled children. Learning disabled children appear to be more easily distracted and inattentive than normal children.

3. Language problems

Learning disabled children show poor language efficiency.

4. Disorders of memory and thinking

Learning disabled children in general demonstrate memory deficits in both auditory and visual stimuli. Rather than reflecting before responding, impulsive children respond quickly without carefully considering the various alternatives.
5. Emotional liability

The learning disabled child frequently exhibits behaviours which are characteristic of emotional disturbance. He is not a happy child and has low self-esteem.

6. Disorders in speech and hearing

The learning-disabled child exhibits problems in remembering or understanding the spoken word, delayed speech articulation or inappropriate use of speech and vocabulary.

7. Neurological problems

Larger percentage of learning-disabled children shows signs of neurological problems than the normal population.

8. Academic achievement

Some children have deficit in all scholastic areas, while others have problems in only one or two academic subjects. Reading disabilities are probably the most prevalent among the academic problems. Academic problems of learning disabled are mainly seen in the areas of reading, writing, arithmetic, conversational skills and auditory perceptual deficits.

2.1.6 Causes of Learning disability

Researches have been conducted to find out the possible factors or causes of learning disability. Studies revealed that apparently there is no single cause for all learning disabilities. Learning disability arises due to
minimal brain dysfunction which occurs in the central nervous system (Panda, 1997).

Children who show symptoms of learning disabilities are usually impaired primarily in the cortex. This kind of injury prevents the child from receiving and processing information properly, which leads to delayed, inaccurate and inappropriate decisions. Because children with these symptoms often have mild to severe problems in the midbrain area as well, they may also have issues with their co-ordination and mobility. The brain impairments associated with learning disability is depicted in the figure given below.

Fig. 2.11 Brain impairments associated with Learning Disabilities
Experts have noticed that learning disabilities tend to run in families and they think that heredity play a role (Lakshmi, 2008). Unstimulating environment at home may develop learning disability (Rao, 2005). A child may inherit a learning disability or it can also result from lack of early learning experience that stimulates mental growth and development. They are neither caused by cultural or linguistic differences nor by poor instruction. Statistics reveal that learning disorders are more common in densely populated areas of large towns than in more affluent sections of the society and are more common among boys than girls. However the factors that cause learning disability can fall into three categories-genetic/hereditary, environmental and organic or physiological factors including psychological factors (Mangal, 2002).

2.1.7 Theories Related to Learning disability

The following are the theories related to learning disability.

2.1.7.1 Developmental psychology and maturational theories of learning disability

This approach suggests that a progression of abilities normally occur under appropriate conditions. During the growing stages a student normally tends to perform functions that are comfortable while avoiding that are uncomfortable. Since certain processes are lagged in maturation
and are not functioning adequately for students with learning disabilities, they avoid and withdraw from activities requiring those processes.

**2.1.7.2 Behavioural psychology and direct instruction**

Behavioural theories advocate teachers to analyse academic skills in terms of the underlying skills needed to accomplish those tasks. These skills are then placed in an ordered and logical sequence. Then students are tested to know the skills they possess. By teaching, students can master the sub skills. The theory emphasises the importance of analysis of the task and the behaviours needed to learn that task. In direct instruction a complex terminal behaviour is analysed into its component parts called enabling behaviours, then those enabling behaviours that the students lack are taught and finally those behaviours are integrated into the terminal objective.

**2.1.7.3 Theories from cognitive psychology**

Three theories are discussed here namely

1. *Disorders of psychological processing* – This is a theory of mental abilities and disabilities that are especially important in the formative years of the field. Students with learning disabilities have disorders in one or more of the basic psychological process needed for school learning. Psychological processes are cognitive abilities in perception,
language, memory, attention, concept formation and problem solving.

2. Disorders of cognitive processing – Cognitive processing theories deal with problems in many cognitive functions in addition to perceptual disorders, including problems in memory and the development of cognitive structures.

3. Information processing theories - These theories expand and incorporate the concepts of psychological and cognitive processing. Learning disabled students could not hold words in short term memory, could not identify the phonemic representations of words and had difficulty with spelling rules.

2.1.7.4 The Perceptual - Motor Model

The Perceptual - Motor Model is a more complex model that relates learning disabilities to intermediate problems, which are, in turn, caused by brain dysfunction. Perceptual disturbances or abnormalities are caused by brain injury or brain dysfunction.

2.1.7.5 The Language Development Model

Another model for consideration of the cause, effects and remedial implications of learning disabilities is Language Development Model, which emphasizes the role of language in the development of all other abilities. Language learning is not instinctive, it has to be learned and acquired.
### 2.1.7.6 Learning Strategy Deficits Model

Learning strategies are designed to teach students how to learn rather than to teach specific content information. Learning disabled students may be wanting in many or some of these strategies. As a result, they may experience difficulty in specific subject areas. The learning strategy deficits model presumes that learning disabled students may have information or knowledge that they cannot access under most or certain conditions. As a result, they have learning difficulties.

### 2.1.7.7 Behavioural Theory Model

Behavioural learning theories tend to emphasize observable behaviour, such as classroom behaviours or new skills or knowledge that can be demonstrated. Behavioural learning theorists believe that pleasurable or painful consequences of behaviour change the individual’s behaviour. Behavioural approaches have been and still are, very popular among learning disabilities practitioners.
2.2 DYSCALCULIA

Dyscalculia was discovered in 1919 by Salomon Henschen, a Swedish neurologist, who found that it was possible for a person to have impaired mathematical abilities that did not affect intelligence in general. A study was first conducted on children by Kosc (1974) in Bratislava on Dyiscalculia and he reported that Dyiscalculia is a structural disorder of

![Answer script of a Dyiscalculic student](image)

Fig. 2.12 Answer script of a Dyiscalculic student
mathematical abilities. Later on many studies were conducted on Dyscalculia regarding the symptoms, the problems faced by such children and overlapping of Dyscalculia with other learning disabilities.

According to British Dyslexia Association, Dyscalculia is a term referring to a wide range of life-long learning disabilities involving Mathematics. There is no single form of Mathematics disabilities and difficulties. It varies from person to person and affects people differently in school and throughout life. Dyscalculia can be defined as dysfunction in the reception, comprehension or production of quantitative and spatial information. Dyscalculia is a poor understanding of the number concept and the number system and it is a learning problem affecting many individuals. It is also referred as developmental arithmetic disorder and number blindness which is a lifelong condition that is likely to show up early. However, less is known about this disability Dyscalculia than dyslexia, because society accepts learning problems in Mathematics as quite normal.

Kose (1974) defines arithmetic disorder or developmental Dyscalculia as a structural disorder of mathematical abilities which has its origin in a genetic or congenital disorder of those parts of the brain, that are direct anatomic physiological substrate of the maturation of the mathematical abilities adequate to age, without a simultaneous disorder of general mental functions. This definition emphasizes the developmental
aspects and the substrates of mathematical abilities. A student with any degree of mathematical difficulty may be considered to have Dyscalculia by some educational specialists.

Dyscalculia is the learning disability associated with the inability to comprehend numbers or use them in working mathematical operations, as if the numbers were the letters in words of a foreign language. Dyscalculia is characterised by a poor understanding of the number concept and the number system. Difficulties are in counting, giving and receiving change, learning abstract concept of time and direction, telling and keeping track of time and the sequence of past and future events. Children with mathematical disabilities are unable to function with these mathematical milestones characteristics of their age group. Dyscalculic children find learning and recalling number facts difficult, often lack confidence and even when they produce the correct answer may fail to use rules and facts. For example, they may know $3+5=8$, but cannot infer therefore $5+3=8$.

2.2.1 Dyscalculia-Prevalence

Research reveals that the prevalence of learning disability ranges between 5-16%. In Indian context prevalence estimate ranges from 9-39%. The incidence of dyslexia in primary school children in India has been reported to 2-18% of dysgraphia (14%) and of Dyscalculia (5.5%) (Choudhry, 2005; Ramaa, 2000). According to UK studies done by
Gross-Tsur and Manor in 1996, 6.5% are dyscalculic. According to Lewis, Hitch, and Walker (1994), 1.3% is dyscalculic while 2.3% dyscalculic and dyslexic - which means that according to this study 3.6% of the world’s population are dyscalculic. Although dyslexia seems to have a take on the male population (30% female and 70% male) when it comes to Dyscalculia, studies show that the representation is equal.

Geary (2004), finds that between 5% and 8% of school age children have some form of mathematical disabilities. Badian (1983) finds a prevalence of 6.4% in an American study and Kosc (1974) also finds 6.4% in Bratislava, but English studies report prevalence rates of 3.6%. German researchers say that the prevalence rate for mathematical disabilities is as high as the prevalence of other well known and well studied disorders such as reading disorders and ADHD (Shalev et al. 2001). Approximately 5% (although estimates vary between 3 and 11%) of children who exhibit normal intelligence, present a specific and persistent difficulty with calculation and mental arithmetic, called Developmental Dyscalculia.

Prevalence rate reported in Indian schools is 6% (Ramaa, 1990). For example, one analysis discovered that approximately 17 percent of dyscalculic children are also dyslexic and another 26 percent experience the effects of attention deficit hyperactivity disorder (Shalev, Manor & Gross-Tsur, 1996). Another study suggested that 4 in 10 people who are
diagnosed with dyslexia also have trouble with Mathematics to some measurable extent (Butterworth, 1999). Therefore, an independent diagnosis of Dyscalculia is often difficult to ascertain (Gross-Tsur & Manor, 1996). Nevertheless, there are some methods that educational psychologists utilize to detect Dyscalculia in a child. Research suggests that 40-50% of dyslexic show signs of Dyscalculia. They do at least as well as in Mathematics as others, with about 10% achieving at a higher level. The remaining 50-60% do have difficulties with Mathematics. They have difficulty in decoding of mathematical notation and symbols. Some dyslexic has difficulty in comprehending the wordings of a question and eventually they are also branded as dyscalculic.

2.2.2 Dyscalculia-Signs and Symptoms

A common feature of dyscalculic students is difficulty in learning and remembering arithmetic facts. Another feature is difficulty in executing calculation procedures, with immature problem solving strategies, long solution times and high error rates (Geary, 1993).

They show difficulty in understanding concepts of place value, quantity, number line, positive and negative value, aligning numbers in columns, using calculator, understanding and doing word problems, sequencing information, using steps involved in mathematical operations, making change and handling money, recognising patterns while doing arithmetic operations, understanding fractions, putting language in
Mathematics, understanding concepts such as time, space, days, weeks, seasons, organising problems in one page, keeping numbers lined up and following long division, telling time, carrying and borrowing, and using $+, -, \times, \div$. They may reverse or transpose numbers (for example 63 for 36, or 785 for 875, 9 for 6, 3 for 8).

2.2.3 Types of Dyscalculia

Kosc (1974) classified Dyscalculia in the following way:

1. Verbal Dyscalculia: Disturbed ability with verbal use of mathematical terms and symbols such as naming amounts and numbers of things, digits, numerals, operational symbols and mathematical performances even though they are able to read or write dictated numbers.

2. Practognistic Dyscalculia: Inability to recognize distinguishing features or to make comparisons of objects that vary on some dimension. For example: Enumeration or Comparison

3. Lexical Dyscalculia: Difficulty in reading digits, symbols or multidigit numbers, operational signs and written mathematical operations.

4. Graphical Dyscalculia: Difficulty in writing dictated numbers or copying symbols and usually seen with dysgraphia and dyslexia for letters.
5. Ideognostic Dyscalculia: Difficulty in comprehending mathematical ideas and relations and making mental calculations.

6. Operational Dyscalculia: Difficulty in completing basic operations of addition, subtraction and so on, including confusion among the operations and appropriate algorithm.

7. Sequential Dyscalculia: Difficulty to count numbers according to sequence. It is also associated with difficulty in calculating time, checking schedule, tracking direction and taking measurement.

These forms of Dyscalculia also occur in combination (Kosc, 1974) often making it difficult to identify the contributions of each component to the exhibited component.

2.2.4 Causes of Dyscalculia

One hypothesis that Dyscalculia is hereditary is gaining support in cognitive sciences (Ansari & Karmiloff, 2002) because the mathematical learning disorder is unusually common in identical twins and to a lesser degree, fraternal twins and other siblings (Alarcon, Defries, Gillis, Light & Pennington, 1997; Shalev et al. 2001).

Scientists believe that mathematical ability resides in our parietal lobes towards the back of our brain, near the ears. It seems that these systems are abnormal in dyscalculics.
The few studies that have investigated the neural basis of Developmental Dyscalculia consistently suggest that there is a pattern of structural and functional alterations in the intraparietal sulcus (IPS) and the prefrontal cortex (PFC). Children with specific calculation difficulties were found to have less grey matter in the left IPS. In people with Dyscalculia, intraparietal sulcus is short and shallow. In addition, a French team of researchers has measured abnormal pulses in this part of the brain in dyscalculics. Recent neuroimaging studies indicate that this area of the brain is important for specific calculation processes. In particular, children with Dyscalculia have reduced grey matter in this area. In Figure 2.13 the right parietal lobe (yellow) appears to be the seat of Dyscalculia.

Numerous investigations are being done by scientists to know the exact cause of Dyscalculia. Investigations are done in several domains.
such as neurological deficits and deficits in working memory. One of the causes may be disturbances in short term memory or it can be inherited or can be caused by brain damage. Exposure to prenatal or environmental traits may also play a role. This disorder results out of the harm caused to central part of the brain. Right hemisphere deficits may result in problems in acquiring mathematical skills. On the basis of the research conducted by Kosc in 1974, it was found that Dyscalculia is a structural disorder of Mathematics which has its origin as genetic or constitutional disorder (Nakra, 1997).

Conclusion

The investigator examined in detail the theoretical overview of learning disability and Dyscalculia. This helped the investigator to frame the topic of the study and to adopt suitable methodology to carry out the study.