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Introduction

Academic success is deemed to be highly necessary for a person to make a living in the present day challenging and competitive society. A person who does not achieve adequate literacy skills will have very limited options in the range of educational and occupational choices he or she can make in life. Hence much importance is given by teachers and parents to achieve good grades in their scholastic performance. Generally speaking, all children strive to succeed in their academic pursuits. However, it is commonly seen in all grade levels that a few children seem to have difficulties in their scholastic achievement due to various reasons. Some children for instance, have difficulty in learning in spite of having average or above average intelligence, adequate exposure to learning environment, good socioeconomic status and not having gross neurological deficits.

Yet there have been many great individuals like Albert Einstein, Thomas Edison, John F Kennedy, Charles Schwab ... to name a few, who had also suffered from scholastic difficulties in their childhood but achieved great feats & immense successes as adults. However, not all children who experience scholastic difficulties will get opportunities or means to become great scholars in their later years. They may exhibit difficulties in one or several of the academic areas such as reading, arithmetic, spelling and writing. Even then not all of their academic and general life growth areas are below expectations. Some of them exhibit good skills and also excel in many areas other than their problem areas. Many are simply slow to develop certain skills because children
show natural differences in their rate of development and are delayed in their maturation or have differences in their learning style. They have an exceptionally uneven ability to learn and as a result have superior achievement in some areas than others. The manner in which they process information is different and inefficient or in an uneven fashion as compared to the academically high or normal achievers. Information processing generally means the way a person receives and stores information from his senses (sight, smell, hearing, taste, and touch) and uses them to complete a given task. Due to their specific, different and inefficient ways of information processing which are unique to each individual, they tend to show backwardness in certain areas of their achievement.

A lot of these children will just “give up” may be due to ‘learned helplessness’. Learned helplessness is a conditioned response that creates problems in thinking, motivation, and emotions in children with learning problems. The theory of learned helplessness was developed in the late 1960’s by Martin Seligman and his associates when they accidentally discovered a phenomenon while doing classical conditioning experiments with dogs. In a controlled study, they used electric shocks when dogs tried to leave their cage. Later even after the dogs were provided a way out, they made no efforts to escape. This “giving up” after a period of negative consequences was termed ‘learned helplessness’ (Peterson, Maier, Seligman, 1993). The dogs had learned that they were helpless and their efforts were futile. Many studies (Dean, & Rattan, 1987; Hersh, Stone, & Ford, 1996) have suggested that children with scholastic problems develop learned helplessness in academic settings as a result of continued failures in school and have an unwillingness to approach new tasks or a lack of persistence. Like the dogs in the study,
the children who develop learned helplessness may give up trying in new situations where they could have succeeded, due to their thinking that their efforts are useless.

Poor Scholastic performance has secondary consequences as well where in, they will be frustrated with formal classroom education, and exhibit personal inadequacy, poor self esteem, social alienation and may have poor interpersonal relationships or certain emotional and behavior problems. Secondary to the feeling of disappointments in these low achieving children, parents and teachers may also feel helpless and inadequate or guilty because of their belief that they may be somehow contributing to the child’s problems. A lot of times such individuals are seen in psychiatric clinics because the secondary effects may have become much greater than the initial scholastic difficulties. Little thought will have been given to the fact that the children could have been low in scholastic achievement due to certain ‘LEARNING DIFFICULTIES (LD)’. The term, learning difficulties is used in this present study in a broad perspective to refer to the learning problems such children experience, even though they have adequate intelligence, are exposed to good socioeconomic environment and are not having gross sensory and neurological deficits. These children may face difficulty in one or several areas of academics such as reading, mathematics, spelling, writing etc. and some may excel in some areas other than their problem areas.

Professionals in this field give many conflicting diagnosis and labels for children with learning difficulties like minimal brain damage, mildly retarded, slow learners, scholastically backward, mild neurological deficits, developmental dyslexia, learning disabilities etc. It is believed that in countries like United States between 1 and 5 % of children in a classroom are clearly identified as having learning disabilities, with up to
10% being mildly disabled (Wong, 1996). Learning disorders have been described and defined variably depending on the particular viewpoint of the researchers. Although debate over definition and labels continues, a significant discrepancy between achievement and intellectual ability is used by many of the professionals as indicative of a child having learning problems. These learning problems are usually evident in their performance on their achievements in different subjects they study in their schools. Since all the subjects studied in the schools like languages, science, social studies, mathematics etc have reading, writing, spelling and computations skills as basic requirements, these children have difficulty in these basic academic skills.

When students struggle with routine assignments and fall behind classmates, a busy teacher may pigeonhole them as slow, give up on them, or become frustrated from failed efforts to bring them up to normal level speed. Well intended efforts to help them by repetitions of the same exercises may fail because the specific reasons for the inadequate performance were not identified. Hendricson, and Kleffner (2002), have proposed six potential reasons for inadequate student performance to serve as a diagnostic framework to help understand why a student struggles academically: 1. Cognitive factors, including poorly integrated, compartmentalized information, poor metacognition that hinders the student's ability to monitor and self-correct performance, bona fide learning disabilities that require professional assessment and treatment, and sensory-perceptual difficulties that may hinder performance. 2. Ineffective study habits, which are common. 3. An inadequate educational experience (unclear objectives, poorly organized instruction, absence of coaching and timely feedback) or a punitive environment in which students avoid approaching instructors for assistance. 4.
Distractions due to nonacademic issues such as social relationships. 5. Dysfunctional levels of defensiveness that hinder student-teacher communication. 6. Underlying medical conditions that may affect student attentiveness, motivation, energy and emotional balance.

Thus the causes for learning difficulties (LD) are many and complex. There have been many theories by the professionals to explain the underlying causes of learning problems. Researchers have attempted to prove one factor or the other as being responsible for causing LD, but inconclusively. No one single factor has been attributable for LD. Researchers have focused on factors like family relationships, poverty, subcultural group habits and expectations etc.; Bio physiological factors like birth trauma, anoxia, genetic, brain injury, infectious diseases, malnutrition etc.; Psycho developmental factors like developmental delay, being separated from parents, building trusting relationships etc.; Educational factors like inadequate teaching, individual teaching style of teachers, Uninteresting scholastic tasks, crowded class rooms, poor study habits etc. Grading on scholastic performances is largely based on the abilities of the individual in reading, writing, spelling and mathematics. Broadly speaking, learning difficulties could be said to stem from cognitive functions involved in scholastic skills in language and mathematics, higher cognitive functions and socio emotional functions.

The present study is an endeavor to study and compare the differences between the children with learning difficulties and the children without learning difficulties in their scholastic skills, cognitive functions and their social emotional functioning. Literature in this area was reviewed and the highlights of the same is presented in the following chapter.
Review of Literature

Research that has been conducted in the field of learning difficulties were reviewed and they are presented in this chapter by focusing on different aspects of the scholastic skills in language and mathematics, higher cognitive functions and socio-emotional functions.

Language:

The important components of language that directly affect scholastic achievements are Reading, Writing, Comprehension and Spelling.

**Reading** is generally understood to mean extraction of meaning from words in written prints. Over the years, research has consistently indicated that students with learning problems have numerous difficulties in reading (Kaluger & Kolson, 1978; Padget, 1998). Despite an extensive literature, reading difficulties also referred to as ‘dyslexia’ remains to be a highly controversial field. Starting from definition and assessment, issues related to sub typing, remediation and prognosis still remain unsolved. A confusing variety of theoretical models, test procedures, and operational definitions are being used by different investigators and clinicians. Conclusions drawn by any investigation are influenced by the nature of operational definition, the method of identification, assessment procedures and the theoretical model one adopts in the study.

Many investigators (John, 1989; Torgesen, 1985; and Mann and Brady, 1988) stressed the role of cognitive skills in reading problems. Approximately 80% of children
with learning difficulties experience reading problems (Learner, 1989). The language domain has become the centre of present research interest in Reading difficulties. The initial studies were done in visual domain. More than 100 years ago, Hinshelwood (1895), an ophthalmologist, concluded that outstandingly poor reading ability was probably due to impaired visual memory for words and letters. Another pioneer in this field, Orton (1925), also spoke of an impairment of the visual processes such as a tendency to reverse letters or sequences of letters. The linguistic explanation now offers a more adequate account of the type of these errors commonly observed in children with reading problems.

Two technical terms are generally encountered in literature on reading and they are ‘phonology’ and ‘orthography’. Phonology refers to the sound units of language and embraces the phonemes and larger units of spoken language. Orthography refers to the appearance of the units of language and refers to the graphemes and larger units of written language. Competencies in perceiving and recalling phonological and orthographic units, small and large, are key elements in reading acquisition.

Reading in general may be conceptualized as four interdependent components: word recognition, word comprehension, sentence comprehension and comprehension of longer texts. Problems in reading can involve many areas, including word recognition and comprehension, oral reading fluency and reading comprehension (O'Shea, O'Shea & Algozzine, 1998), within each of these areas, numerous skills are needed to successfully read. For example, comprehending a passage involves noting important details, identifying the main idea, tracking a sequence of events or steps, drawing inferences and conclusions, organizing ideas, and applying what is read (Lerner, 1993). It is only in the
last few years that there has been a systematic attempt to relate the development of reading and spelling in children where it breaks down in those with reading problems. A widely quoted model is that of Frith (1985) who argues for three stages in the development of reading. These are Logographic, Alphabetic and Orthographic stages.

Logographic skills refer to the instant recognition of familiar words. The salient graphic features may act as important cues in the process. Here a child pronounces the word after he or she recognizes it. The child often guesses on the basis of contextual or pragmatic cues like shape recognition, using visual memory in environment which are familiar – particular word spoken / written. This refers to, essentially sight vocabulary stage.

In alphabetic skills, the child acquires the knowledge and use of individual phoneme / grapheme translation – sound to letter correspondences. Being an analytical skill it involves phonemic awareness, decoding novel words and grapheme by grapheme. Here the letter order and phonological factors play an important role. The use of phonological / letter sound approach creates an alphabetic approach in reading.

Orthographic skills refer to the instant analysis of words into orthographic units, without phonological conversion, by the automatic recognition of graphemic clusters. Here the lexical analogies and orthographic codes are used first in reading and then transfer / develop spelling.

But the current understanding of the reading acquisition models reveal that the stages of normal reading acquisition across different alphabetic scripts are not uniform and the stages envisaged by the different models are not applicable to all scripts. Prakash (2003), on his extensive examination of the reading acquisition in different languages
across the world concluded that “there will never be ‘A model’ that fits all the situations and to obtain a more comprehensive picture, greater information should be obtained from a non-alphabetic milieu” (p.71-72).

Some signs of Reading difficulties are lack of age appropriate number of sight words, lack of oral fluency or is halting, persistent decoding difficulties, not understanding what was just read aloud, decoding problems, transposing words, interchanging articles and prepositions (e.g., “a” and “the”), Frequent substitutions of words that are visually similar (e.g., want for what), slow rate of reading, fragmented word reading, word additions and continuing to rely on finger pointing and continuing to move lips while reading (Gorman, 2001).

Researchers have wondered if the reading problems continue as children grow older. Results of long term follow up of studies of children with reading disabilities have been reviewed by Spreen (1982); Horn, O’Donnell, and Vitulano (1983); Schonhaaut and Satz (1983); and Finucci (1986). Although results from individual studies are often contradictory, a general conclusion that emerged was that reading and spelling difficulties continues for children who were found to have reading problems in childhood. LaBuda and Defries (1988) also reported from their study that reading disability tends to persist into young adulthood.

Reading difficulties also known as Dyslexia is generally referred to a reading deficit that cannot be accounted for by low IQ; emotional, sensory or neurological problems; or lack of educational opportunity. As operationally defined and identified by a discrepancy between actual reading level and the expected level for age and IQ, whether it differs from poor reading that is part of a generalized below average profile is hotly
debated and an unresolved question (Shaywitz, Escobar, Shaywitz, Fletcher, & Makuch, 1992; Siegel, 1989, 1992; Stanovich, 1991a, 1991b). The phrase garden-variety is often used to describe poor reading that is congruent with intelligence level (Gough & Tunmer, 1986; Stanovich, 1988). Studies comparing the two types of poor readers on reading related tasks have been referred to as 'garden variety control designs' (Stanovich, 1988, p590). Another method of validating the concept of dyslexia is through the reading-level (R-L) match design (Goswami & Bryant, 1989; Jackson & Butterfield, 1989; Rack, Snowling & Olson, 1992) in which older children are compared with the younger children reading at the same level. The rationale of such studies is that if the older and younger children do not differ in reading related skills, it would mean that the older children are acquiring reading skills normally but at a slower rate which could be inferred as due to a developmental lag. Conversely, if the younger children were superior to the children with dyslexia in reading related skills, there would be a support for a deficit theory of dyslexia. Unfortunately, the results of both R-L match and garden variety control studies have been inconsistent (Rack et al., 1992; Siegal, 1992; Stanovich, 1988). Rack et al., concluded from their review of R-L match nonword reading deficit studies, that there was clear evidence that most individuals with dyslexia have specific deficit in phonological reading.

In her review of the garden variety control design literature, Siegal (1992) concluded that differentiation between dyslexia and nondiscrepant poor reading may not be valid. In a meta-analysis of her own data from several studies, she also came to the conclusion that the distinction between the two groups of poor readers does not appear to be a meaningful one in terms of the basic processes underlying reading. She found no
significant differences between children with dyslexia and other poor readers in reading, spelling, or phonological processing in short term memory, although some differences were found on simpler tasks involving syntactic understanding. But in their study of readers with dyslexia and poor-for-age readers and controls, Ackerman and Dykman (1993) concluded that the two groups of poor readers had different cognitive profiles. Unlike the dyslexic group, the non-discrepant poor readers did not differ from adequate readers in phonological sensitivity, continuous naming speed or running memory span. Badian’s (1996) study provided no support for the concept of dyslexia at age 6 to 7 years. In the older age group her study gave support for the concept of dyslexia as a phonological deficit and of non-discrepant garden variety poor readers as a developmental lag. More discrepant participants with dyslexia exhibited orthographic and serial naming speed deficits as well as phonological deficits, and were found to be a distinctive dyslexic group. Less discrepant participants with dyslexia were more similar to garden variety poor readers than to the more discrepant participants with dyslexia.

Phonological skills are being investigated in more depth. Phonological skills refer to a wide range of abilities and some of the phonologically sensitive tasks include phoneme segmentation, phoneme counting and phoneme reversal, rhyming, syllable segmentation etc. Swan and Goswami (1997) investigated the phonological skills of children with delays in their reading acquisition with average and below average IQ scores. The results indicated that children develop an awareness of syllables, then onsets and rimes, before being able to develop awareness of individual phonemes. The final skill, they state, may partly depend on reading acquisition. From the results of their study on tasks of phoneme segmentation, onset-rime segmentation, alliteration and rhyme
Nation and Hulme (1997, p.166) suggested that ‘measures of phonemic segmentation are probably the most sensitive measures to identify early reading problems’. Also, research by Post, Foorman and Hiscock (1997) suggested that specific difficulties with speech perception and production are related to reading difficulty and could be used as indicators.

In the west, due to the growing multicultural community, research interest has been given to children learning English as a second language. Research by Tomlinson (1980) and Mabey (1981) comparing the reading performance of Asian bilingual and monolingual children concluded that children acquiring literacy in English as an additional language were less efficient in various reading processes than monolingual English children. The complexity of the reading process provides many specific problems for a child learning to read in a second language. The children need to develop a large vocabulary, basic syntactic structures and higher level interpreting strategies (including background knowledge, schematic inferences and comprehension strategies) if they are to master the reading process (Beech & Keys, 1997). Research in this area indicates that the form of the first language affects the extent to which the understanding of rules applicable to language learning can be transferred to the learning of a second language. Muljani, Koda and Moates (1998) investigated whether differences in first language affect word recognition in reading a second language, and they found that high-frequency words were processed faster than low frequency words. They also found that the Indonesian speakers, who had related orthographic backgrounds to English, were able to relate the reading task in English and were also able to relate the reading task in English to the written structure of their own language and so achieved a better performance than
the Chinese speakers, who are accustomed to processing primarily logographic characters in their first language and so were having difficulty to transfer the reading process from their first language to the reading demands in English, their second language. From their comparative study on native English speaking and bilingual (English and Portuguese) children in Canada, Da Fontoura and Siegel (1995) reported that bilingual children with reading problems in English were also likely to show reading problems in their first language. They concluded that phonological skills are highly correlated with word recognition in both languages and the same difficulties with phonological processing is evident in both Portuguese and English.

Children with learning difficulty may have as much difficulty with oral reading as they do with silent reading for comprehension (Manning, 1984; Rose & Beattie, 1986; Rosenberg, 1986). The type of errors these students are likely to demonstrate include omission of words, incorrect pronunciation of words, long hesitation prior to unknown words and lack of comprehension of the material read.

Reisberg (1982) conducted a study designed to identify the most effective way to reduce oral reading errors among students who have learning difficulties. Results indicated that reading words in context resulted in fewer oral reading errors than reading words in isolation. But it was also observed that a few students consistently read the words better in the isolation condition and suggestion was made that it is possible for students with difficulties to perform better on oral reading when words are presented in isolation. Without decoding skills there can be no reading comprehension but without compression skills even good decoding ability is useless. Once children can become competent decoders, reading can become a tool for learning. Comprehension is not a skill
used just during reading. It also accounts for how well children attend to, conceptualize, organize, store and receive information that they hear. Frith, U (1980) found poor readers were worse than the good readers only on reading comprehension but not on listening comprehension. She attributes this failure to poor decoding skills.

**Writing** is another form of communication for language. The writer is attempting to convey his thoughts to the reader by means of written words. Writing is related to both language and reading. It is a complex process of communication through language, which integrates visual, motor and conceptual abilities and through which students demonstrate their scholastic achievements. As children progress through school, they are increasingly expected to express what they know about many different subjects through writing. If a child fails to develop certain basic skills related to writing, he/she will be unable to write with the expected level of speed and fluency. Indeed, for a child struggling with writing problem, the writing process itself interferes with learning. Many students with learning difficulties demonstrate problems in some areas of writing - handwriting or written expression (Barenbaum, Newcomer, & Nodine, 1987). Unlike the difficulties associated with reading skills, the writing skills of these students have not been widely researched. It is known that many of these students demonstrate difficulties in printing and handwriting from their earlier years and that these difficulties are probably related to other problems, including perceptual problems, language problems and copying ability. Some theorists believe that these copying and writing problems may be symptomatic of deeper neurological or visual-processing abilities, while those who follow behavioral approach in their research concentrate on the accurate letter-writing behavior. In addition to copying errors, other errors include letter height, letter spacing
within words, letter proximity to the line and word spacing (Blanford & Lloyd, 1987). John, (1998) found substitution of letters, omission and adding of letters were the three measures on which the scholastically backward differed most from the average achievers. Berninger (1994, p.422) states that “visual perception cannot be equated with orthographic skills for processing the letters in written words. Orthographic abilities probably are important for processing the letters in words not only for reading but also for writing”. When children have a reading difficulty, the problem of writing is further intensified. When they translate the dictated word into its phonemes, they must translate the phonemes into graphemes. Along with this, the spatial orientation and awareness of position of the fingers also comes into play. Due to reading problem, the phonemes may not be accurately perceived and sequenced correctly there by adding another layer of problems to their writing skills.

**Spelling** is the forming of words through traditional letter arrangements of letters. Words in the English language can be difficult to learn to spell because of many irregular spelling patterns. For example “do”, “due”, and “dew” are all pronounced exactly the same but differ in meaning. While English has 44 sounds, it has only 26 letters. The letter-sound correspondence is necessary for reading, as is the sound-letter correspondence for correct spelling. Spelling is one language arts skill area that is essential when written products are required in class work. Research has shown that the spelling errors made by the LD children do not deviate from the types of errors made by the younger children without learning difficulties (Gerber & Hall, 1987). Their spelling errors are typified by insertion of unnecessary letters (*umberella* for umbrella), omission of letters (*famly* for family), substitution of letters (*kast* for cast), phonetic spelling of
irregular words (*sed* for *said*), directional confusion (*was* for *saw*), vowel substitution (*doller* for *dollar*), letter orientation confusion (*d, b: p, q; n, u; m, w*), and reversed letter sequences (*aminals* for *animals*) (Poteet, 1980). Children with learning problems may have difficulty with phonetic or revisualization/orthographic awareness elements of the spelling process or both. The child with auditory-processing weakness often has trouble analyzing phonetic sequence in words. The child may be able to spell highly irregular words that have familiar derivations or whose orthographic sequences have been visually recalled, yet be unable to spell easier phonetically regular words and thus, being unable to spell words that he or she is familiar with. On the other hand, the child with visual-processing or orthographic weakness may be able to spell phonetic words that he or she has never read before, yet have trouble revisualising which letter sequences appear right for familiar words. (Boder, 1973; Frith, 1983). Because language and auditory-processing skills are so important in reading development, it makes sense that the good reader who has a spelling disorder tends to make far fewer phonetic errors than the child with both reading and spelling difficulties (Frith, 1983). More recently, the importance of phonemic awareness as a basis for effective spelling among children with LD has been demonstrated (Berninger et al., 1998). Their research demonstrated that students need not only to understand letter sounds, but also to generate a mental representation of sound-symbol relationship as well as to apply multiple spelling strategies.

**Mathematics** is a study of relationship between quantities and numbers. A person is seeing and making use of numbers in almost all walks of life. School arithmetic is only a part, but a very important part of the preconditions for the ‘mathematics of life’. Mathematical difficulties have also been called as *Dyscalculia* or *developmental...*
dyscalculia and it refers to a failure to develop mathematical competence. Compared to reading difficulties, mathematic difficulties have not been widely researched. Learning difficulties in mathematics are widespread in school age children (Badian 1983; Geary, 1994). Converging evidence (Badian, 1983; Gross-Tsur, Manor & Shalev, 1996; Kosc, 1974) reveals that 6% to 7% of the school-age population suffers from mathematics difficulties. Children are normally exposed to physical and social environment that is rich in mathematic opportunities very early during their preschool years itself. Research studies (Ginsberg & Russel, 1981; Jordan, Levine & Huttenlocker, 1995) have shown that children develop key elements of informal mathematical knowledge before they enter elementary schools. They learn informally the basic arithmetic principles of more or less, big or small, counting etc. by seeing adults counting and using money, TV, billboards & by listening to folk tales and fairy tales etc. Based on a model of cognitive factors that are specific to math knowledge, Russel and Ginsberg (1989) reported that elementary-school children with mathematic difficulties were not severely deficient in a variety of informal mathematical concepts & skills (e.g., strategies for mental calculations and the ability to solve simple story problems). In many cases their performance was qualitatively similar to that of younger children without mathematic difficulties. But they also reported severe deficiencies among children with mathematical difficulties in the two areas of rapid retrieval of number facts and the ability to solve complex story problems involving basic operations.

Like reading and spelling, mathematics involves the integration of important cognitive and information-processing abilities. Visual spatial abilities for example, enable one to imagine and rearrange objects in one’s mind, thereby facilitating mental addition
and subtraction. Fine motor coordination helps a child to keep track of each object counted, to write numerals, and to align numerals properly while calculating. Focused attention is always an important prerequisite to understand instruction, for ex. in word problems it helps a student to spot the extraneous information to eliminate and the words that cue how to go about solving the problem (Goodstein, 1981). Thus the subject of mathematics demands from the student, the ability to concentrate and the ability to think and reason abstractly. This is why weaker students often have difficulties particularly if they are not offered opportunities to learn at a slower pace and to receive extra support, which are two of their greatest needs.

Geary (2000), has described three problem areas that are frequently seen in school-age children with mathematic difficulties – Semantic memory problems, procedural deficits and visuospatial problems. Semantic memory problems refer to the difficulty the child has in retrieving the addition and subtraction combinations, and sometimes even when some facts are retrieved, the rate of errors is high. Due their confusion of signs in computations, they might add when the sign calls for multiplication or subtract when it requires addition. With simple counting tasks, they sometimes have trouble in keeping the rote sequence in counting like when they get stuck in their counting they tend to start counting from the beginning e.g., in adding the combination 4+2, they cannot start with 4 and say 4,5 to find the sum, but must say 1,2,3,4,5,6. Because of their problem with working memory, they will have difficulty in keeping count in their mind while doing counting and tasks that involve a carry over of facts to the next step in computation. Due to the cumulative nature of knowledge in mathematics, inadequate mastery of early skills interferes with these students learning more advanced
and complex processes. Procedural deficits are seen in children having difficulties in following the order and sequence of the series of steps required in solving problems. Visuospatial problems includes errors in dealing with place values in multiplication, division and decimals; illegible or untidy handwriting that misaligns columns in basic computational process; misinterpretation of numerals in decimals and inability to deal with spatial relationships in geometry.

Very often a large portion of Mathematics difficulties in children have been observed to co-occur with reading and spelling difficulties (Fletcher & Loveland, 1986; Miles & Miles, 1992). Many studies, (Geary, 1990; Geary, Brown & Samaranayake, 1991; Ostad, 1997) define children with math difficulty as a single group of low achievers, and observed that young children with math difficulty only, show a different pattern of cognitive deficits than the children with math and reading difficulty. Recently, Hanich, Jordan, Kaplan and Dick (2001) found that second graders with MD, regardless of whether they were math difficulty only or math and reading difficulty, performed worse than normal achieving children in most areas of mathematical cognition. However, children with math difficulty only outperformed children with math and reading difficulty on orally presented arithmetic computation and on story problems. The two LD groups did not differ on tasks assessing place value, rapid fact retrieval, calculation principles, and written computation with multidigits. Children with math only difficulty seem to have an advantage over children with math and reading difficulty on mathematical tasks that may be mediated by language but not on ones that depend more on understanding of numerical magnitudes, visuo-spatial processing, and automaticity. Similar findings were

So it has been observed that children with dyslexia also have difficulties with mathematics (Lovitt, 1989; Sharma, 1990; Miles & Miles, 1992). However, Malmer (2000) cautions that this difficulty should not be viewed as a primary factor but rather as a consequence of their dyslexia and has listed certain primary and secondary factors responsible for difficulty in Mathematics. Some of the primary factors mentioned by her were deficient cognitive development, poor linguistic competence, neuropsychiatric problems like Minimal brain damage, ADHD, Tourette’s syndrome etc., and the secondary factors mentioned by her include dyslexic difficulties like in reading and comprehending the text in math problems, inappropriate teaching methods etc.

Higher cognitive functions:

Higher cognitive functions in the processing of information like attention, concentration, visuospatial, perceptuomotor and Memory play a major role in an individual’s reading and learning abilities. Many researchers have studied the roles some of these cognitive functions play in children with learning difficulties, with mixed conclusions.

Attention is generally thought of as the focus of consciousness on something in the environment or a sensation or an idea. There are numerous aspects to the concept of attention and theorists have used different terms for these various aspects (Alabiso, 1972; Brown & Wynne, 1984; Ross, 1976). Some of the aspects of attention that will be
discussed here are Time on task, Sustained attention, Focus of attention and Selective attention.

Time on task or attention span refers to the amount of time a student attends on a task. Many researchers have indicated that on task time for students without learning problems ranges around 60 to 85% of the time during instructional activities. Where as children with learning difficulties are on task about 30 to 60% of the time (Bryan & Wheeler, 1972; McKinney & Feagans, 1983). Sustained attention is the ability to remain engaged with an activity over time, rather than turning away to follow another line of thought or engage in another activity.

Focus of attention is the ability to focus one’s attention on the most relevant stimuli that is an essential component for learning at a given time. This also involves inhibiting the other distracting stimulus in the environment. Research on the ability to focus attention is inconsistent (Bender, 1987a; Zentall, 1986; Zentall, Zentall & Booth, 1978). Many of the researches have examined distractibility of students which is the opposite of focus attention. They have used teachers’ rating of the behavior of students with learning problems and data collected in this manner generally demonstrate that teachers’ rate students with LD are more distractible than the students without LD. (Bender, 1985; McKinney & Feagans, 1983). Such research does support Cruickshank’s historical view that children with learning disabilities are more distractible and need a reduced stimuli environment (Cruickshank, Bentzen, Ratzeburg & Tannhauser, 1961). However, several researches have studied distractibility more directly with intentional distractibility built into the task or structured peripherally to the laboratory tasks being tested. Rather than indicate that peripheral distracters impair the learning of children with
LD, these laboratory tasks seem to suggest such distracters facilitate learning. (Carter & Diaz, 1971; Zentall, 1986; Zentall et al., 1978). Teacher rating studies have also indicated that children with LD do not demonstrate a high level of reaction to distracting stimuli in the environment (Bender, 1987a).

An aspect of focus attention is selective attention and it is the ability to identify the important aspects of stimulus and disregard all the other stimuli in the environment (Albisso, 1972; Ross, 1976). The early research by Hallahan, Gajar, Cohen and Tarver (1978) on selective attention is a hallmark in research in this aspect of attention. These researchers used an adapted version of Hagen’s (1967) task to measure the students ability to intentionally remember (central recall) certain object in relation to the number of objects remembered incidentally. Results showed that the students with LD were similar to the children without LD on incidental recall, but both central recall and selective attention scores for the group with LD were lower than for the other group. Hallahan and his coworkers concluded that due to this selective attention deficit, children with learning difficulty could be thought of as inactive learners. Selective attention has been conceived as an adaptive capacity and research suggests that it is an acquired skill (Ross, 1976). As children mature they develop a greater capacity to attend selectively to information presented. However, research also has suggested that children with LD may lag behind other children on this skill (Brown & Wynne, 1984; Hallahan et al., 1978; Ross, 1976).

Recently Rabiner and Coie, (2000) based on their longitudinal study on early attention problems and children’s reading achievement where in 387 children were monitored from kindergarten through fifth grade, reported that attention problems
predicted reading achievement. They found that first grade attention problems significantly increased children's risk for reading difficulties who previously had normal reading scores. They suggested that inattentive children who fail to develop critical reading skills during first grade have difficulty catching up with peers after this occurs. Richards, Samuels, Turnure and Ysselduke (1990) studied the sustained and selective attention of fourth, fifth and sixth graders with LD and compared them with controls without LD. A continuous performance test yielded no differences for students with LD and controls, suggesting similar ability for both the groups in sustaining attention and inhibiting impulsive responding. Children with LD made more errors than controls on a selective attention task when letter distracters were adjacent to the target letter but not when they were distant, suggesting that students with LD were less able to narrow the focus of their attention. Regrouping the students according to teacher ratings for attention deficit-hyperactive disorder (ADHD), showed that LD students with ADHD made more errors than LD students without ADHD.

Another aspect of attention that is worth mentioning is the co morbidity of learning difficulties and attention deficit hyperactive disorders (ADHD). Although the nosologic systems for diagnosing ADHD have continued to evolve with each new edition of diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000), a recurring theme is the presence of two basic symptom clusters, one consisting of hyperactivity and impulsivity and the other of inattention. Barkley (1990) has mentioned that as many as 26% of the students with ADHD may also manifest learning difficulties, and with the relationship between attention problems and learning difficulties, relatively undefined there continues to be some confusion between
ADHD and learning disabilities. Stanford and Hynd (1994) compared three groups of students to address this comorbidity issue. The groups were comprised of students with attention-deficit disorder (ADD) with hyperactivity, students with attention deficit disorder (ADD) without hyperactivity and students with learning disabilities. The behaviors of students with ADD without hyperactivity and the students with learning disabilities were shown to be similar according to the ratings of parents and teachers.

**Perception** is the process through which sensory information (hearing, sight, touch, movement, taste, and smell) is recognized and interpreted. Perception involves both the intake of information through the senses; processing and making sense of that information within cognition and it involves learned behavior as well as intellectual capacity. In general, visual processing and auditory processing are the most commonly referred to areas of perceptual processing when addressing issues of learning and learning problems in clinical and educational settings.

Perception combines aspects of both, the outside world (the stimuli) and the inner world (our previous knowledge). Pattern recognition — the identification of stimuli — plays an important role in reading letters or words. Different theories of pattern recognition have been proposed. According to Template matching theory, a stimulus is compared with a set of templates, i.e., a specific pattern stored in memory. Pinker (1984) showed that this theory works for only isolated letters and other simple objects presented in their complete form. In Prototype models, a stimulus is compared to the stored prototypes which are abstract and idealized patterns in memory. A number of studies have demonstrated the usefulness of prototype in perceiving geometric designs, letters of the alphabet and cartoon like drawings (Franks & Bransford, 1971; Rhodes, Brennan &
Distinct features models state that we make discriminations among letters on the basis of a small number of characteristic distinctive features which remains constant regardless of whether the stimuli is written, printed or typed. The computational approach which includes both the prototype and distinctive features approach, aimed to develop computer tasks that humans can achieve, e.g. recognition of three dimensional objects (Biederman, 1987, 1990; Marr, 1982). All these theories discussed so far have emphasized bottom-up processing or data driven processing which stresses the importance of the stimulus in pattern recognition. Another important process in pattern recognition is called top-down or conceptually driven processing. This process is based on how a person’s concepts and higher level processes influence pattern recognition. Palmer (1975) found that people were more likely to recognize an ambiguous figure when it was located in an appropriate context. Most of the researches on this topic examine how context enhances the recognition of letters of alphabet. One of the most widely demonstrated phenomena in pattern recognition is the word superiority effect. It states that, we can identify a single letter more accurately and more rapidly when it appears in a word than when it appears in a string of unrelated letters (Cattell, 1986; Reicherl969).

The involvement of visual perception in reading difficulties remains to be a controversial factor. The argument for the influence of visual perceptual defect on reading impairment has been justified by some early studies (Orton, 1937; Bender, 1957). Contrary to this argument some studies have shown that there is no involvement of visual perceptual defect in reading difficulties. For e.g. Morrison, Giordani and Nagy (1977) found that dyslexic children could report visual information presented for less than 300
msec. as efficiently as the normals. Also in a study by Vellutino, Steger and Kandel (1972) required children to reproduce single designs, numbers or letters presented, and they found no differences between dyslexics and normals. But in a study conducted by Mallinger and Longley (1988), it was found that learning disabled children performed significantly worse than the normal children without LD on Bender Visual Motor Gestalt Test using the Koppitz scoring system (Koppitz, 1975).

Tests of visual motor abilities continue to be among the most popular assessment instruments used by psychologists during assessment procedures and the most popular visual motor test is the Bender Gestalt Test (Bender, 1938). However, Buckley (1978) in a comprehensive review of the Bender over 11 years, from 1965 to 1977, concluded that “We have no conclusive body of proof that this instrument can be used to predict school achievement, neurological impairment, or emotional problem at a statistically acceptable level on an individual basis” (p.334). Another widely accepted instrument which is used to assess perceptual abilities (visual perception and visual motor skills) is the Minnesota Percepto-diagnostic test (MPDT, Fuller, 1962, 1982 R). A study by Wallbrown, Wallbrown and Engin (1977) found that the MPDT was a more sensitive measure of achievement. This was also supported by another study by Vance, Fuller and Lester (1986) which reported that the MPDT-R provides unique information concerning a child’s perceptual-cognitive development which may be useful in differential assessment of learning disabilities. Although they reported that neither of the tests Bender and MPDT were good predictors of reading performance as measured on WRAT (Wide Range Achievement Test, Jastak & Jastak 1978).
Both visual and verbal impairments have been reported as variables in two independent streams of research into the etiology of dyslexia or reading difficulties. A study by Eden, Stein, Wood and Wood (1996) assessed and compared between normal, reading disabled children and garden variety backward readers with low IQs, on the presence of abnormality in visuo-spatial and phonological ability. They reported that reading disabled children performed significantly worse than the normal group but similar to the garden variety poor readers. The results also suggested that reading disabled children not only have poor phonological awareness, but also show visuospatial deficits.

To find out if standardized achievement test measures are good predictors of learning difficulties, Morgan, Harris, Bernstein and Waber (2000) compared the cognitive, neuropsychological (information processing) and academic profiles two groups of children referred for learning problems. One group was within average range (standard scores>90) on a standardized achievement test and the other was below average and both the groups were ruled out for ADHD. Results indicated that both groups had similar neuropsychological profiles that differed from normative expectation. Profiles of the normally achieving referred children were consistent with diminished automaticity of information processing and output. These profiles were similar to but somewhat less severe than that of the lower achieving children, suggesting a similar underlying biological substrate in both referred groups. These results were supported by Harris, Forbes and Weiler (2001) whose findings from computer tasks for rapid auditory processing, motor sequence learning, paced finger tapping and visual filtering, suggested that children who struggle in school yet perform adequately on standardized achievement
measures can have heightened neurodevelopmental vulnerability in information processing. They also pointed out that despite achieving scores in the normal range on standard academic measures, children referred for clinical evaluation of learning problems performed more similarly on the battery of information-processing tasks to the referred children with lower achievement scores than they did to normal children matched for reading skills.

As with reading, visual-perceptual abilities relate to success in arithmetic, especially at younger ages. However as children get older and the math tasks get more difficult, progress becomes more highly related to verbal abilities. Those children who continue to have math difficulties, despite adequate language, reading and spellings skills often show perceptual and coordination difficulties. These difficulties are not characteristic of children who experience reading and spelling deficits (Strang & Rourke, 1985a; Van der Vlugt & Satz, 1985).

The speed of information processing on children referred for learning impairment was studied in comparison with non-referred children and was evaluated on a visual filtering task, by Weiler et al., (2000). They sought to determine whether elementary school children with learning problems have greater difficulty with visual search (i.e., extracting information from a static visual stimulus in the presence of distracters) than comparable group of children without learning problems. The task was designed hierarchically to provide for evaluation of component operations search, parallel search, decision, and response. They found that with each additional processing demand, response times increased disproportionately for the learning impaired group than the non learning impaired group. Waber and Bernstein (1995) evaluated the ability to copy and
draw form memory a complex visual design (i.e., Rey-Osterrieth complex figure; ROOF) among a heterogeneous group of children referred for evaluation of learning problems and most of them had difficulty with reading. The control group showed a steady age related improvement in the ability to organize the figure, the learning problem group reached an asymptote at about 8 years of age and in striking contrast the control group showed no improvement through the age of 14. In interpreting this finding, Waber and Bernstein speculated that “The challenge of the ROOF stems largely from the superimposition of distracting detail on a skeleton geometric form. Normatively, with development, children are able to focus spontaneously on the base rectangle, even in the presence of distracters. The LD children in this study, however, were relatively ineffective at doing so” (p.250).

Learning is defined as the process of acquiring new information. Memory is the persistence of learning in a state that can be retrieved at a later time. The importance of memory in learning cannot be overestimated. As we know from our own experiences, memory skills are used in most of the required tasks in the class rooms. Research has linked memory deficits among children with learning difficulties to have problems in reading, language, spelling and other areas (Ceci, Ringstorm & Lea, 1981; Cohen, Netley & Clarke, 1984; Haines & Torgesen, 1979; McLeod & Greenough, 1980; Swanson, 1994). Historically, memory has been differentiated into two levels: short-term memory and long-term memory (Ellis, 1963; Swanson, 1994). Short-term memory represents storage of a limited amount of information (six to eight bits) for a limited amount of time (usually less than 15 seconds) and long-term memory has been defined as a memory of a longer duration. More recently, the term working memory has been used
to describe a refinement and extension of short-term memory skills (Swanson 1994). Working memory represents the ability of a student to hold a small amount of information in short-term memory while working that information and integrating with other information. Memory has also been conceptualized as including three relatively distinct processes encoding, storage and retrieval. Encoding refers to translating a sensory input into a representational form for storage. Storage refers to the durability of the memory and retrieval refers to the process of recovering an encoded representation of a stimulus from memory (Torgesen, 1984).

Short term memory has been one of the most researched cognitive processes in children and adults. Most models of readers' processing performance argue that the temporary retention of information is important to reading recognition (e.g., Baddely, Ellis, Miles, & Lewis, 1982; Bisiacchi, Cipolotti & Denes, 1989; Ellis & Large, 1987; Jorm, 1983). Many studies (Jorm, 1983; Hulme, 1992) have implied that tasks that measure short term memory like digit and word span tasks are important in differentiating readers with learning difficulties from readers without learning difficulties. Children with LD find difficulty in retaining auditory (verbal) and visual types of information with a fast presentation rate. The children with reading disabilities group tend to perform poorly on the digit span sub-test W.I.S.C. (Rugel, 1974). In addition, much credence is given to digit span performance on the W.I.S.S. for identifying students as learning disabled (Mishra, Shitala, Ferguson & King, 1985). On the other hand there is research evidence that has shown that digit span and word span measures were not always distinguishing between good and poor readers (Cohen, 1981; Cohen & Heath, 1990; Perfetti & Lesgold, 1997).
Visual information processing (imagery) is important for children’s memory for words (Pressley & Lewin, 1977) and verbal codes (words) improve skilled reader’s retrieval of visual information (Swanson, 1978). Memory is strongly tied to the use of language to label what we have seen. This labeling process or verbal mediation helps us to organize, store, rehearse and recall visual information. Researchers have suggested that the children who have reading problems do not use the verbal codes or integrate those codes for effective storage and retrieval of visual information (Ceci, 1982; Perfetti, Finger & Hogoboam, 1978; Swanson, 1983).

Because short-term memory depends on the ability to gain access to phonological structure and to use it to hold linguistic information (Conrad 1964), it is expected that children with reading problems will have underlying phonological deficits to show various limitations on the verbal tasks that tap short term memory. Memory differences between poor readers and good readers may also depend on other demands of the task - tasks that require rote recall of a list of unstructured items may be less differentiating than tasks that require both storage and further processing (Daneman and Carpenter 1980; Perfetti and Goldman 1976). Since language structures are hierarchically organized and sequentially transmitted, comprehension of the language depends on working memory - a short-term memory transiently storing and continuously processing the incoming segments of the information. Swanson (1994) in comparison with short-term memory and working memory indicated that working memory was more influential in reading skill than short-term memory for all students with or without learning problems. That is, short-term retention of isolated facts is less important than the skill of short-term
retention in combination with the need to process and integrate that information with previous knowledge that is in storage.

Siegel and Ryan (1989) found that children whose arithmetical learning difficulties were accompanied by reading problems were impaired on both listening and counting span. In contrast, children whose learning difficulties were specific to arithmetic were impaired only on counting span and showed no deficit on listening span. They concluded that LD in both reading and arithmetic are associated with low capacity in general-purpose working memory whereas specific arithmetic learning disability is associated with low capacity in a type of working memory that is specialized for arithmetic operations. Hitch and McAuley's (1991) study indicated that the children with arithmetic learning difficulties were slow at one of the simplest counting tasks like reciting numbers from 1 to 20. They discussed that the poor performance in counting span may have implications for their ability to perform many arithmetical tasks for such as calculations that involve storing temporary numerical products during ongoing processing and counting is the child's initial method of performing simple additions and subtractions.

Beyond the ineffective encoding strategies for information storage, deficient retrieval of information from semantic memory to working memory, along with deficits in selective attention, have been posited as characteristic of memory problems in people with learning difficulties (Brainerd, Kingman, & Howe, 1986; Fletcher, 1985; Swanson, 1988b). Furthermore, it is very likely that failure to engage in facilitative active processing strategies reflects some metacognitive deficit, possibly attributable in part to learned helplessness. Such metacognitive deficiencies may stem from the persistence of
reading and learning difficulties perceived by the individual to learn (Barclay, & Newman, 1982). “After experiencing failure, the ‘helpless’ child engages primarily in one sort of metacognitive activity, namely, nonproductive thoughts about his or her lack of ability” (p.22).

**Socio-Emotional Functions:**

School makes up a major portion of a child’s life. Half of a child’s waking hours are spent in school - learning, making friends, and developing an identity in the context of others – and school related experiences dominate early development. Hence, it would make sense that if a child has significant struggles with learning which is the major focus of childhood, will also suffer from some social and emotional difficulties. Learning disorders have also been said to be strongly related to emotional problems because the core deficits that interfere with learning affect social and emotional development (Bender & Wall, 1994). For example, a child with language processing problems will also probably have difficulty interacting in social situations in which language subtleties are important. Neurological deficits have been reported to be responsible for both learning, emotional, social and behavior problems (Marshall & Hynd, 1993; Spafford & Grosser, 1993; Vogel & Forness, 1992). Although exactly what causes the emotional problems is unclear, it is hard to dismiss the substantial research findings that many children with learning difficulties also experience a number of social, emotional and behavior problems.

In his book, “The Learning Mystique” Gerald Coles (1987) critiqued the biological etiological theories and presented an ‘Interactive Theory’ which implies that
interactions of broad personal, social, school, economic, political and cultural factors even if not immediately apparent, are fundamental to the creation, maintenance, remediation and prevention of learning difficulties. While this does not mean that these factors by themselves determine LD, it does mean that they are inseparable from all activities and interactions that are part of LD. Many researchers have held this view (Adelman, 1989; Bartoli, 1990; Miller, 1990, etc.,). The ramifications of the possible social emotional aspects of learning difficulties reverberate through relationships in home and family, in school with teachers, peers and the world of subjective understanding and reactions to the difficulties (Pumfrey & Reason, 1991).

Thus, the Social Emotional Adjustment of individuals are just as important to deal with as their academic achievement because success in life often has far more to do with how people feel about themselves and are accepted by others than with their ultimate level of academic achievement. Some of the socio emotional factors will be examined here.

**Self concept** of students with LD has been studied extensively over a long period of time. Self concept can be understood as a person's evaluation of him or herself. It provides an estimate of a person's sense of self and emotional well-being. It is the view one has of oneself, either overall or in relation to a particular situation or setting. It is important to distinguish between global self concept and a self-concept restricted to one's self-perceptions in a particular setting. Most people have a good overall self-concept but when they think of particular settings their perception of their self-concept will vary.

Self-concept is considered important to understand for many reasons. First, it is often viewed as the "window" to a person's happiness and self-satisfaction. Individuals
with high self-concept are considered as well adjusted and self-satisfied whereas those with low self-concept are troubled and are in need of support and help. Further low self-esteem is associated with many negative outcomes including delinquency and drug use (Harter, 1993; Jung, 1994; Kaplan, Martin & Johnson, 1986), depression (Parker & Asher, 1987), low peer acceptance (Li, 1985; Vaughn, McIntosh & Spencer-Rowe, 1991), and long-term unhappiness (Bednar, Wells, & Peterson, 1989; Harter, 1993). Hence, there are many reasons to consider self-concept an important measure in children with learning problems.

Research has been fairly consistent in demonstrating that younger students with LD have lower self concept than the other students without LD (Bender, 1987a; Black, 1974; Bryan & Pearl, 1979). An evaluation of the early studies reveals a focus on self-esteem as a unifaceted entity, using global measurement tools that yielded a single score. This restricted perspective ignored the need to separate academic self perceptions from general self perceptions. This distinction may be essentially pertinent for the individuals with LD, due to their academic difficulties and frustrations. Consistent with this view many later studies included specific measures of academic self image. In studies where children with LD have been assessed using unidimensional scales of self-concept or self-esteem, they have scored lower than the children without LD (Chapman, 1988). This lower self-esteem was attributed to school failures, awareness of being different than one’s peers, problems in social acceptance, and incongruities in academic performance (Raviv & Stone, 1991). Multidimensional measures of self-concept has provided a new perspective on the self perceptions of students with LD. The separation of academic and nonacademic competencies allowed investigators to see that although children with LD
had lower academic self-perceptions than did their peers they did not necessarily have lower perceptions of their competencies in nonacademic domains (Ayres, Cooley & Dunn, 1990; Chapman, 1988; Hagborg, 1999; Kistner, Haskett, White & Robbins, 1987). In a study by Bender (1987a), the self-concept of 38 children with LD and 38 children without LD from grades three through six were compared. Results indicated that the children were different on specific self-concept scores, including self-perceptions of behavior and intellectual status. Both intellectual status and self-perception of behavior are school specific measures rather than measures of global self-concept. Thus, children with LD in that study viewed their school status and capabilities more negatively than children without LD. We can think of two reasons for viewing intellectual and academic abilities as two different factors. First, it indicates that children with LD are as capable as their nondisabled peers to differentiate and evaluate their competencies. Second, this difference suggests that the structure of self-concept is affected by the child’s early experiences. Harter (1990) suggested that the differentiation between cognitive ability and academic performance among children with LD reflect the special experiences of this population in the schools (p.307).

Studies regarding global self-concept among students with LD are somewhat equivocal (Meltzer, Roditi, Houser, & Perlman, 1998), though some research has suggested that younger children with LD may have a lower global self-concept (Bender 1987b). However there is general consensus that older children with LD demonstrate lower self-concept on particular school-specific tasks associated with their difficulty like reading, math, language etc (Kistner, Haskett, White, & Robbins, 1987; Rothman & Cosden, 1995), rather than a global self-concept. Bender (1987b) suggested that there
may be a developmental trend in which younger children with LD demonstrate a lower self-concept, and older children as they mature, may learn to think more highly of themselves in general while maintaining a lower self-concept relative to academic tasks. Development of nonacademic strengths appears to be a strong protective factor for children with LD. Studies find that self-perceptions of nonacademic areas, including perceptions of one's physical attractions, social behavior and athletic skills are associated with self-esteem (Cosden, Elliott, Noble, & Kelemen, 1999, Hagborg, 1996, 1999; Kloomok & Cosden, 1994; Renick & Harter, 1989). Hattie (1992) described this as an internal process, by which children compare their competence in one domain with competence in other domains, allowing their positive perceptions of stronger areas to compensate for their perceptions of their weaknesses. This view of the multiple domains that contribute to self concept has been an important advance and has provided insight into how an individual's overall self-concept may be high despite low abilities in particular areas (Harter & Pike, 1984).

There have been attempts to study the self-perceptions of learning disability under the assumption that children as they grow older may become more aware of what their disability is and of ways to cope with it. Heyman (1990) developed the self perception of learning disability (SPLD) scale which is a self report instrument with questions that covers three areas: whether students see their disability as delimited or global; whether they feel their disability is modifiable or permanent; and the degree to which they feel their disability is stigmatizing. Studies conducted in this area (Heyman, 1990; Rothman & Cosden, 1995) have reported a positive relationship between scores on the SPLD and global self-esteem. Heyman (1990) suggested from her study that self
perception of the learning disability may have an effect on academic self-concept and self esteem, which in turn may influence academic achievement. Rothman and Cosden (1995) found that children who had higher SPLD scores also had higher achievement scores and perceptions of greater behavioral and intellectual competence, social acceptance and support. Thus, Students who saw their LD in a positive manner also were aware of their academic and nonacademic strengths. In a more recent study, Cosden et al. (1999) administered the Self-perception profile for learning disabled students (Renick & Harter, 1988), the Self perception of learning disability scale (Heyman, 1990) and a series of open ended questions on what it meant to have a learning disability to a elementary and junior high school students with LD. The investigators analyzed the relationship of the open-ended questions to SPLD and self esteem scores. Many interesting findings emerged from this study. Increased knowledge about LD was associated with lower self-esteem. Open ended descriptions of LD for questions like ‘What is LD?’ and SPLD scores were not significantly correlated, indicating that these two measures yielded different information. As the elementary students were not able to articulate responses to interview questions due to their LD, an analysis of the junior high students responses yielded a higher self esteem for students who answered ‘I don’t know’ for the question of ‘What is LD?’, suggesting that self esteem was lower for students beginning to understand about their LD. This supported the findings of earlier studies (Bear & Minke, 1996; Heath, 1995). Cosden et al further reported that global self-esteem was associated with SPLD scores and perceptions of nonacademic competencies, particularly social acceptance, physical attractiveness and behavioral conduct. These relationships were found to be similar to those found by Kloomak and Cosden (1994) and Renick and Harter
(1989) and support the compensatory hypothesis, suggesting that children with LD feel better about themselves when they recognize their nonacademic strengths.

Low self-concept measures are considered to be related to high anxiety levels (McCandles, 1967). On studying the relationship between achievement, anxiety and self-esteem, negative correlations are usually reported which indicate that higher the level of anxiety, the lower level of achievement and self-esteem. Information on the LD children regarding this has been conflicting. Patten (1983) investigated the relationship between self-esteem, anxiety and achievement on eighty eight kindergarten through sixth grade LD children placed in the regular classroom. Significant relationship was found between (a) self-esteem and mathematics, reading recognition and general information achievement scores for the total groups and females, (b) self-esteem and reading recognition and general information achievement scores for males, (c) general anxiety and general information achievement scores for the total group and for males (negative direction), and (d) general anxiety and self-esteem for the total group and males (negative direction).

**Anxiety** refers to behaviors that indicate a fear of situations or a more global, all pervasive anxiousness. Fear of specific situations is called ‘state anxiety’ because it is manifested only in specific situations. If a person demonstrates the more pervasive anxiety behaviors, this is called ‘trait anxiety’ and is assumed to represent a more stable personality characteristic than the former (Margalit & Shulman, 1986). There have been several research articles that have suggested that students with LD are more anxious overall (trait anxiety) than the children without LD (Margalit & Shulman, 1986; Margalit
& Zak, 1984). Anxiety and achievement have been found to have a curvilinear relationship where optimal performance is associated with a moderate degree of anxiety and arousal (Sharma, 1970). Extremes of anxiety (none or too much) tend to decrease performance. In school, some ‘anxiety’, or emotional investment in doing well, is necessary for exerting effort, persisting with difficult tasks, and trying to understand and recall information. However too much anxiety can hamper children’s efforts to learn by immobilizing them, causing confusion and disorganization and interfere with memory. This results in yet another barrier to learning children with LD must overcome to succeed.

Within the social learning theory, anxiety is often viewed as a series of responses indicative of a low expectancy of success in a valued-need area. A variety of anxious behaviors might flow from such expectations as worrying, crying, withdrawal, manifestation of somatic distress and showing avoidant or inappropriate behaviors (Fischer, 1970; Phares, 1979). The efficiency of cognitive process involved in learning is lowered by anxiety as demonstrated by Tobias’ review (1979). It has been estimated that up to 25% of children with learning difficulties meet the criteria for an anxiety disorder, with incidence increasing with age (Cantwell & Baker, 1991). Students with learning problems may express their anxiety directly, such as by doubting themselves (ex., “What if I fail the test?”) or more directly through somatic (physical) complaints (Margalit & Raviv, 1984). Children who somaticize their anxiety are unaware that they are worried but instead feel only the physical symptoms of anxiety like headaches, stomachaches, or fatigue, etc.
Although state anxiety can be related to a number of causes, one potentially important cause that is directly related to school is test anxiety. Like if the students with LD were highly test anxious, this could account for many of the academic problems displayed by them. Swanson and Howell (1996) investigated the test anxiety among a mixed group of children (i.e., some students with LD, some with behavior disorder, some with attention deficit disorders, and some with various combinations of disability). Results indicated that lower test anxiety was related to effective study habits and effective task related self-instructions during task/test performance. This supports earlier findings of Bryan, Sonnefeld, & Grabowski (1983), that test anxiety was found to be a slightly stronger predictor of academic test scores for children with LD than the children without LD. Heightened anxiety may also be related to a student’s sense that things are beyond his or her control (Margalit & Zak, 1984), since students with LD tend to see control over success and failure is in the hands of others (Grolnick & Ryan, 1990; Tarnowski & Nay, 1989). Connelly (1969) observed that children with LD become more disorganized than do NLD children under the tension and pressure of testing. Also LD children have been found to react more negatively to failure on a reading task and experienced greater difficulty recovering from their anxiety and stress as well (Dean & Rattan, 1987). The relationship between problem-solving skills and anxiety was studied by Fisher, Allen and Kose (1996). Their study compared the effects of low, medium and high pretest anxiety levels on the social and nonsocial problem-solving performance of 9-11 years age levels of boys with and without LD. Children with LD and NLD were not found to differ consistently in their nonacademic social and nonsocial problem solving. However the children with LD were found to be functioning under high levels of anxiety,
which escalated in situations that the NLD children found enjoyable. But the researchers also noted that the children with LD were found to be effective problem solvers in structured, nonacademic situations.

Coming to Adjustment problems of these individuals, research has mostly focused on the social competence and adjustment, peer acceptance, friendship patterns and behavior problems. In one of the first studies of children’s adjustment, Fabian (1955) found that 83% of problem readers showed serious maladjustment in social and/or personal domains. Since then, findings from several studies suggest that while not all students with LD demonstrate deficits in social functioning, many of them differ significantly from their peers in this area (Foss, 1991; Jarvis & Justice, 1992; Merrell, 1991; Swanson & Malone, 1992; etc.). However this should not be interpreted to suggest that there are converging findings regarding the social functioning of students with LD. This is likely a function of social behaviors exhibited by students with LD, including students with LD who demonstrate very poor social behaviors and those for whom social functioning is a strength (Sridhar & Vaughn, 2001).

Children with learning difficulties have been shown in many research studies to have problems with social relationships, interaction with others and to have a variety of emotional difficulties (Greenham, 1999; Morrison & Cosden, 1997). Studies on friendship have given evidence that children who have close friendship are psychologically better adjusted than children who do not (Bagwell, Newcomb, & Bukowski, 1998; Newcomb & Bagwell, 1996; Schneider, Wiener, & Murphy, 1994). Studies have focused on comparing the number of friends, children with and without LD
claim to have. These studies have yielded confusing results. Some investigators found no differences between children with LD and without LD in the number of friends they have (Juvonen & Bear, 1992; Vaughn, McIntosh, Schumm, Haager, & Callwood, 1993; Vaughn & Haager, 1994). These investigators also did not find that children with LD had a higher proportion of friends with LD than did the other children. Contrary to these findings, Tur-Kaspa, Margalit, and Most (1999) and Vaughn and Elbaum (1999), did find that children with LD had fewer friends than children without LD. Weiner & Schneider (2002) in a more recent study found similar results, wherein children with LD had fewer mutual friends, more friends with children who had learning problems & younger than them, with less stable relationships.

In general, students with LD report more problems in interpersonal relationships and are seen as being less socially competent than their peers who do not have LD (Bryan, 1974; Roberts & Zubrick, 1993). Specifically they may use less assertive and effective conversational skills and behaviors (Wojnilower & Gross, 1988) and may actually misread nonverbal communication (Bryan, 1977). Kavale and Forness (1996), on their meta-analysis research on social skill deficits of LD children, indicated that 75% of students with learning disabilities manifest social skill deficits (ex., nonverbal communication, social problem solving, etc) that distinguish them from comparison samples of children without LD. Approximately the same level of group differentiation was from different raters (teachers, peers, self) and across most dimensions of social competence like the ability to perceive and interpret social situations, generate appropriate social responses and initiate a strategic behavioral response. In addition
passivity which often accompanies learning difficulties may hinder development of positive peer relationships (Margalit & Raviv, 1984; Wong & Wong, 1980).

Overall, students with LD appear to be more likely experience more peer rejection (Swanson & Malone, 1992). Some researches have indicated that almost 50% of students with LD are not well accepted by their peers and are at risk for social isolation (Stone & La Greca, 1990; Vaughn, McIntosh & Spencer-Rowe, 1991). Research finding indicated that peer acceptance appeared to decline with time suggesting that peer rejection persisted over time (Vaughn, Hogan, Kouzekanani & Shapiro, 1990). Some of the characteristics of difficulties experienced by LD children were reported from a study conducted on middle school students as feeling more lonely, received more threats, had personal items stolen more often, and participated less in within-school and out-of-school activities when compared to their non-LD peers. Students with LD were also rated by regular classroom teachers as demonstrating lower social competence than non-LD peers (Sabornie, 1994). A study conducted by Tur-Kaspa and Bryan (1995) on teacher’s rating of social competence and school adjustment of students with LD in elementary and middle school revealed that teachers rated younger Children with LD as having significantly lower social competence and school adjustment than their non-LD peers. However the teachers rating did not differentiate between the LD and non-LD groups of students at older grade levels.

A review of research by Rourke (1988) on relation between socio-emotional functioning/disturbance in children suggests that – although some LD children suffer from socio-emotional disturbances, most do not; there is no single, unitary pattern of emotional problem or social incompetence displayed by the LD children; there is no
conclusive evidence that LD children as a group are more prone to socio-emotional disturbance with advancing years; - but there is evidence that the types of socio-emotional disturbance exhibited by LD children may be more frequent than their normally achieving age mates.

Finally as also observed by Sridhar & Vaughn (2001), it is important to note that while many students with LD can be distinguished from their non-LD peers by their level of social functioning, this does not mean that their social functioning is so dysfunctional as to warrant intervention. But it does warrant for intervention in students experiencing distressing difficulties and the problems that these children could encounter, should be kept in mind and identified as they occur by the professionals while dealing with these children. Also for many students with LD, lower social functioning than their peers does not mean a highly problematic social behavior. Further research is required to isolate the specific effects of the various components of academic, personal, social and emotional adjustment of these individuals.

**Research conducted in India**

Since the last decade or two there has been growing awareness and identification of children with LD in India but research in this field is fairly new and studies conducted are sparse compared to the western parts of the world. One of the reasons for this could be because conducting research on LD in India is not a very easy task due to the multicultural background with different levels of socioeconomic status, multi-school systems (ex., CBSC, ICSC, State system, government schools / private schools), and multilingual society. Each state in the country with its own language having many dialectical forms adds complexity to
the research dimensions. As reviewed by Prakash and Joshi (1995), there are 18 standard languages and each one of them has its own orthographic systems. Children are exposed to more than one or two languages in most of the states. In the multilingual social context in the schools, the children are often having to learn through a medium of a language not spoken in their homes could be an added complexity in the education system for the children, especially if they experience difficulty in learning. The situation becomes more complex in identifying the difficulties as the children are exposed to varying levels of literacy and educational support at home before they enter formal education. In many instances children in the urban areas are exposed to preschool atmosphere by the age of 2½ years, whereas a rural child would be exposed to basic educational material for the first time when he/she enters school at the age of five or six without any additional literacy support from home. In most schools English is the main medium of education in the urban areas. Though the children study in English, it may not be the language used at all times with friends and neighbors as well as at home.

Historically, eastern scholars have viewed the high incidence of problems associated with the acquisition of reading in the western world as the result of the vagaries and complexities of alphabetic writing systems such as English (Karanth, 2003). Paradoxically, the seemingly lower incidence of reading difficulties and the relative lack of concern about these issues in the east were attributed by the western scholars to the lack of awareness and sensitivity among eastern educators to the specific difficulties of the LD child learning to read in a crowded classroom (see Karanth, 1998, for a detailed discussion of these issues).

Conducting research in this field is more difficult due to a lack of formal standardized tools to identify and diagnose the type and level of learning problems the
children suffer. Some tools have been developed in a few regional languages but not in English and for all age levels. Most of the research conducted has adopted a set of inclusionary and exclusionary criteria and some of the criteria included, as reviewed by Ramaa (2000) from the existing studies are – no sensory problems, no serious emotional problems, no serious brain damage, no intellectual retardation, eight years of age or above, regular school attendance, serious academic difficulty, receiving help at home for schoolwork and motivation to achieve academically. Some modifications are generally done in inclusion and exclusion criteria depending on the methodology of their study. Review of available research in India will be cited here with the limitations of a full database for research in India is not available. Most of the research reported has been from studies derived from Doctoral, MPhil, and Masters Degrees. Some studies have been conducted in the regional languages - Kannada, Malayalam and Hindi. As English is a major medium of education in India, a few attempts have been done to study the identification of the pattern of difficulties and the associated socio-emotional patterns.

The estimates of percentage of students having problems with academics range from 10 to 37 percent according to researchers (Rao, 1978; Kapur, 1985; D'Amato, Dean, Rattan and Nickell, 1988; Rozario, 1990) as cited in a review of research done by Rosario (1991, p. 8). This is not surprising considering the large class sizes in most of the schools in India, where in student to teacher ratio is at least 60 -70 students: one teacher. This is different from most of western countries where in the class sizes are mostly 22 -25 students: one teacher. In many classes a teacher might also have an assistant which is usually not the practice in Indian schools. So the chances of children receiving individual attention are limited.
John (1989) explored some factors associated with scholastic backwardness in children with average intelligence. She conducted a comparative study between scholastically backward achieving students referred to a child guidance clinic to average achieving students attending local schools. Cognitive factors, perceptual-motor functioning, reading writing and arithmetical skills, behavior problems and socio-demographic factors in 50 scholastically backward children were compared to normal achieving children. Tools were prepared specifically to assess reading, writing, and arithmetical abilities. Results showed that scholastically backward children have poorer cognitive, perceptual functioning along with poor reading, writing and arithmetic skills compared to normal achievers. They were also reported to have more behavior problems than the control group. The author also identified the need to develop norms for the prepared tools.

Ramaa (1985) by administering diagnostic test on visual and auditory discrimination, visual and sequential memory, visual recall and recognition, word analysis and synthesis on 14 dyslexic and 14 normal readers, found that the dyslexics differed significantly from the normal readers in visual verbal association both when presented in the context of a word and when presented in isolation. She also reported that dyslexics differed significantly from normal readers in auditory sequential memory, word analysis and word synthesis, thus indicating that though there is grapheme-phoneme correspondence in the Kannada language, dyslexics still had difficulties with word analysis and synthesis. Bindu (1996) on her study in Malayalam on dyslexics found a similar type error pattern as reported by Ramaa (1985) in Kannada. The major types of errors were word substitution, 'Kagunitha' (different consonant and vowel combinations), blending and reversal errors. She also found that the errors of the dyslexics did not differ qualitatively from those of non-dyslexic poor readers or those of
normal readers; the main difference was in frequency and persistence. Monica (1996) reported from her study on language performance of dyslexic children in Hindi, that their language performance was very poor.

Jayaram (1998) identified seven categories of children with reading difficulties in Kannada language. 1. General impairment group – their major problem were not in any specific task but had poor performance in more than five tasks out of 14 tasks. 2. Cognitive impairment group – these were children who performed very poorly only on cognitive tasks. 3. Linguistic impairment group – were children performed poorly only on linguistic tasks. 4. Phonemic impairment group – children having difficulty in phonemic tasks showed no specific difficulties on syllable rhyme, grammatical and synonymy judgment tests. 5. Metalinguistic impairment group – group of individuals found to have difficulty on two or more metalinguistic tasks (related to syllables, phonemes, rhyme etc.). 6. Linguistic and Metalinguistic group – had difficulty in both linguistic and metalinguistic tasks. 7. Cognitive and metalinguistic impairment group – had difficulties on both cognitive and linguistic skills.

A comparison study between dyslexic 4th graders, normal readers from 4th graders, normal readers from 2nd grade was done in the Kannada language on various tasks like rhyme recognition, phoneme oddity detection, phoneme deletion, syllable deletion, syllable reversal, a sequential serial recall test, identification of body parts, repeating polysyllabic words, a visual retention test and a test of knowledge of orthographic principle (Prakash and Sunita, 1998). They found that the dyslexics performed worse on most of the tasks than did the other two normal groups. Chandy (1997) reported from her study on 30 reading disabled children that dyslexics have language and related deficiencies such as poor short term memory, rather than simple perceptual deficiencies.
The incidences of dyscalculia was observed to be similar to the incidences identified by the western studies by Baker and Cantwell (1985); Garnett and Fleischner (1987); etc., (Ramaa, 2002). Ramaa (1990) identified that the percentage of children having dyscalculia was 5.98% (15 out of 251 referred students) and Gowramma (2000) found similar incidence rate which was 5.54% (78 out of 1408 students). The findings also revealed a consistency in prevalence of children with dyslexia alone and in combination with reading and writing difficulties is more or less the same as observed in different studies (Ramaa, 2002). Ramaa (1991) and Gowramma (1998) analyzed various types of arithmetic errors of the children with math difficulty and they both identified similar types of errors relating to number concepts, fundamental arithmetical operations and arithmetical reasoning. Some of the types of errors included rotation of numerals, reversals of digits, reading digits (or writing orally presented numbers) in the wrong order, lack of knowledge of 'carrying', subtracting a lower number from a higher one irrespective of place value, multiplication of numbers in a wrong sequence writing the product in the wrong place, multiplying in between dividing, difficulty with spatial relations and verbal relation in different combinations.

Ramaa, Ashok and Balachandra (1997); Ramaa and Gowramma (1999) studied behavioral correlated of children with LD in relation to ADD and ADHD and it was reported that there were fewer than 1% of such problems among children with LD. Mukerjee (1994) reported high state anxiety and lower self-esteem in general, parental an academic domains in 20 clinic referred children with scholastic difficulties when compared to 20 children without academic problems in the age group of 8 -13 years. No difference was reported in the social self-esteem between the academically poor group and the normal group, probably indicating that the children with learning difficulty did not perceive themselves as viewed unfavorably.
by their peers. Higher trait anxiety of the academically poor children was positively related to lower parental self-esteem, indicating the importance of parental attitudes and acceptance.

Bhola (1995), explored the relationship between self-esteem, self-perception of learning disability and family learning environment in 20 children with scholastic difficulties referred to child and adolescent mental health clinic and compared the results to 20 children without scholastic problems between the age group of 8-13 years. She found that the referred children with scholastic difficulties had lower general, social, academic, parental and total self-esteem. Observation was also made that there was a significant association between the self perception of learning disability and the general, social, academic and total self-esteem levels in children with LD. No significant association was found with parental self-esteem.

Lall (1996) studied the association of perceived relationship (peer and parents) and social competence in children with academic skill difficulties. It was found that the children’s perceptions of their parents were partially related to their social competence. But no associations were found between their perception of peers and social competence.

As can be seen, not much research in India has been done to identify the pattern of learning difficulties the children experience especially in English. Since the English language is used universally almost all over Indian schools specifically after high school in the colleges, it was felt by the author that there was a strong need for further research using English language. It can also be understood from the review of literature and also from the studies in India, not all of the studies address all the variables that could be coexisting in children with learning difficulties. Since the problems and the different variables that are
involved in children with learning difficulties is so vast, it can be understood that to include all the variables in one research endeavor is virtually impossible, but it was felt by the author that an attempt should be made. Hence with this present study, the investigator attempts to study and compare most of the variables in cognitive and socio-emotional factors in children with learning difficulties and with no learning difficulties. Also an attempt is made to assess any changes that occur in the different variables as the children grow older by studying samples of students in a lower age group and a higher age group.