Chapter – 2

Literature Review

2. Introduction
As discussed in the earlier chapter, Learning disability is not a handicap as visible as Cerebral palsy. The term was first coined by Samuel Kirk in 1963. It is a condition where the children’s reading, writing and arithmetic skill is affected. After discussing the concept and its types it became vital for the researcher to dive into the ocean of related researches which could enlighten the work of the eminent researchers related to the field.

Review of the relevant literature is considered as one of the most vital stage in the research process. The inception of the thought to conduct a research is merely possible after reviewing the
work done by the eminent researchers in the past. Once this is done then it would give a researcher a complete clarity over an ambiguity to choose the topic. After selecting the topic the researcher goes through this phase in-depth as it helps the researcher to gain adequate familiarity with the work which he would pursue. Moreover it is an important prerequisite for the researcher to depict the ability to critically review the related literature according to the regulations reserved for research degrees. It also helps the researcher in the understanding of the research gaps, motivates the investigator to choose the right path and correct methodology for pursuing the selected study.

In simple words, review of related literature pertains to extracting the work conducted by the legends or specialists in the field.

The researcher has made an attempt to present previous studies and researches with regards to learning disability and factors influencing it. Current study is super specialized and despite of the best possible efforts made by the researcher to find and review related literature concerning Hypotonia- Learning Disability- Achievement, hardly any identical study could be identified. However, whatever studies the researcher could find for this specialized study, all of them were incorporated. Every effort was made to quote the primary sources but where the primary sources were not within the reach of the investigator, secondary but authentic sources had been quoted.
The studies presented in the section ahead are based on the independent and dependent variables as the studies had a combination of factors and hence could not be clustered. Also, the studies also were organized under the following headings.

- **Studies conducted abroad**

- **Studies conducted in India**

It helps the researcher to also understand the cultural and other differences by reviewing. The experience of executing literature review is very enriching as it adds immensely to one’s knowledge and character.

### 2.1.0 **Studies conducted abroad**

The various research studies conducted in relation to learning disability outside India are given under:

**Lubs & his associates (1990, 1991)** conducted a detailed study to check out whether reading disability showed autosomal dominant mode of inheritance. This study was conducted by them at Miami. A big group of 20 families was taken as a sample.
After doing a detailed study on these 20 families it was concluded by the researchers that there reading disability, a kind of learning disability did not show a consistent mode of transmission. Moreover the researchers also found out that there could be multiple causes to it other than just autosomal mode of inheritance.
They concluded the research with the finding that transmission of reading disabilities were polygenic.[86,87].

**Susan A. Vogel (1990)** conducted a research on children with learning disabilities. The research was mainly intended to study the gender differences in learning disabled children on parameters like intelligence, academic achievement, language and Visuo Motor abilities.

It was seen that girls who were learning disabled but lower on intelligence had grave deficits in academic achievement especially in selective areas of reading and math; however, they were relatively better on language, spellings and visuo motor abilities as compared to males with learning disability. Interestingly in the area of numerics males with learning disability showed a marked superiority in the scores [148].

**Laura Lyons Bailey (1990)** conducted a study to find the spelling performance of children with learning disability and without disability. Also younger normal achieving students were also considered for the study. Students with learning disability were divided into two groups: Poor readers/poor spellers and good readers /good spellers. A spelling test battery was administered on the selected sample.

It was seen that groups with learning disability performed very poor on same age achieving group on all the spelling tasks. No significant differences were seen among two groups with learning disability [81]

**S.D Smith et.al (1991)** conducted a study on 84 individuals. These 84 individuals were taken from 9 extended families with reading disability.

The basic assumption of the research was to find out found that reading disability was inherited in autosomal dominant manner. Results of the study showed that 70% of segregation was due to one family and not because of the autosomal dominant mode, therefore the autosomal dominant mode of inheritance could not be proven [142].
**Mijna Hadders- Algra & Bert C. L Touwen (1992)** conducted a study on 570 nine year old children from Netherlands without overt neurological condition. They studied the relationship between presence of minor neurological dysfunction (MND) and cognitive and behavioral problems.

The study was mainly to find out that minor neurological dysfunction was related more to learning problems or behavioral problems. The researchers used the age specific and standardized neurological examination technique of Touwen which explicitly described the neurological condition in terms of deviant clusters. Absence of deviant clusters showed normal neurological condition, children with one or two deviant clusters were categorized as (MND 1) and those with more than two deviant clusters were categorized as (MND 2). The parent and the teachers were given a questionnaires to rate the distractible behavior to see that whether it is related to minor neurological dysfunction.

The researchers hypothesized the severity and MND was related to performance i.e. the performance on standardized tests of reading, spelling and arithmetic.

Findings suggested that the learning problems were more closely related to minor neurological dysfunction than the behavioral difficulties [98]

**Lisa Hamstra & AnkeBlote (1993)** worked on a longitudinal study on 121 Dutch primary section children. This study started when they were in Grade 2 and continued for 5 years. Their written scripts were evaluated yearly. A scale designed for children’s handwriting was used to rate their scripts on 13 characteristics and measured their writing speed.

The component analysis gave three clusters of items: a) fine motor skills, b) structural performance and c) stylistic preference.

Results revealed that children with Dysgraphic handwriting showed poor fine motor skills. Also in their higher grades they showed less preference to personal style. As compared to other writers their structural performance was also poor. However, it was also seen that children with and without Dysgraphia and writing did not differ on the speed of writing [84]
**Sharon Vaughn et.al, (1993)** conducted a study on the primary group children to investigate the effect of motoric conditions on their spelling performance. It included both the groups with and without learning disability an equal sample size of 24 children, boys and girls. Motoric conditions include: Writing, tracing and computer key boarding. 24 third and fourth grade children were identified. Procedures like teaching spellings, interviews regarding preference for motoric conditions and their performance was evaluated over time.

The results revealed significant difference between both the groups, i.e. to be more explicit, children without learning disability performed significantly better on the number of the words correctly spelled and the proportion of the words in a proper letter sequence than the children with learning disability.

Moreover, the difference in the effect for condition was not seen which indicated that the children did not learn more words in writing, tracing or computer condition. The interviews regarding preference for motoric conditions revealed that both the groups preferred computer condition but they also reported that their learning was the best in writing and tracing conditions [137]

**Theresa Malloy Miller et.al (1995)** conducted a study whose objectives are stated as under:

The purpose of the study was to identify the handwriting error patterns of children with mild motor difficulties, they also wanted to the relationship between perceptual motor abilities and handwriting error patterns. The researchers selected 66 children with mild motor difficulties between the age group of 7 to 12 years. The results showed three handwriting error patterns

- Execution factor was linked with Visuo motor skills and sensory discrimination

- The aiming factor was co related with visuo motor and fine motor performance

- It was seen that there was no association with perceptual motor abilities for visual spatial factor [149]
G.Wayne Mac Donald & Anne Cornwall (1995) conducted a longitudinal study (11 years) to find out the relationship between the Phonological awareness and Reading and spelling achievement.

The study was conducted on a sample of 24 teenagers where 11 were boys and 13 were girls. Their mean age was around 17 years. When these adolescent were in Senior Kg, they had participated in this study of phonological analysis and reading and spelling abilities.

Results suggested that the phonological awareness ability which was tested during the Kindergarten years was a major predictor of word and spelling identification skills when they grew up as adolescent.

Hence from the results we can conclude that phonological awareness is important for the development of identification of words and spelling ability [54]

Lily Dyson (1995) conducted a comparative study on the families and Siblings of Children with Learning disability and without Learning Disability.

A sample size of 19 parents and their siblings were taken. The areas measured were the functioning of families and the self concept of siblings.

Results showed that parents of children with learning disability experienced more stress as compared to parents of children with no learning disability.

There was not significant difference in both the groups with regards to siblings self concept.

Also the families of children with learning disability experienced adaption difficulties specially with regards to school [82]

De fries & Alarcon (1996) conducted a study on reading disability, a type of learning disability and heredity. This study was conducted on twins, identical and fraternal at the Colorado Learning Disabilities Research Centre. Results showed the percentage of risk, the type of twin carried. It was seen that the identical twin (MZ) of a child diagnosed with reading disability shows 68% risk of having a reading disability.

On the other hand a fraternal twin though showed only 38% chance of inheritance, but definitely shows positive risk of inheriting reading disability [33]
David McNaughton et.al (1997) interacted with 12 college students with learning disabilities and checked their spelling performance on a composition activity. They wanted to investigate the effect of five proof reading conditions on spellings. The proof reading conditions investigated were:
Handwriting with no additional assistance, Handwriting with a conventional print dictionary, Handwriting with hand held spelling checker, Word processing with no additional assistance and Word processing with an integrated spelling checker. It was seen that except the handwriting alone, all the other techniques helped in the spelling error reduction. However, when their spelling performance was compared with their non-disabled peers the spelling accuracy did not match to their level [32]

Tuija Lamminmaki et.al (1997) conducted a study to check the effectiveness of two treatments for children with Learning Disability.
There are total 94 participants in the study between the age group of 6 to 11 years.
The first treatment comprised of multiple training components that basically targeted particular cognitive and behavioral factors.
The second treatment gave emotional support and monitoring in school tasks.
The effectiveness of these two treatments were compared on Neuro cognitive tests, School achievement tests and behavior in school and at home.
It was seen that both the groups improved. To be explicit, the first group showed the best results in parents rating of behavior at home. The second group improved a lot in reading. Thus from this we conclude that including the parents group in the treatment for children with Learning disability and giving emotional support was very important [152]

Angela J. Fawcett et.al (2001) studied the children with learning disability. They selected children with learning disabilities from two schools and administered a comprehensive battery which included tasks like: phonological, speed, motor and cerebellar. The children were divided into a group based on their I.Q: Non discrepant group (IQ of < 90) and a discrepant group i.e. the children suffering from learning
disability (I.Q of 90). It was seen that the non-discrepant group on the phonological tasks, speed and motor tasks were severely impaired as the discrepant group. However, on the cerebellar test which measured the postural stability and muscle tone, the non-discrepant group was definitely better than the children in the discrepant group. This finding therefore proves the cerebellar deficit hypothesis for dyslexia [8].

**Aydin Yucesan Durgunoglu (2002)** conducted a study to see the cross linguistic transfer in literacy development and its implication for language learners. Educators who work in settings where there is multilingualism, it becomes difficult to identify the actual etiology of Reading difficulties of language learners. Therefore it becomes a challenging task to discriminate reading problems from poor linguistic proficiency versus learning difficulty. Results concluded that children with good exposure and good instruction in their first language, the skills and insight becomes easy and so is the transfer of second language. However, if the opposite is true then the skills and insight doesn’t develop properly then there is a delay in developing language proficiency which can be corrected through good practice. Therefore it is important to know that this delay is not because of learning difficulty [9].

**Christopher J. Daly et.al (2003)** conducted a study on Kindergarten children. The purpose of the study was as follows:

- To test the performance of these children on the tests of visual motor integration and examine its relationship with the handwriting legibility.

- To examine whether use of lined paper or unlined paper has any impact on the handwriting legibility. The researcher used the following tools: Developmental Test of Visual-Motor Integration- VMI.

- Total of 54 children studying in Kindergarten were selected and administered the VMI.

Out of which 30 students were given the Modified SCRIPT with unlined paper and the
remaining 24 students completed the Modified SCRIPT with lined paper. **Positive** relationships were found between VMI scores and the child’s ability to legibly copy letterforms. To be explicit, the children who copied the first nine forms on the VMI were definitely better than students who could not correctly copy the first nine. So it clearly proved that there existed a relationship between the Visual-motor integration skills and the ability to copy letters legibly. Also they concluded that there was no significant relationship between legibility and writing on lined paper versus unlined paper [23]

**Marian Jongmans et.al (2003)** mentioned a descriptive study where they compared the performance of children with the Developmental coordination disorder and Learning disability and children with Developmental coordination disorder without Learning disability on the perceptual motor skill tasks. It was confirmed that these children did not have any other neurological disorder. The purpose of the study was to examine the consequences of co morbidity of Developmental Coordination Disorder and Learning Disability for the severity and pattern of perceptual—motor dysfunction. It was seen that children with Developmental Coordination Disorder and Learning Disability performed lower on the standardized test of perceptual motor ability as compared to children with Developmental Coordination Disorder and no Learning Disability. Interestingly it was also seen that the former group also showed poor manual dexterity and balance [90]

**David Mather (2003)** conducted a study with the objective of finding out the differences in brain processing. The researcher identified three groups in the early adolescent age group, good readers but poor spellers, poor readers and poor spellers, good readers and good spellers. These group were administered a dual task which involved concurrent finger tapping and line orientation judgment. It was seen that on the left hand tapping task all the groups were similarly affected. However the results were not same in the right hand tapping condition. Here the tapping disruption was seen less in good spelling group than both poor spelling group. From the above it can be inferred that people with Dyslexia and Dysgraphia have left hemisphere processing limitation. However one must bear it in the mind that it is not limited to written language [34]
Louise Spear- Swerling et.al (2004) conducted a study and examined the novice teacher’s word structure knowledge and the children’s progress who were tutored by a sub group of teachers. Teacher’s word structure knowledge was checked by using tasks like grapho phonemic segmentation, classification of pseudo words by syllable type and classification of real words as phonetically regular and irregular. Children who were tutored were tested on reading and writing skills. It was seen that novice teachers who got word structure instruction performed better than the comparison group on knowledge of word structure after the test. So the tutored children showed a lot of improvement on the assessment. Teacher’s posttest knowledge on irregular words and graphophonemic segmentation showed good correlation with the progress of tutored children in decoding phonetically regular words so there was a link between teacher’s pattern of knowledge word structure and children pattern decoding process. From this it was clear that to effectively teach word decoding word structure knowledge is very important [85]

Heikki Lyytinen et.al (2004) conducted a longitudinal study on children with and without dyslexia. The researchers identified 107 children who are at a risk of developing dyslexia as it showed up in their family; also there were total 93 children in the control group. These two groups were studied right from the birth till they entered school.
When the risk group children entered the school their decoding ability was lower than that of control group. Measures of speech and language like phonological and morphological skill were collected from 3 years of age of both the groups. Differences were seen in groups and also their predictive correlations.
It was seen that with increasing age, the group differences and predictive association to later language and reading disability strengthened and the predictions became stronger in the risk group. These results help to understand early identification and intervention of dyslexia in at risk children [69]

Severine Casalis et al (2004) conducted a study to find out the morphological awareness in developmental dyslexia.
It is generally seen that children with dyslexia who have poor morphological awareness have difficulty with reading and alphabetic principle. It was vital to analyze, how do children with dyslexia having phonological impairments deal with larger units
The performance of children with dyslexia was compared to the controls of the same chronological age on a series of morphological tasks. On all the tasks, the children with dyslexia definitely performed lower than the controls which suggested that the morphological awareness cannot be developed independently of reading experience or phonological skills. The children with dyslexia were poor in morphemic segmentation tasks but the controls showed normal performance in reading sentence completion task.

In the second study, the sample was a sub group of dyslexic with different degrees of phonological impairment. It was indicated that children with dyslexia develop some type of morphological knowledge which they use it as a compensatory measure during reading [136].

Ingvar Lundberg (2006) carried out a study on 60 children from grade 3. They followed up the case for over a year. In the first year an assessment battery that measured aspects of reading, arithmetic and working memory was used. Also the teachers rated them on a 7 point scale on various dimensions of motivation. A total score was assigned called as task orientation. After a year, the testing and the teachers rating scores were repeated. It was found out that the correlation between readings, arithmetic and task orientation were all high. The highest co-relation between reading and arithmetic decreased when the task orientation was partialized. It got further reduced when working memory which was measured by backward digit span was added to the controlling factor. The ratings of the teacher on cognitive ability and language development also mattered for some variance between arithmetic and reading. It was also found that the task orientation in grade 3 may have caused the impact on reading and arithmetic performance level in grade 4 [70]

Batya Engel- Yeger et.al (2009) carried out a research study on children with Dysgraphia to find out the relationship between the self reports of children on their handwriting performance, their actual handwriting process and product and moreover their motor perceived self-efficacy.

The researchers conducted a study on 21 children having dysgraphia and the other 21 without the condition. All these children were given a copying task on an electronic
tablet (Computerized Penmanship Evaluation Tool). The researchers used Hebrew Handwriting Evaluation to check the handwriting product. The children were also administered a questionnaire called Children's Questionnaire for Handwriting Proficiency (CHaP) and the Perceived Efficacy and Goal Setting System (PEGS). The groups CHaP scores showed significant correlation with PEGS scores, handwriting process and products. However, they were quite poor with those of controlled participants. Due to this, the children get aware of their own handwriting shortcomings and are able to report the same.

Since there is an identification of Dysgraphia this facilitates their participation in their occupational therapy intervention and in their classes [12]

Elpis Pavlidou et al. (2009) pursued an experimental study on primary children, typically developing and children with developmental dyslexia. These children were from the age group of 9 - 12 years. The researchers used an artificial grammar learning task, AGL. They conducted two experiments which differed from each other in terms of time of presentation and nature of instructions. The first experiment had implicit instruction and the second one had explicit instruction. It was seen that typically developing children performance on AGL showed intact implicit learning whereas children with developmental dyslexia did not show such evidence because of possible mediating cognitive developmental factors [45]

Gwemyth Roberts et al. (2010) conducted a study to check the effectiveness of kinesthetic cursive writing intervention. The researchers identified small groups of children from grade 4th to 6th with handwriting difficulties. These children were given the Kinesthetic writing system for 7 weeks.

The researchers used repeated measure design for evaluation. Dependent variables included legibility, individual letter formation, speed and personal satisfaction. It was seen that 39% of the children showed a significant change in the legibility, improvement was also seen in the individual letter formation, legibility features like closure, line quality etc. also with the intervention the writing speed showed an increase and so did the personal satisfaction.

From the above study it could be concluded that kinesthetic cursive intervention proves
effective in improving the skills of children with handwriting difficulties [60]

Vincent Connelly et.al (2010) made a study to see the effect of dyslexia on the students writing skills which was compared to chronological matching peers and spelling skill matched peers. It was seen that the writing of children with dyslexia were poor than the chronological matched control but not poor than the spelling skilled control group. Differences in ideas and organization i.e. the higher order skills were not much when compared to chronologically matched controls. But on lower order skills the tasks like spellings, and handwriting the children with dyslexia made more spelling errors [154]

Patrick Snellings et.al (2010) studied on children with reading disability. The purpose of the study was to find out the role of speech perception accuracy and speed in fluent word decoding of reading disabled children. The children with reading disability and the other control group chronologically matching were presented in a natural speech a same and different phoneme discrimination activity to test the perception of single consonant and consonant clusters. It was found out that children with reading disabilities were slower than the control group in recognizing similar sounds. It indicated less distinct phonemic categories [111]

Elizabeth B. Meisinger et.al (2010) made an attempt to know the diagnostic use of reading fluency measures in identifying children with learning disabilities. The sample of 50 children with a diagnosis of dyslexia was taken for study. Within this sample the researchers identified a group of children that showed deficits in reading fluency and also in rapid naming speed and reading comprehensions. Just with a single, word reading skill assessment could not identify children with reading disability as it is very important to assess reading fluency apart from word reading. If one fails to do, it may result in under identification of children with reading disabilities [43]

Amanda Goodwin et al (2010) conducted a study on children with literacy difficulties in relation to the control group to find out the effect of morphological interventions and the literacy outcomes.
Children from different grade levels were selected. The sample ranged from 15 to 26. It was seen that the morphological intervention had a great effect on the literacy outcome as there was a marked improvement in the literacy achievement. Its effect was seen on phonological awareness, morphological awareness, vocabulary, reading comprehension and spellings. The effect of morphological instruction was seen the best in children with learning difficulties, speech and language difficulty and struggling readers etc which concluded that the morphological interventions can help in phonological processing challenges and literacy difficulties [4]

**Evelyn S. Johnson and his colleagues (2010)** attempted to find out the role of cognitive processes in the diagnosis of specific learning disability and its evaluation. They conducted a meta-analysis of 32 studies to see the cognitive processing differences between children with specific learning disabilities and their normal achieving peers. The analysis concluded that there exists a moderately to large difference in the cognitive processing ability of children with learning disability and normal achieving peers. So it concludes that it is important to measure cognitive processing ability of the child during evaluation and identification of learning disability [47]

**Monica M.P Hoy et al (2011)** conducted a study with the objective to find out the effectiveness of the handwriting interventions. School aged children were identified with handwriting problems. The researchers used randomized and non-randomized controlled trials of intervention. Intervention strategies like relaxation and practice, sensory based training without handwriting practice and handwriting practice which included other interventions like sensory or cognitive focuses handwriting practice were used. It was seen that irrespective of any treatment used, the interventions that had no handwriting practice and also the ones that had handwriting practice but less than 20 practice sessions were ineffective. For effective occupational therapy for the purpose of improving handwriting adequate handwriting practice is mandatory [99]

**Stefan Gustafson et al (2011)** conducted a longitudinal study where they wanted to find out the effects of three intervention strategies on the reading skills of children with reading disabilities.
They identified children from grade 2. The three interventions were the computerized training programmes which were bottom up intervention, top down processing and the third was a combination of both the above programmes. Bottom up intervention was to improve the word decoding skill phonological abilities. The top down processing intervention focused on words and sentence level. Each intervention group had 25 children. Moreover in addition to this, there were two comparison groups. The first comparison group had 25 children with reading disabilities. This group received general ordinary special instruction and the other group had 30 children of the same age who were typical readers. The children with reading disabilities completed 25 sessions of training under special educators. It was seen that in all the groups the reading skills improved. Moreover the group that received a combination of all the training showed the highest improvement than the other two groups i.e. the typical reader group and the ordinary special instruction group. Hence the treatment that combines bottom up and top down aspects of learning was the most effective.

Pieter Jelle Vuijk et al (2011) studied children with learning disability. The purpose of the study was to find out the association between their academic and motor performance. The researchers collected a heterogeneous sample of 137 schools going learning disabled children. They had an I.Q of > 80. A test called, Movement Assessment Battery for children (MABC) was used. The findings were as under:

- It was seen that 52.6% children performed below level on manual dexterity tasks.
- 40.9% performed below level on ball skills.
- 33.7% performed below level on balance skills.

Also there were moderate co-relations between spelling and Math and MABC total score, small to moderate co relations were found between Math and balance, reading and ball skills and spellings and manual dexterity [113]
**Maria Lulsa Lorusso et.al (2011)** identified a total of 123 children with developmental dyslexia. The identified groups were given different treatments. The treatment consisted of variations of Bakkers intervention programme based on the balance model. Moreover the researcher also had a control group i.e. a specific reading training group. With help of cognitive and neuropsychological assessment subtypes of dyslexia and profiles of reading, spellings, verbal memory and phonemic awareness were identified. The researchers manipulated hemispheric based stimulation to see the bases and mechanisms of reading improvements. It was seen that effects of treatment varied with the type of dyslexia and different intervention programs have different effects on reading. So study suggests while planning a therapy for the child with learning disability, a proper classification of subtypes on the base of reading and reading related variables proves beneficial [93]

**Carsten Elbro et al (2012)** conducted a study that whether dyslexia is seen in second language or not. One’s poor performance on testing of reading is because of poor language proficiency in second language and limited schooling. It may not be a pure poor reading disability. To find out this they conducted a study on 88 adults’ second language learners and 65 native language speakers. It was seen that the incidence of dyslexia varied a lot in second language learners depending on the measure of reading. Therefore the researchers designed a dynamic test. This test was designed with a purpose to check the acquisition of basic decoding ability. In this test the participants were taught three novels letters and then to put the letter sounds into words. The results showed that the dynamic test gave results which matched the definition of dyslexia. Also it was seen that the influence of second language vocabulary and schooling was reduced. Also the same cut off between dyslexic and non-dyslexic performance appeared valid in native language speakers and second language learners [21]

**Chunmei Zheng et al (2012)** in their research investigated that how self-determination and self-concept affects academic achievement of 560 adolescents with learning disabilities. Factors like financial status, gender and urbanicity were also considered. It was revealed that the three variables, self-concept, self-determination and academic achievement showed significant correlations.
Also it revealed that self-determination was vital in predicting the academic achievement of adolescents with leaning disability [25]

Heidi Schwellnus et al (2012) investigated the effect of pencil grasp on the speed and legibility of handwriting in children. Researchers conducted this study on 120 children from the fourth grade. While these students were writing they captured their movements in a video. The researchers then categorized their grasps and used handwriting assessment to evaluate their writing for legibility and speed. A relationship between the grasp and handwriting was to be studied. The researchers found out six types of grasps and found no significant effect of grasp on speed and legibility [67]

Heidi Schwellnus et al (2013) carried out a 10 minutes copying task on 74 children of grade 4 to find out the differences in handwriting kinetics or forces, legibility and speed among four pencil grasps. The researchers wanted to study the relationship between the grasp, grip and forces. The researchers gave a handwriting assessment to the children before and after the copying tasks. They measured grip and forces with the help of instrumented stylus and force sensitive tablet. It was seen that there were no kinetic differences among the grasps. The adducted grasps showed higher mean grip and axial forces. The grip forces remained same across all the grasps [68]

Wenchong Du et al (2013) conducted a study on adult dyslexic to find out their implicit sequence learning by comparing sequence transitions with different complexities. The researchers gave a learning sequence task of 12 items to 12 university students with dyslexia and without dyslexia. Both the groups showed identical increment in reaction time when there was an unexpected change in the sequence. But, when the transitions were compared of different complexities it was observed that the participants having dyslexia showed impairment only for higher order sequencing and not for the first basic order. Results suggest that the complexity of the sequence may account for intact and impaired learning in dyslexia. [155]

Alison M. Mitchell et al (2013) conducted a study. The objective of the research was to find out the relationship between vocabulary knowledge and novel word reading.
Children from 4th grade were tested on standardized measures of word identification, decoding and receptive vocabulary and also on experimental word identification measure where these students had not seen such words before.

In the experimental measure, the word pairs were matched on printed frequency and orthographic pattern i.e. variety of spelling presented. However it differed in terms of frequency i.e. higher or lower of expected oral exposure for children. It was seen that children receptive knowledge of vocabulary was related to performance on both standard and experimental word identification. Also the students read the words better with high expected oral frequency on experimental task than words with lower expected oral frequency [2]

Marie Lallier et al (2013) presented a dichotic listening task to 17 children with dyslexia and the other 17 skilled readers. The skill to be measured was simultaneous auditory processing skill. Results showed that when the dyslexic children were asked to report, they had difficulties in reporting syllabic material when presented simultaneously. Also the visual attention span skills were checked in dyslexic children. To check their phonological skills, dyslexic children were given a phonological short term memory task and phonemic awareness task. It was seen that visual attention span had a positive correlation with the scores obtained on dichotic listening task. However phonological skills had no correlations with dichotic listening scores and visual attention scores. Interestingly, all the children who showed deficit in dichotic listening tasks had deficit in visual processing. Majority of the children with dyslexia showed phonological processing deficits even though their scores were low on dichotic listening task. Findings suggest that when children with dyslexia have to process simultaneous auditory stimuli, they show impairment, even if they have or do not have phonological processing difficulty. This could also be seen in visual processing task [91]

Christopher R. Niileksela et al (2014) conducted a study to find out relations between learning disability and different latent cognitive abilities. The latent cognitive abilities like global
intelligence, broad cognitive abilities and specific abilities were based on Cattell- Horn- Carroll theory of intelligence, also called as CHC theory. A multiple – indicator multiple cause models were created using the data from Differential Ability Scales (DAS-II).

This model was designed to check the latent mean differences in cognitive abilities between two groups, children with and without learning disability. The learning disability group included children with reading disability, children having difficulty in Math and children with reading and writing difficulty. Both the groups i.e. children with and without learning disability statistically differed in the global intelligence factor. When the differences in global intelligence factor was controlled, differences was seen in children with reading disability and children with reading and writing difficulty as they showed lower latent processing speed. Also children having difficulty in Math showed higher latent knowledge of comprehension. Differences in specific cognitive ability were also seen. Children having difficulty in Math showed lower scores in space relations and numerical facility whereas children with reading and writing difficulty showed lower scores on visual memory [24]

Elizabeth Swanson et al (2014) attempted to analyze the reading interventions using social studies content for children with learning disability. A research was conducted to observe the effect of reading interventions using social studies content for children with learning disabilities. The age ranged from kindergarten children till Grade 12. Reading interventions like mnemonics, reading and answering questions etc was used with in the context of social studies. It was seen that the mean of the analysis conducted was 1.02. It concluded that reading intervention using social studies content has positive effect on outcomes among children with learning disability [44]

Meirav Hen et al (2014) made a comparison between children with and without learning disabilities. Academic procrastination is because of one’s anxiety, stress and illness. Also other vital factors according to the researchers for academic procrastination are ones self-regulation and efficacy. The objective of the study was to examine the relationship between academic
procrastination, emotional intelligence; academic performance mediated by academic self-efficacy. This study was conducted on 287 children with and without learning disability. It was seen that indirect effect of emotional intelligence on academic procrastination was stronger in learning disabled children than children without learning disability also children with learning disability scored lower on both emotional intelligence and self-efficacy and higher on academic procrastination. A child with learning disability manifests greater levels of learned helplessness, low academic expectations and decreased persistence as compared to a child without learning disability.

**Kristina Moll mail et al (2014)** conducted a study to find out the prevalence and gender differences for both isolated and co morbid learning disorder. A total of 1633 German children from grade 3rd and 4th were chosen as a representative sample for the study. After analyzing the rates of prevalence for both isolated and co morbid learning disorders and also for the criterion for normal performance, it was seen that even when a strict cut off criteria were applied, co morbid learning disorders occurred with the same frequency as isolated learning disorder. In association with arithmetic problems, the reading and spelling deficits differed. To be explicit, the deficit in arithmetic was seen more with spelling deficit than with reading deficits. In addition to this, the rate of co morbidity was also higher in arithmetic and spellings. From the above finding we could understand that the mental processes may be different for relationship between arithmetic and reading and arithmetic and spellings. With regards to gender, boys showed more spelling deficit than girls. Also girls had more deficits in arithmetic as compared to boys. There was no difference noted for isolated reading problems and combination of all three, i.e. reading, writing and arithmetic [75]

**Eveline Geiser et al (2014)** conducted an investigation on one aspect of timing perception, called temporal grouping to check whether children with reading disabilities have any kind of impairment in auditory timing perception. Temporal grouping are present in the prosodic phrase boundaries and it facilitates the processing of speech at the syntactic level. Children between the age group of 6-8 years with and without dyslexia were selected for study. The prosodic
facilitation was measured by checking their efficiency of processing a sentence for syntactic ambiguities spoken with facilitation and spoken neutrally.

It was seen that both the groups with prosodic facilitation were benefitted. Their reaction times were faster as compared to neutral prosody. From the above findings we could conclude that the use of prosodic phrase boundaries for speech processing is not impaired in children with dyslexia [46]

2.2.0 Studies conducted in Indian Context

S. Prasad (1994) designed a study to investigate hypoxican characteristics of learning disabled and non-learning disabled children.
The results revealed that learning disabled children had poor level of information processing sensitivity and also inefficient discriminating abilities as compared to non-learning disabled children.[129]

P. Sood (1994) designed a study to examine the relationship between certain personality factors like self-concept, social maturity, reasoning ability and general anxiety.
The results revealed that children with Learning disability exhibited more anxiety, had lower self-concept and below average reasoning ability.
He also stated that learning disability was seen more among boys than girls [107]

R. Singh et al (1994) conducted a study to examine whether dyslexic children differed on memory deficits from non-dyslexic children when matched in age, education and socio economic back ground.
Results revealed that dyslexic children differed from non-dyslexic children on long term and short term memories [115]

The researchers selected 100 male children who had similar socio economic status and formal education. These children belonged to two groups. Severely iodine deficient group and mild iodine deficient group. These children were given tasks like: Mazes, picture tasks etc. Results indicated that children with severe iodine deficiency were slow learners compared to mild iodine deficiency. They also scored quite low on the tasks and achievement motivation scale when compared with children with mild iodine deficiency.

It also indicated neural impairment, poor socio psychological stimulation resulting into learning disability and low achievement motivation.

**Pandit (2000)** carried out a research to check the factors that affected learning disabled children in Math.

The study was conducted in central region of Nepal. The total sample in the study was 100. Findings have shown that 32 children out of 100 were affected by different factors like poor parent’s instructions, their negative behavior towards them, teacher negligence in the class etc. The study concluded suggesting that the quality of teaching strategies should be improved. Also the quality of instructions in the class needs improvement [109]

**Lall (2001)** conducted a study on perceived relations and social competence of children with specific disorder of scholastic skills.

A sample of 20 children who had specific developmental disorder of scholastic skill between the age of 7-12 years and 20 controls matched on age, class & I.Q were taken. The groups were assessed on:

- Semi structured interview
- NIMHANS index for Specific Learning Disability
- Malins Intelligence test for Indian Children
- Perceived Peer relation questionnaire
Interpersonal Competence Scale (teacher’s version)

Results revealed that the perception of children with specific skill disorder about their relationship with peers was cordial. However teachers found these children poor on social competence, sportsmanship qualities and affiliation in the area of academics [79]

S.Ramaa & Gowramma (2002) conducted a study to identify and classify children with Dyscalculia in primary schools. They excluded other causes of arithmetic failure.
In one study 15 cases out of 251 had dyscalculia. In other study 78 out of 1402 had dyscalculia. In the second study, 40 out of 78 had reading and writing problems [130]

Mathew (2003) carried out a research to see the effectiveness of modern teaching strategies in minimizing learning disabilities of students of secondary section school. The researcher identified 895 students from four different schools as a sample in his study. Out of which 204 students were identified as having learning disability and remaining others as non L.D.
The findings revealed that modern teaching strategies indeed proved useful to minimize L.D’s [94]

M.Kulkarni and S. Karande (2007) conducted a study with the objective to check the impact of the provisions given to the LD children by the government of Maharashtra on the academic performance of L.D children.
They selected a sample of thirty girls between the ages of 12- 18 years and checked their performance on the tests.
Results revealed a very positive outcome. It was seen that children with LD who were given the provisions had a significant improvement in their academic performance [76]

Pushplata (2008) conducted a study with an objective to find out the relationship between competence and social anxiety of learning disabled children.
This study was conducted on 100 children between the age group of 10-14 years who were randomly selected from two schools. Results showed that children with Learning disability had low academic competence and high social anxiety indicating low academic competence is directly related to social anxiety [114]

Rani and Vashistha (2008) carried out a research on the determinants of Rorschachian measures of Learning disability.

The tools that they used in the test were:
- Self-constructed tool for learning disabled
- Rosharch inkblot test

The study was conducted on 50 children including boys and girls between 4-6 grades. Findings revealed that comparison was possible between LD and non LD to check the discriminatory power of the tool. Both the groups had distinct features on reading and arithmetic test; however it could not be confirm in relation to language. Moreover, results also indicated that LD had extrovert tendencies; even it was evident on the Psychogram. They were very responsive to the environment. They were creative in their relationship to object and people around them [118]

Amruth and Devika (2009) conducted a study to check the effect of school remediation programme on the academic achievement of children with disabilities. This study was conducted on children who had enrolled in the year 2007-08. It was seen that the children who attended the school remediation programme showed positive responses. In other words, children who attended remediation in the school showed good academic achievement [6]
Abraham (2010) conducted a study on Self esteem & Social relations of Adolescent with Learning Disability. 
The study was conducted in Bangalore. Sample of the study was adolescent with learning disability. They were between the age of 11 to 18 years. The total sample size 29 was 50 which included both boys and girls. The researchers used purposive sampling technique. 
The results of the study indicated that with regards to self esteem parameter the relationship between the participant and the parent was significant and important. 
A similar finding was seen with the participant relationship with his teacher and his self esteem. 
This finding indicates that adolescent with good social relationships with their teachers and parents has high self esteem.

However this was a little less true with their relationship with their peers. In other words their relationship with their peers did not have a direct impact of their self esteem [1].

2.2.0 Overview of the chapter

Effort was made to study and understand the researches done in the area of student’s learning disability. Forty nine studies including ten of Indian studies enabled the researcher to understand the earlier works. Reviewing of the literature available on learning disability, spanning over twenty four years (1990 to 2014), facilitated proper understanding of various factors like: Inclusion, motor development, handwriting, gender differences, classroom teaching, effective teaching strategies, impact of remediation, phonics, muscle tone, auditory processing etc. 
It is evident from the above researches that good number of studies was conducted on learning disability. This provided some scope for further research. Further it highlighted many valuable findings and observations in respect of research on learning disability of students. However, present review of the related research also revealed that very few studies have been conducted on Learning disability and Hypotonia, indicating a need to conduct further research in this super specialized topic. 
After considering number of studies as presented above and after noticing the research gaps it becomes necessary to move ahead for rising pertinent research questions. It also becomes
important to identify and state appropriately the problem to be studied. The objectives of the study, population and sample, research design, framing of hypothesis etc. deserve to be clearly elaborated. Following chapter presents the essential details dealing with the methodology of the present research.