Chapter 3

REVIEW OF RELATED LITERATURE

3.1 Studies Related to Learning Disabilities
3.2 Studies Related to Dyslexia
3.3 Studies Related to Intervention Programme
REVIEW OF RELATED LITERATURE

The review of related literature is essential and it plays a significant role in research work. Research always takes the advantage of the knowledge, which has accumulated in the past as a result of human endeavour. For any worthwhile research, the research worker needs sufficient familiarity with the literature available in that field of study. The keys to the vast store house of published literature may open doors to source of significant problems, good hypotheses, helpful orientation, scientific procedure and comparative data for interpretation of results. The documents include periodicals, abstracts, reviews, books and other research reports. The review of related literature involves the systematic identification, location and analysis of documents containing information related to the research problem (Gay, 1996). The Investigator can be sure that his problem does not exist in vacuum, and that considerable work has already been done on problems which are directly related to his proposed investigation. The success of his efforts will depend on no small measure on the extent to which he capitalised on the advances-both empirical and theoretical made by previous researchers (Mouly, 1970).

The review of related literature throws light on the nature of work done in this area. It helped the Investigator to delimit and define her problems. It also brings the Investigator up to date on the work which others have done and thus to state the objectives clearly and concisely. Thus as it is said “The review of related literature is a forerunner for the research worker and shows the way through which the newcomer should proceed”.

For the purpose of this research work, studies related to Dyslexia has been reviewed to ascertain whether computer applications have been found to be associated with improved student outcomes in the primary school settings. Hence the Investigator had reviewed the research studies as well as scholarly works done in this area and classified these into three major sections such as
- **Studies related to Learning Disabilities**
- **Studies related to Dyslexia and**
- **Studies related to intervention programme.**

### 3.1 Studies related to Learning Disabilities

Bane et al. (2012) explored the perspectives of people with learning disabilities on relationships and supports in the Republic of Ireland. A national research network consisting of 21 researchers with learning disabilities, 12 supporters and 7 university researchers conducted the study. Findings suggested that people with learning disabilities have a diversity of experiences and views on relationships and support needed to keep them. People with learning disabilities taking part in the focus groups identified that they need more support from friends, family, and services staff to develop new relationships and keep their existing ones.

Boyle & Rivera (2012) examined three different note-taking techniques used by students during lectures and the study included 125 students of varying disabilities. Findings revealed that students who used note-taking techniques were effective at increasing scores on measures of achievement and the quality and quantity of notes recorded.

Ho & Siegel (2012) conducted a study on the Identification of Sub-Types of Students with Learning Disabilities in Reading and Its Implications for Chinese Word Recognition and Instructional Methods in Hong Kong Primary Schools. The results showed that students with surface dyslexic pattern made more phonological errors, whereas students with phonological dyslexic pattern made more semantic errors.

Berninger & May (2011) conducted a study on evidence-based diagnosis and treatment for specific learning disabilities involving impairments in written and/or oral language. Findings are discussed in reference to the importance of (a) considering individual differences (diagnosis of impaired hallmark phenotypes) in planning and evaluating response to instruction and modifying instruction when a student is not responding; (b) recognizing that teaching may change epigenetic gene expression at one stage of schooling, but not the underlying gene sequences that render individuals still vulnerable as curriculum requirements increase in nature,
complexity, and volume in the upper grades; and (c) using evidence-based diagnoses of specific learning disabilities that are consistent across states for free and appropriate education K to 12 and for accommodations throughout higher education.

Ryan (2011) investigated the barriers facing students with disabilities in nursing courses, in particular in clinical placements. Results showed that a lack of understanding of legislative and institutional requirements underlies negative attitudes about students with disabilities, especially in practicum-based courses.

Erik (2010) examined the summer employment and community activities of 136 high school students with severe disabilities. The majority of youth was either not working (61.7%) or reported sheltered employment (11.1%). The most prominent predictors of summer employment status were holding a job during the spring semester and teacher expectations for employment. Recommendations for research and practice focus on increasing the capacity of schools, families, and communities to support the involvement of youth with severe disabilities in meaningful summer activities.

Michael (2010) investigated whether curriculum modifications predicted student and teacher behaviours related to the general education curriculum and if there were differences in ecological, student and teacher variables depending on the presence of such curriculum modifications. The study observed 45 high school students with disabilities during instruction in core content areas. Findings indicated that there were significant differences in student and teacher variables depending on the presence of curriculum modifications. When curriculum modifications were provided, students were engaged in more academic-related responses and fewer competing behaviours and teachers were engaged in fewer classroom management activities. Implications and recommendations from these findings are provided pertaining to the importance and implementation of curriculum modifications for students with disabilities in general education settings.

Simoncelli & Hinson (2010) detailed in their study, the methodologies that could be used to better deliver online course content to students with learning disabilities and whether the design of the course affects the students' attitudes and
performance. These include digitally delivered instructional audio, various textual interactions between the students, and other assistive methodologies. The methodology and pedagogical side of the delivery of the online course was found to be beneficial to students with learning disabilities.

Allen (2009) identified that a major factor that has a risk for a juvenile to become an offender is the presence of a mental disorder. Ranked among the most prevalent of disorders are learning disabilities. 103 participants were randomly selected from an archival data set of 300 male juveniles that were taken from three separate juvenile halls in Los Angeles country. The mean age of the participants in the study was 16.05 (SD 1.43) years. This study identifies 2.3% of the sampled male incarcerated juvenile who self-reported having been diagnosed with a learning disability.

Jones (2009) examined the self-concept of adolescents with intellectual disabilities (ID). The sample included 51 adolescents with ID, their parents (n=50), and teachers (n=12). A mixed method approach was utilised with qualitative data used to enrich quantitative results. The relationship among adolescent perception of support, adolescent self-determination, parent perception of child impact and student-teacher relationship was explored along with the contribution of each of these variables to adolescent global self-worth. Group differences between students in self-contained classrooms and students in resource rooms were also examined. Significant correlations were found among this constellation of variables. The study revealed that adolescent perception of parent support and self-determination were significant predictors of global self-worth.

Lauren (2008) examined initial evidence of progress in reading for 1,512 children with and without identified speech-language and/or learning disabilities (LD-SLD) in the context of the explicit literacy instruction provided in Michigan’s Reading First (RF) schools. The findings suggested that children with LD-SLD labels demonstrated significantly slower growth compared to children without LD-SLD labels. Children considered more at risk also demonstrated slower progress in oral
reading fluency (but not reading comprehension) compared to children considered less at risk.

Iqbal & Preeti (2006) studied about self-esteem and adjustment of children with learning disabilities and found out that children with learning disabilities had lower self-esteem than normal children in the domains of general – self, home – parents and total self-esteem. The study also showed that children with learning disabilities had significantly poorer adjustment than normal children in all the areas assessed, i.e., educational, emotional, social and also total adjustment.

Mehta (2006) in his study revealed that there is a significant difference in the awareness of learning disabilities in teachers of different boards such as SSLC, CBSE, ICSE. Among the boards ICSE board teachers were more aware about learning disabilities as compared to CBSE and SSLC board.

Sangeetha & Sunitha (2006) explored the effect of AIDS Training program on the awareness of students with special needs about AIDS and AIDS prevention and concluded that the students with three disabilities, i.e., physical handicap, visual impairment and hearing & speech impairment were having a very low level of awareness about ‘AIDS’ and its prevention prior to the intervention program and the training program on ‘AIDS’ significantly improved the awareness level of students with all the three disabilities.

Carlson (2005) in his study described the history of learning disabilities and intervention theories, which might be helpful for adult college students suffering from many other learning disabilities Learning disability is not longer considered as a form of mental retardation. It is related to some typical brain dysfunction.

Jeena & Aswathi (2004) examined that adolescents with learning disabilities tend to have disturbed family relationship and poor emotional maturity which is accountable for poor scholastic achievement. An experimental group of adolescents with learning disabilities (N = 30) and a control group with average scholastic achievement (N=30) were subjected to a comparative assessment by administering a Family Relationship Questionnaire and Emotional stability Test. There were significant differences between the control and experimental groups only on some
areas of family relationship. The adolescents with learning disabilities scored significantly lower in areas like father acceptance, mother concentration, and father concentration. These aspects of family relationship contribute to learning disability. There was no significant difference between the groups in their emotional maturity.

Pandey (2001) focused on the super ego variants of learning disabled children. The sample consisted of 200 children, 100 LA and 100 LD ranging 6-9 years. Indian Adaptation of Rosenzweig picture Frustration Scale was used for measuring different super-ego variants. The findings were (1) Both LD and LA children equally denied that they were responsible for some offense, which they were charged (2) Both the groups did not differ in admitting guilt by referring to unavoidable circumstances. (3) Both LD and LA children were homogenous with respect to their initial strength of super-ego (4) LD students reflected more critical and fault finding tendency than LA children (5) Both the groups were similar in socialisation process and social adjustments as they had the tendency of excusing themselves and others of blame.

Sharpe (2001) studied case notes of 120 adults with learning disabilities and concluded that the greater the severity of a person’s learning disability, the more difficulty, they have in understanding the concept of time.

Pandey (2000) attempted to investigate the effect of parent-child relationship on learning disability among young children. The sample comprised of 93 mothers and 88 fathers of learning abled (LA) children and 97 mothers and 86 fathers of learning disabled (LD) children. Mothers of LD were found to be significantly different from learning abled ones only on two dimensions namely, strong realism Vs utopian expectation and lenient standards Vs severe moralism. Fathers of LD children did not differ significantly on any dimensions of PCR scale from fathers of LA children. Both LD and LA children were homogenous with respect to their initial strength of super ego. LD children reflected more critical and self-fault finding tendency than LA children. Both the groups were similar in socialisation process and social adjustments.
Snow (1998) identified several individual risk factors for learning disabled-family history of reading difficulties, poor pre literacy skills either because of inherent cognitive limitation or home environment, poor literacy, related cognitive – linguistic processing especially phonological awareness, confrontational naming, sentences/story recall and general language ability, a diagnosis of specific language impairment, hearing impairment and a primary medical diagnosis in which reading problems tend to occur as a secondary symptom. Among the group factors listed as risk factors for LD by Snow et al are poor schools, low income/poor neighborhoods, limited proficiency in medium of instruction and dialectal differences in language.

Arya (1997) designed to estimate the prevalence of disability and impairments among pre-school children in rural areas and to discover the significant socio-demographic variables which influence such prevalence rates. The distribution among different age groups appeared to be positive on screening. In relation to sex variables, there was generally higher prevalence of all disabilities. It was found that there existed a greater prevalence of handicaps among lower socio-economic status groups such as scheduled castes, scheduled tribes and backward classes than among the other groups.

Jordan (1996) in his study describes general information about what is known as learning disability in adults. It also analysed the way in which specific differences in urban structure influences the mastery of reading, spelling, handwriting and arithmetic and this study also points out various strategies for compensating the disabilities.

Shafir (1994) in his survey found that 331 Toronto (Canada) adolescence and adult with learning disabilities could be grouped into three sub types 1. Arithmetic disability, 2. Reading disability 3. Reading and arithmetic disabilities. Findings showed that each group differed significantly from the others on testing of reading, spelling, memory and other Cognitive measures.

Wilson & David (1994) evaluated the academic intrinsic motivation and attitudes toward schools and learning of learning disabled students. Administration of two affective tests to 89 students with learning disabilities (LD) in grades 4-8
revealed that subjects perceived the school environment and academic tasks as two separate factors. Learning disabled students, compared to non-disabled students, exhibited more positive attitudes toward the school environment than for academic learning tasks. School attitudes improved as grade level increased.

Carlisle & Andrews (1993) in their study tried to find out how mainstreamed learning disabled students cope with their science classes. This study found that mainstreamed fourth and sixth grade students with learning disabilities had significant weaknesses on a science curriculum-based assessment related to non-disabled peers, and they rated themselves and were rated by their teachers more negatively. Mismatches were revealed in the perception of the student and teacher regarding student adjustment and classroom habits.

Scott (1993) in her study tried to identify the rhyming skills differentiating among mildly mentally retarded, learning disabled, and normally achieving students. This study of children between ages 6-8 found that the rhyming ability of normally achieving students (N=33) and students with learning disabilities (LD) (N=33) was much higher than that of students with mild mental retardation (MMR) (N=33). Most of the LD children could generate rhymes while most of the MMR students could not generate rhymes.

Swanson (1993) conducted a study on the information processing analysis of learning disabled children. The sample for the study consisted of 32 learning disabled, 17 gifted and 14 normally achieving students from grade 4 and 5. Results reveal that learning-disabled children’s problem-solving performance reflects a weak integration of meta-cognitive skills with online processing and problem solution.

Coleman (1992) compared the similarities in the social competencies of learning disabled and low achieving elementary school children. Eighty-five children with learning disabilities in grades 3-6 were compared to match low achieving (LA) peers. Results indicated that the two groups were comparable on most social competence measures, although LD children reported themselves less lonely than LA children, and regular class children rated LD children more likable than LA children.
Lorsbach & Frymier (1992) made a comparison of learning disabled and non-disabled students on five at-risk factors, viz, personal pain, family socio-economic status, family instability, family tragedy, and academic risk. This study compared 1356 students with learning disabilities and 1743 non-disabled students in grades 4, 7 and 10 on at risk factors and number of school interventions. The study found that learning disabled children were significantly more at risk on personal pain, family socio-economic status, family instability, family tragedy, and academic risk.

Vallies (1992) compared the oral and written testing with primary aged mainstreamed learning disabled students. The study compared the performance of four mainstreamed learning disabled students on oral and written tests in social studies. The study found superior test performance during oral testing replicated across all four students. She also suggests procedures for implementing oral testing by classroom teachers.

In a study to measure the writing language abilities of learning disabled and non-disabled children, Watkinson & Lee (1992) examined the differences in written expression between learning disabled and non-disabled middle school students matched by grade and sex, using eight curriculum based measures. All of learning disabled students had been identified as having written language deficits. Non-disabled students showed superior written expression skills.

John & Rattan (1991) conducted a study on Short Term Memory (STM) tests as predictors of reading achievement of learning disabled and educable mentally retarded students. They examined nine measures of short term memory used by school psychologists with a group of learning disabled (N=48) and educable mentally retarded (N=34) special education students. Results indicated that not all STM tasks were significant predictors of reading. Sentence memory task was best predictor for learning disabled students whereas letter sequence task was best predictor of reading for educable mentally retarded students.

Robinson (1991) reviewed the causes and association of severe and persistent specific speech and language disorders in children. He found that 40% of children
with delayed speech and language development had a positive family history of some delay and 28% of the affected member being a parent or a sibling.

Chapman (1988) argued that the negative motivational characteristics of LD children develop early in their school careers but reach a level of stability that is maintained through high school. These findings offer a preliminary challenge to the notion of a self-perpetuating failure cycle and have positive implications for intervention programs that are needed if LD children are to gain a stronger sense of control over their development and achieve their full metacognitive potential.

Hallahan (1985) have consistently concluded the following, regarding the memory of learning disabled children (a) the performance of learning disabled children on a variety of memory tasks is poorer than that of their non-handicapped peers; (b) these memory difficulties seem to be related to a failure to use certain strategies that non-handicapped children use spontaneously and (c) those strategies that non-handicapped children use can be taught to learning disabled children so that they experience success on the memory tasks similar to that of the non-handicapped.

Pathak (1984) investigated the personality traits, adjustment, aspirations and sociometric status of the disabled children in normal schools. The study revealed that the disabled children were somewhat reserved, emotionally stable, satisfactorily adjusted but low in scholastic ability, demanding and easily excitable, obedient, expedient, vigorous and not very tense. Emotional adjustment was found to be good and social and educational adjustment was average.

Rane (1983) evaluated the scheme of integrated education for disabled children in Maharashtra. Inadequate assessment procedure, lack of training for general teachers, heads of institutions and educational administrators, inadequate monitoring and evaluation were highlighted as the major deficiencies.

Singh (1981) conducted a study on the effects of peer tutoring on Mathematics skills of learning disabled students. Results indicated that peer tutored group of LD students made significant gains in both mathematics computation and mathematics concept application scores compared to non-peer tutored students.
Bryan & Pflaum (1980) (as cited in Morsink, 1985) investigated about oral reading behaviours of elementary students with learning disabilities and shows that the learning disabled group was less effective in using context for decoding. They self-corrected less frequently and made decoding errors that changed meaning more seriously.

Magee & Newcomer (1978) (as cited in Morsink, 1985) studied the relationship between oral language and academic achievement in LD children. The findings of the study reveal that 1) correct grammar and understanding words and sentences are more closely related to academic achievement than the articulation and speech discrimination skills; 2) Math proficiency is related to language ability; and 3) language skill seems to enhance children’s ability to acquire general information about their environment.

### 3.2 Studies related to Dyslexia

Kong (2012) explored the experiences of six students diagnosed with Dyslexia after starting their Masters degrees in a qualitative study. Their personal accounts were analysed using thematic analysis. The major themes identified were: (1) Distress (2) Self-doubt (3) Embarrassment (4) Frustration (5) Relief (6) Confidence and (7) Motivation. This study provided a deeper understanding of the consequences of a late diagnosis and highlights the need for management approaches to be individually tailored to specific needs. The findings revealed that being diagnosed with Dyslexia as an adult can be cathartic or devastating depending on the individual’s current emotional status and personality.

Melby & Lervag (2012) paid attention to the relationship between Dyslexia and non word repetition. The results showed that children with Dyslexia have poorer non word repetition skills when compared to both chronological-age and reading-level controls. However, the severity of the non word repetition problem varies significantly and the most important predictor of this variability is oral language skills.

Rose & Rouhani (2012) investigated the relative contributions of several cognitive and linguistic factors to connected-text oral reading fluency in a sample of
adolescents with Dyslexia (n = 77) and tested the effect of verbal working memory on connected-text oral reading fluency is moderated by word-level skills and/or vocabulary knowledge. The results suggested that many deficits associated with childhood Dyslexia remain prominent in adolescence, but the nature of the relationships between key cognitive and linguistic predictors (i.e., word-level reading, vocabulary, verbal working memory) and reading fluency appear to be different in adolescence.

Van et al. (2012) conducted a study which concerns literacy and its underlying cognitive skills in Dutch children who differ in familial risk (FR) for Dyslexia. Results showed that FR-children with and without Dyslexia differed in parental reading skills, suggesting that those who go on to develop Dyslexia have a higher liability. The group comparisons (FR-Dyslexia, n = 42; FR-no-Dyslexia, n = 99) and the parent-child relations highlighted the importance of good rapid naming (RAN) skills for reading acquisition.

Boets, Poelmans, Luts & Ghesquiere (2011) conducted a study on impairments in auditory processing and speech perception of pre-school children identified with Dyslexia. The findings indicated that impairments in auditory processing and speech perception are not merely an epiphenomenon of reading failure. Although no specific directional relations were observed between auditory processing, speech perception and phonological awareness, the highly significant concurrent and predictive correlations between all these variables suggested a reciprocal association and corroborated the evidence for the auditory deficit theory of Dyslexia.

Dahle, Knivsberg & Andreassen (2011) focused on a small group of children and young adolescent with Dyslexia who have severely impaired reading skills despite prolonged special education. A clinical group of 70 students with severe dyslexia, due to phonological problems, and a control group of 70 without reading problems participated. The results reported significantly more problems in the Dyslexia group than in the controls in all the syndrome areas. Parents reported more children with Dyslexia to be anxious and depressed and have social problems and
attention problems than teachers. They also reported suicidal ideations in nine participants with Dyslexia.

Friedmann, Tzailer & Gvion (2011) tested whether the syntactic structure of the target sentence affects reading in text-based neglect Dyslexia. Individuals with text-based neglect Dyslexia omit words on the neglected side of the sentence or text, usually on the left side. The participants were 7 Hebrew-speaking individuals with acquired left text-based neglect Dyslexia, without syntactic impairments. Because Hebrew is read from right to left, it enables testing whether the beginning of the sentence and its syntactic properties determine if the final, leftmost, constituent is omitted or not. The results clearly indicated that the syntactic knowledge of the readers with neglect Dyslexia modulated their sentence reading. They tended to keep on reading as long as the syntactic and lexical-syntactic requirements of the sentence had not been met. Another finding of this study was dissociation between neglect Dyslexia at the text and at the word level.

Helland, Plante & Hugdahl (2011) focused on predicting Dyslexia in children ahead of formal literacy training. Because Dyslexia is a constitutional impairment, risk factors should be seen in pre school. A questionnaire was given to caretakers of 120, 5-year-old children, and a risk index score was calculated based on questions regarding health, laterality, motor skills, language, special needs education and heredity. It is concluded that it was possible to identify children at the age of 5 who will have Dyslexia at the age of 11 through a questionnaire approach.

McBride et al. (2011) tested the rates at which Chinese children with either language delay or familial history of Dyslexia at age 5, manifested Dyslexia at age 7. Results indicated that both early language delay and familial risk strongly overlap with subsequent Dyslexia in Chinese children. Overall, rapid automatised naming and morphological awareness are relatively strong correlates of developmental Dyslexia in Chinese; visual skill and phonological awareness may also be uniquely associated with subsequent literacy development in at-risk and typically developing children, respectively.
Schmid, Labuhn & Hasselhorn (2011) investigated about response inhibition and its relationship to phonological processing in third-graders with and without Dyslexia. Children with Dyslexia (n = 20) and children without Dyslexia (n = 16) were administered a stop signal task and a digit span forward task. Results revealed phonological processing deficits in terms of a phonological short-term deficit in children with Dyslexia but revealed no group differences with regard to performance on the stop signal task. There was no relationship between performance on the stop signal task and phonological short-term capacity for the group of children with Dyslexia. In contrast, in the group of children without Dyslexia, there was a tendency that better phonological short-term capacity was associated with faster primary reaction times on the stop signal task.

Veater, Plester & Wood (2011) compared 10 to 13-year-old Dyslexic children's use of text message abbreviations with that of reading age- and chronological age-matched controls. There were no significant differences in the proportion of textisms used between the Dyslexic children and the two control groups, although a preference for non-phonetic text abbreviations was observed in the Dyslexic group. Unlike the controls, there was little evidence of an association between phonological awareness and textism use in children with Dyslexia.

Batson (2010) assessed the validity of the Developmental Indicator for the Assessment of Learning (DIAL) language based tasks in predicting future reading performance and reading programme placement of first grade students. Bivariate correlation and multiple regression analysis confirmed that both phonological and non-phonological tasks were moderately useful in predicting students’ subsequent word analysis and reading comprehension abilities, even after controlling for age, gender, preschool enrollment and non-verbal cognitive skills. This study supports a multi-factorial model of reading with equal importance given to both phonological and non-phonological language skills in the development of decoding and comprehension skills.

Hornstra et al. (2010) examined teacher attitudes toward Dyslexia and the effects of these attitudes on teacher expectations and the academic achievement of
students with Dyslexia compared to students without learning disabilities. The results showed implicit attitude measures to be a more valuable predictor of the achievement of students with Dyslexia than explicit, self-report attitude measures.

Jenkins (2009) found out that pediatric Traumatic Brain Injury (TBI) is often associated with difficulties in word decoding, text comprehension, and reading speed. Injury-related brain changes (eg: loss of cortical gray matter, reduced integrity of white matter, etc.) in the dominant hemisphere may underlie these reading difficulties. Contrary to expectation, age-and-injury effects were not found with regard to performance on word decoding and reading comprehension tasks.

The goal of the project of McGrath (2009) was to have an advance understanding of the complex multifactorial etiology of developmental dyslexia, or reading disability (RD), by investigating gene X environment (GXE) interactions. This project tested for GXE interaction using molecular genetic methods and measures of psychological and bioenvironmental risk factors. This study was a sib-pair linkage design including dizygotic twins and their non-twin siblings (age 8-19 years) from 212 families. Analyses initially focused on identifying genetic and environmental risk factors showing main effects on reading phenotypes. In the environmental analyses, three home variables (parental education, books in the home, and child print exposure) and two bioenvironmental variables (prenatal exposure to smoking and birth weight) showed statistically independent main effect on child reading.

Macdonald (2009) analysed the life narratives of adults diagnosed with Dyslexia using the social model of disability. The author investigated the impact that disabling barriers have in education and employment for people with Dyslexia. Results argued that social-class positioning and institutional discrimination (in the form of disabling barriers) shape the experiences of people living with this condition.

Zaidan (2009) investigated gap detection (GD) performance using the Gaps-in-Noise (GIN) test in three groups of 30 children, aged 8 to 9 years. GD thresholds and gap identification scores (%) were determined for each participant. Repeated measures of ANOVA showed that GD thresholds for the three groups were
significantly different. This study confirmed that auditory temporal processing (ATP) deficit is a factor to be considered in Dyslexia and suggested that the GIN test is a promising clinical tool that should be incorporated in the evaluation procedures for children with reading difficulties.

Facoetti, Corradi, Ruffino, Gori & Zorzi (2008) investigated different neurocognitive dysfunctions, before reading acquisition, in a sample of preschoolers including children with (N=20) and without (N=67) familial risk for developmental Dyslexia. Children were tested on phonological skills, rapid automatised naming, and visual spatial attention. At-risk children presented deficits in both visual spatial attention and syllabic segmentation at the group level. Moreover, the combination of visual spatial attention and syllabic segmentation scores was more reliable than either single measure for the identification of at-risk children. The findings suggested that both visuo-attentional and perisylvian-auditory dysfunctions might adversely affect reading acquisition, and may offer a new approach for early identification and remediation of developmental Dyslexia.

Neuroimaging studies of developmental Dyslexia are reviewed and focused by Goswami (2008) on (a) the neural networks recruited for reading, (b) the time course of neural activation and (c) the neural effects of remediation. Representative studies using the different methodologies were selected. It is concluded that the Dyslexic brain is characterised by under-activation of the key neural networks for reading.

Tressoldi, Lorusso, Brenbati & Donini (2008) tested whether older Dyslexic children may obtain fewer gains on fluency and accuracy with respect to their younger peers after specific remediation. Changes in accuracy and fluency of a group of children with a diagnosis of Dyslexia attending third and fourth grades were compared with those obtained by a group of children attending the sixth, seventh or eighth grade in two different treatments, one based on the Balance model (Bakker) and the second based on the automatisation of syllable recognition (sublexical). The outcomes suggested that, at least for the chronological ages and types of treatments considered in the study, older children with Dyslexia may obtain comparable gains to
their younger peers, suggesting that "it is never too late" to remediate reading fluency and accuracy.

Gupta & Jamal (2004) examined word reading and spelling accuracy of dyslexic readers in comparison to chronological-age (CA) matched skilled readers of Hindi and English. In case of spelling, both groups showed no significant difference between the two languages in terms of the represented proportion of letters of the target word ‘stimuli’. Further dyslexics showed a significantly greater proportion of letters of the target word stimuli in their reading errors than in their spelling errors in both languages, whereas no such differences were seen in case of the skilled readers.

Neale (1996) devised a test in which the child is asked to read aloud a series of passages graded in difficulty and after each passage the child is asked some questions to test his understanding of what he has read. On the basis of this, reading ages for accuracy and comprehension are calculated. When reading ability was calculated, the children with neurological abnormalities formed a more homogeneous group as far as both reading accuracy and comprehension were concerned and their level of reading accuracy was about fifteen months below their actual ages, retardation being even greater in the case of comprehension. Most of these children had IQ’s in the range 80-90. Several had specific learning disabilities which affected progress in reading and would have benefited from extra help.

Nicolson (1994) conducted a study on deficits in Cognitive and Motor skills among children with Dyslexia. Thirty five children with dyslexia and normally achieving children matched for IQ and age, were tested on basic skills. Subjects’ performance on such tasks as phoneme segmentation, picture naming, speed, tachistoscopic word recognition, speeded bead threading and balance showed less complete automatisation than did controls.

Tonnessen (1994) conducted a study on Immune Disorders and Dyslexia on Asthmatic children and their families. He administered reading tests to the students and questionnaires to parents concerning the prevalence of reading difficulties and immune disorders. He found that the proportion of students with reading problems- specially phonological problems- was much higher than would be
expected in a normal reading population and finds an elevated incidence of both reading problems and immune disorders among family members.

Katz, Goldstein, Rudsin & Bailey (1993) observed that children with developmental language disorders and later reading disability had rapid automated naming difficulties and manifested similar deficits in manual dominance and were more likely to experience behavioural problems at 4 and 8 years of age. They provided supportive evidence that developmental language disorders result from difficulty in processing basic sensory information entering the central nervous system in rapid succession.

Yap (1993) compared Dyslexic children with normal readers on measures of phonological decoding and automatic word processing. He found that Dyslexics have a deficit in automatic phonological decoding skills.

Duara (1991) demonstrated the absence of leftward asymmetry of the superior surface of the temporal lobe on coronal section among dyslexics. He also provided evidences of reading comprehension difficulties.

Kathleen (1991) analysed the memory of specific learning disabled readers using the California verbal learning test for children. A group of 73 normal children (ages 8 to 10) was compared to 49 age-matched developmentally dyslexic children of average intelligence on the California verbal learning test for children (CLVT-C), to determine if reading disability was associated with impaired verbal memory. Results indicated that learning disabled readers and normal children had the same rates of verbal learning, forgetting, and memory development, and were equally able to utilise semantic categorisation. Reduced memory efficiency in dyslexia appears to result from verbal encoding difficulties rather than memory deficit per second.

Ryan (1989) made a comparative study of 16 learning disabled and 16 non-disabled children of eighth grade of similar intelligence. He compared the achievement levels, skill mastery rates, learning strategies and attitudes of these children. The course was individualised so that each subject had access to a set of materials. The results indicated that the learning disabled with reading disability could
master computer literacy skills in the regular classroom environment if given the opportunity to ask questions to teachers and peers.

3.3 Studies related to Intervention Programme

The study conducted by Wang, Huss, Hamalainen & Goswami (2012) explored the relationship between basic auditory processing of sound rise time, frequency, duration and intensity, phonological skills (onset-time and tone awareness, sound blending, RAN, and phonological memory) and reading disability in Chinese. A series of psychometric, literacy, phonological, auditory, and character processing tasks were given to 73 native speakers of Mandarin with an average age of 9.7 years. Twenty-six children had developmental Dyslexia, 29 were chronological age-matched controls (CA controls) and 18 were reading-matched controls (RL controls). Chinese children with Dyslexia were significantly poorer than CA controls in almost all phonological tasks, in semantic radical search, and in phonological recoding proficiency. Chinese children with Dyslexia also showed significant impairments in most of the basic auditory processing tasks. Results demonstrated that different auditory measures of rise time discrimination were the strongest predictors of individual differences in Chinese character reading and phonological decoding respectively.

Deborah (2011) compared the effects of 2 supplemental interventions on the beginning reading performance of kindergarteners identified as at risk of reading difficulty. Students (N= 206) were assigned randomly at the classroom level either to an explicit/systematic commercial programme or to a school-designed practice intervention taught 30 min per day in small groups for approximately 100 sessions. Multilevel hierarchical linear analysis revealed statistically significant effects favouring the explicit/systematic intervention on alphabetic, phonemic and untimed decoding skills with substantive effect sizes on all measures except word identification and passage comprehension. Group performance did not differ statistically on more advanced reading and spelling skills. Findings support the efficacy of both supplemental interventions and suggest the benefit of the more
explicit /systematic intervention for children who are most at risk of reading difficulty.

Kast, Bascher, Gross, Jancke, & Meyer (2011) developed a spelling training software that recodes words into multisensory representations comprising visual and auditory codes. These codes represent information about letters and syllables of a word. This enhanced version contains an additional phonological code and an improved word selection controller relying on a phoneme-based student model. They investigated the spelling behavior of children by means of learning curves based on log-file data of the previous and the enhanced software version. The results evidenced that those children with Dyslexia benefit significantly from the additional phonological cue and the corresponding phoneme-based student model. Actually, children with Dyslexia improve their spelling skills to the same extent as children without Dyslexia and were able to memorise phoneme to grapheme correspondence when given the correct support and adequate training.

The claim that speech perception abilities are impaired in Dyslexia was investigated by Messaoud, Hazan & Rosen (2011) in a group of 62 children with Dyslexia and 51 average readers matched in age. Results indicated that children with Dyslexia, on an average, performed more poorly than did average readers in the synthetic syllables identification task in quiet and in across-category discrimination. They did not differ from average readers on 2 tasks of word recognition in noise or identification of synthetic syllables in noise. For all tasks, a majority of individual children with Dyslexia performed within norms. The study concluded that for the tasks and speech stimuli that the authors used, most children with Dyslexia did not appear to show a consistent deficit in speech perception.

Passig (2011) tested the effectiveness of VR (Virtual Reality) technology in enhancing the teacher's knowledge and awareness of Dyslexia, a phenomenon that is very difficult to explain. The research results clearly suggested that experiencing a variety of simulated types of Dyslexia via Virtual reality can bring about a greater improvement in teacher awareness of the Dyslexic pupil's cognitive experiences than is achieved by viewing a film about Dyslexia.
Sharolyn (2011) examined the effects of an intensive shared book-reading intervention on the vocabulary development of pre-school children who were at risk for vocabulary delay. The participants were 125 children, who the researchers stratified by classroom and randomly assigned to one of two shared book-reading conditions (i.e. the experimental, Words of Oral Reading and Language Development (WORLD) intervention; or typical practice.) Results on researcher developed measures showed statistically and practically significant effects for the WORLD intervention with no differential effects for children with higher versus lower entry-level vocabulary knowledge. The researchers detected no statistically significant differences on standardised measures. Results suggested that a combination of instructional factors may be necessary to enhance the efficacy of shared book reading for children with early vocabulary difficulties.

Milani, Lorusso & Molteni (2010) tried to understand what benefits the use of audiobooks (both school-books and books of various genres, recorded on digital media) could bring to preadolescents and adolescents with developmental Dyslexia. Two groups, each consisting of 20 adolescents, were compared. The experimental group used the audiobooks, while the control group continued to use normal books. After 5 months of experimental training, the experimental group showed a significant improvement in reading accuracy, with reduced unease and emotional-behavioural disorders, as well as an improvement in school performance and a greater motivation and involvement in school activities.

Miller (2009) examined the effects of two instructional approaches to teach main idea identification with students, having mild intellectual disabilities /specific learning disabilities. A total of 38 students served as participants in this study. The participants were randomly assigned to either an explicit treatment condition or a basal treatment condition. The participants in this study received either the explicit or basal instructional approach during a treatment session that lasted 25-30 minutes a day, four days a week. The course of the treatment condition lasted for three weeks, resulting in 12 treatment sessions per participant. The results of this study indicated that the explicit institutional approach produced significantly better scores on two
measures that were based on the story content and procedures taught during the lessons.

Vaughn (2009) examined the effects of an intensive reading intervention for students demonstrating minimal response to previous, less intensive intervention. Participants received intervention for 13 to 26 weeks in first grade. In second grade, students were screened and those meeting the benchmark (higher responders) did not receive further intervention, whereas those who did not meet benchmark (lower responders) received an additional 26 weeks of a more intensive intervention. Using a regression-discontinuity design, lower and higher responders were compared on several measures of reading. Significant findings for reading comprehension and word reading were demonstrated in favor of the lower responder group. No significant results were shown for reading fluency. Teachers’ perspectives of the lower responders’ academic competence were significantly lower than those of higher responders.

Diane (2008) evaluated the impact of curriculum called the Early Literacy Skills Builder on the language and early literacy skills of students with significant developmental disabilities. Students in the control group received the ongoing sight word and picture instruction prescribed by their individualised education programmes. Results indicate statistically significant interaction effects for the treatment group for two research team-designed measures of early literacy (the Nonverbal Literacy Assessment and a pretest/post test for the experimental curriculum.). Significant interaction effects were also found for two standardised measures (Peabody Picture Vocabulary Test III and Memory for sentences of the Woodcock Language proficiency Battery). Implications and future research needs are provided.

Odegard, Ring, Smith, Biggan & Black (2008) found out that phonologically based remediation programs appear to rehabilitate brain function in key reading areas for some children diagnosed with dyslexia. Educational testing and brain activation measured after treatment suggested that the reading intervention
rehabilitated several basic level reading processes in all participants diagnosed with Dyslexia.

Rollanda (2007) evaluated two methods to improve the reading fluency of struggling readers. Poor readers in Grades 2 and 4 with (n=17) and without (n=20) learning disabilities were randomly assigned to one of two fluency practice variations or to a control group. Students in the treatments practiced reading aloud under repeated or continuous reading conditions with an adult listener in 15-min sessions, 3 days per week for 14 weeks. For students in the treatment conditions, growth curve analyses revealed significant differences in fluency and reading comprehension over students in the control group.

Tijms (2007) conducted two experiments to provide a window on the processes by which the accuracy and rate of reading develop during psycholinguistic treatment for Dyslexia. In the experiment, 1140 children with Dyslexia followed a treatment method that presented them with a learning system that clarifies the basic elements and operations by which one's writing system encodes the characteristics of the spoken language system. The results revealed that during the first half of treatment most progress was made on reading accuracy, which gradually transformed into a more prominent (or pronounced) improvement in the reading rate during the second half of treatment. Experiment 2 examined the reading of 46 individuals with Dyslexia after the termination of their treatment. It was shown that following mastering of the reading system the reading rate, as opposed to reading accuracy, continues to improve.

Dick, Kaplan & Crawford (2006) examined whether family history of reading disability influences the efficacy of reading remediation. A retrospective review of children's performance in a reading remediation program was carried out along with parental interviews for 102 families. Significant improvements were found in the areas of non word decoding, phonological awareness, and spelling following the reading remediation program.

Balasubramanian (2001) discussed how computer can best be used as an instructional medium in teaching reading to primary school children. CAI software
can be categorised under a variety of modes which includes drill and practice, tutorial, games, simulations and teacher utilities and concluded that CAI can result in a number of positive benefits when used for developing reading skill among children at the primary level.

Bains (2000) indicated that the remedial methods like Multisensory Structured Linguistic Method (MSLM) and Alphabetic Phonic Method (APM) brought improvement in reading of dyslexic children. He used control group experimental design and multistaged randomised sampling technique for his study. There were three groups – two experimental and one control group. Six subjects were randomly assigned to each of the three groups. Variables of intelligence and socio-economic status were taken as controls.18 reading disabled with age group of 7-9 years from middle socio-economic status (SES) with IQ of 90 and above were included in the final sample. Examination of the means of MSLM and APM indicated larger pre-post treatment differences in reading disability for the MSLM and this difference was significantly greater than the change for the APM group. Thus, there was a tendency for the MSLM to effect greater reduction in the reading disability than APM.

Bose (1996) studied the effectiveness of the remedial strategies using computer- based learning materials - cum- methods and traditional materials for overcoming specific learning disabilities. The sample of the study comprised of 60 LD children from 6 Delhi schools with computer facilities. The collected data were treated with non- parametric statistical methods. Findings show that the experimental group gained more than the control group in English by 7%. Also, the experimental group gained more than control group in maths by 5%. The gains made by the sub groups of the experimental group were noticeably more than those made by the control group.

Rana & Sinha (1996) aimed to see the effectiveness of mode of instruction (explicit and implicit) on free recall performance of LD and normal subjects (NS) under immediate and delayed recall conditions. Findings revealed that Learning Disabled showed inferior performance than normal subjects on memory performance. It has been observed that LD recalled less number of words organising the material
into different categories as compared to normal subjects when implicit mode of instruction were given. It was found that the learning disabled were not capable of using the organization strategy effectively which helped in memorisation.

Lovett (1994) compared two forms of word identification training to promote transfer of learning by dyslexic children. One programme taught phonological analysis and blending skills and provided direct instruction of letter-sound correspondence, the other taught the acquisition, use and monitoring of four met cognitive decoding strategies. Both approaches were associated with positive effects, transfer on several measures and generalized achievement.

Ferre & Ferre (1991) evaluated the effects of individualised social skills training sessions with rural elementary learning disabled students. Four third grade students with learning disabilities, poor interpersonal skills and low esteem participated in weekly individual social skills training. After five weeks, all students showed improvements in peer acceptance, social and general self-esteem and two to three students showed improvement in attention and academic self-esteem.

In a study involving First-letter Mnemonic Strategy, Nagel & Deshler (1986) indicated that LD students performed significantly better on both ability level and grade level material when the students were taught to memorise lists of information through a First-letter mnemonic strategy. Students used a wide variety of mnemonic devices on grade level tests; mnemonic devices consisted of both single-word mnemonics and sentence or phrase mnemonics.

Bhattacharya (1985) tried out a technological approach for alleviation of learning disabilities of the students in life science. Results of the study indicated that learning through audio-visual materials and techniques caused prolonged retention than by traditional methods.

**Conclusion**

Studies conducted in different parts of the world related to Learning Disabilities, Specific Learning Disabilities and Dyslexia have been reviewed by the Investigator. Results of the studies conducted by Jordan (1996) & Arya (1997)
revealed the existence of learning disabilities and impairments among pre-school children and the need for various strategies for compensating the learning disabilities. Michael (2010) indicated the importance and implementation of curriculum modifications for students with disabilities in general education settings. Simoncelli & Hinson (2010) detailed that the methodological and pedagogical side of the delivery of the online course was beneficial to the students with learning disabilities. The studies conducted by Erik (2010), Berninger and May (2011) and Bane et al. (2012) also revealed that research is needed to identify the prevailing specific learning disabilities and for developing remedial intervention strategies for such students.

Batson (2010) supported a multifactorial model of reading (DIAL) in the development of decoding and comprehension skills. Ryan (1989) indicated that the reading disabled could master computer literacy skills in the regular classroom environment. Also studies conducted by Boets et al. (2011), Dahle et al. (2011) and McBride et al. (2011) and Melby & Lervag (2012) supported the need for assessment and remedial intervention for Dyslexic children at primary level. These studies also highlighted the need to have a multisensory approach while teaching such students. Technology-rich environment can help the students to sustain their interest in reading and also their retention power. Multimedia Package can be used to present the content matter to Dyslexic students in a motivating and pleasing manner. The findings of various studies such as Bhattacharya (1985), Bose (1996) Balasubramanian (2001) Kast et al. (2011) and Passig (2011) showed better results in reading when media based interventions are applied to students having learning disabilities. All the above studies gave insight and awareness of the varied and different aspects of the problem under investigation. But studies concerning the preparation of Multimedia Package for Dyslexic students are rarely found. In this context the Investigator decided to develop a Remedial Package for such students.