CHAPTER III
CHAPTER III
REVIEW OF THE RELATED LITERATURE

The literature has been reviewed with regard to the efficacy of different remedial strategies to reduce reading disability and other related problems like spelling and writing of dyslexic children. The direct instructional interventions dominate the field in the remedial work with dyslexics. The remedial specialists have also developed their own favoured approaches. The literature surveyed has been classified under five major remedial strategies:

1. Multisensory Structured Linguistic method
2. Alphabetic Phonic method
3. Behaviour Modification method
4. Eclectic method or (combination of all methods)
5. Other interventions, which are not included in the above categories.

All these intervention strategies are further subdivided into different categories and their impact was reviewed on reading and comprehension, writing and spelling.

Pictorial form of the classification of review of related literature is represented in figure 3.1.
VARIOUS REMEDIAL STRATEGIES

Remedial Strategies

- MSLm = Multisensory Structured Linguistic Method
- Apm = Alphabetic Phonic Method
- BMm = Behaviour Modification Method
- ECM = Eclectic Method

FIGURE 3.1
Multisensory Structured Linguistic Method

Multisensory Structured Linguistic method include teaching phonology and syntax explicitly in a systematic step by step fashion, presenting small amounts of materials at one time, assuring complete mastery through repetition and using simultaneous auditory, visual and tactile/kinaesthetic procedures.

Impact of Multisensory Structured Linguistic Method on Reading

Shedd (1969) reported to have achieved a 2.77 grade score increase in nine months with 156 diagnosed dyslexics (grade IV to VIII) with three periods a week of special multisensory instructions.

Dyslexia Institute (1975) adopted multi-sensory methods at every step of a planned programme of structured language. They advocated that while teaching reading by Multisensory Structured Linguistic (MSL) method, children are also prepared for written language and spelling. A careful record of progress through the structure is maintained. Nothing is taken for granted, and recall is based only on what has been included in individual’s programme.

Hornsby and Shear (1976) in their highly structured programme of teaching reading, writing and spelling, followed step by step sequence which ensures that the pupil is at no point required to read or write any

83
spelling pattern or language structure which has not been specifically taught.

During four years covered in this study (1978-1981), 426 students, studying in grade III-VI were trained by the Multisensory Teaching Approach for Reading, Spelling and Handwriting (MTARSH). Out of these 426 students, 282 students were enrolled in remedial classes and 144 in non-remedial classes. No modification was made in the school wise evaluation procedure. In April of each year, California Achievement Test (CAT) was administered. Baseline mean score for remedial reading for grade III was 297.09, with means of 323.50, 307.69 and 343.79 corresponding for first, second and third year of instruction by the MTARSH program, respectively, $F(3,96)=3.52, p<.02$. CAT scores made after the third year of instruction by the MTARSH program were superior to baseline scores. Grade IV: the CAT baseline mean scores ranged from 318.17 to 329.25. None of the means were significantly different from each other. Grade V: The baseline mean score was 361.68 with 345.39, 382.21 and 399.74 being the means after one, two and three years of instruction by the MTARSH program. Grade VI: The baseline mean score was 361.68, with 368.08, 379.94, 391.32 and 414.85 being the means after one, two, three and four years of instruction by the MTARSH program respectively, $F(4,93)=41.6, p<.004$. The mean score
after four years program was significantly greater than the base line mean score. (Karen, Valarie, Samuel, 1987).

Recently, however, some evidence has been generated which supports the use of these techniques when teaching to read, spell and write their native language (Brightman, 1986; Frankiewicz, 1984; Guyer and Sabatino, 1989; Hutcheson, Selig and Young, 1990; Vickery, Reynolds and Cochran, 1987; White, 1986). Clark (1988) summarised that despite the widespread use of multisensory structured language technique and positive reports from practitioners that these techniques work, there has been little empirical data to validate their effectiveness.

Nevertheless, MSL instruction, which directly taught the phonological and syntactic structure of the foreign language, generally showed positive effects on the foreign language aptitude and native language phonological skills of the second cohort. The following findings are supportive of both theoretical speculation and empirical research showing that instruction which concentrates on the structure of language results in improvements of student’s performance (Demuth and Smith, 1987; Sparks and Ganschow, 1991, 1993a, in press; Sparks, Ganschow, and Javorsky, 1992; Sparks et al., 1992).

In the first empirical research on this topic, Sparks et al. (1992), reported that adapting Multisensory Structured Linguistic method for foreign language
instruction (Spanish) for at-risk learners resulted in significant improvement over one year of instruction on measures of foreign language aptitude, phonology, and other native language skills. Students who received instruction on sound/symbol correspondences in both English and Spanish showed even greater gains than students taught these relationships in Spanish only. At risk students who were taught Spanish using a traditional foreign language teaching method did not make similar gains.

Because of the dearth of literature on Multisensory-Structured-Linguistic method for at risk learners in both native (reading and writing) and foreign language instruction, there is a need for further research to substantiate the effectiveness of this teaching methodology.

Impact of Multisensory-Structured-Linguistic Method on Spelling and Writing

There is growing evidence that structured linguistic sequential teaching based on multisensory approach provides reading-disabled children with appropriate strategies for both decoding and spelling skills. (Enfield, 1976; White, 1986).

An experimental project employed the Multisensory Teaching Approach for Reading, Spelling and Handwriting (MTARSH) Programme for four years beginning in 1977 to 1981. The baseline mean score for Grade III was 299.08, and the
mean score after one, two and three years of instruction by the MTARSH program were 314.17, 312.65 and 360.39, respectively; \( F(3,86)=9.88, p<.00001 \). The means of Grade IV ranged from a baseline of 325.73 to 352.29; \( F(3,91)=1.62, p>.05 \). The baseline means score for Grade V was 351.88 and mean scores were 344.33, 383.88 and 398.93 after one, two and three years of instruction by the MTARSH programme respectively; \( F(3,90)=4.46, p<.0006 \). The baseline mean score of Grade VI was 378.64 and mean scores after one, two, three and four years instructions by the MTARSH programme were 398.77, 380.29, 382.32 and 415.25, respectively; \( F(4,65)=1.30, p>.05 \) (Karen, Valarie, Samuel, 1987).

There is also evidence that once students learn the structure of English spelling, and use this structure to analyse unfamiliar words, both reading and spelling improve.

**Alphabetic Phonic Method**

The Gillingham Stillman Method (Gillingham and Stillman, 1956) deriving from Orton’s (1966) theory, is based on linking letter combinations of phonemes and digraphs to the appropriate sound. It is phonic but completely multi-sensory.

**Impact of Alphabetic Phonic Method on Reading**

American Institute for Research (1970) reported that Alphabetic Phonetic Structured Linguistic method was very successful to improve reading disability of dyslexic
higher for the total group (t=10.60, p<.001) and all subgroups indicating improved reading performance.

**Impact of Alphabetic Phonic Method on Spelling**

Miles (1970) advocated phonic cues which are based on Alphabetic Phonic Method. The procedure takes the child through 15 stages, each tested by graduated dictation exercises, until all phonemes combinations and spellings are covered. It is highly successful approach for spelling. Brightman (1986) identified significant spelling gains among first, second and third grade students on the basis of pretest-posttest measures after at least one year of Alphabetic Phonic multisensory teaching.

Larsen and Hammill's Test of written spellings (1986) was used to study spelling performance of those students who were getting Alphabetic Phonic multisensory instructions. The sample used to norm the TWS-2 consisted of 3805 students six to eighteen years old. Total TWS-2 post-test scores were significantly higher than pretest levels for the total group (t=9.00, p<.001) and all subgroups. The greatest change in pretest-posttest scores occurred among elementary students (pretest = 74.9, posttest = 79.5).

Frankiewicz (1984) investigated the progress of 12-14 years old students in spelling. He found improvements after two and three years which appear to be attributable to
continuous alphabetic phonic instructions received in the programme.

Hooks et al. (1993) used an intensive phonic programme for 12 weeks within a resource classroom for eight learning disabled students (aged 13 years 3 months to 15 years 2 months). Results indicate that reading skills and word recognition increased for all subjects. Specific improvements were found for word attack skills, spelling, capitalization and punctuation.

**Behaviour Modification Method**

Behaviour modification has had a major effect on interventions in the area of L D. Early studies (Haring and Hauck, 1969; Zimmerman and Zimmerman, 1962) conducted with pupils who today would probably be considered learning disabled revealed that behavioural principles could be applied to matters of learning outside of the laboratory setting. More recently, researchers influenced by behavioural principles have conducted studies in each of the academic area.

**Impact of Behaviour Modification on Reading**

One of the most ubiquitous findings in the behaviour modification literature is that behaviour can be influenced by its consequences. Haring and Hauck (1969) examined changes in four elementary-age boys reading performance. They compared the boys' skills under baseline conditions to their performance when programmed reading
materials and token reinforcements were provided, the frequency of correct responding increased. Lahey (1971) used modeling technique to increase the use of objectives in reading.

Lahey, McNees and Brown (1973) evaluated the effects of simple reinforcement on the reading comprehension performance of two elementary-age pupils. Their single subject analysis indicated that the accuracy of answers to reading comprehension questions could be increased by providing praise and rewards for correct answering.

Fry (1973) examined the effects of token reinforcement programme on the reading ability of thirty, 7-12 years old children with retarded reading levels. Pre-and post-test measures included word recognition, accuracy and comprehension of prose reading and sight word vocabularies. Two groups were used, one which received re-inforcement and other no treatment. All the subjects were reassessed at a three months follow up evaluation. Results showed that the subjects in the reading programme made substantial gains (6 months in reading ages) on all measures while the control group made small gains on all measures. Results, are interpreted as supporting the validity of token reinforcement programs in educational settings.

Hart and Risley (1974) increased the use of phrases and compound sentences using behavioural techniques and
common teaching materials. Word, Penny and Rozynko, Vitali (1974) reviewed a case study of behaviour therapy of an eleven years old girl with reading problem caused by learned dysfunctional avoidance responses. Relaxation and desensitization techniques to reduce fear responses were employed. Concomitantly, the behaviour of the reading and of talking positively about reading were reinforced. In this case, by engaging in behaviour compatible with anxiety, the association or connection between the stimulus and the resulting fear was broken.

Lovitt and Hurlburt (1974) used behavioural procedures to study the effects of phonics instruction on the oral reading behaviour of two elementary age dyslexic boys. In both cases when phonic instruction was implemented, the boys had higher correct oral reading rates and lower error rates than they did under baseline conditions.

Collette et al. (1975) investigated two groups of six children (aged nine and ten year old) and were treated with behavioural therapy. The method involved positive reinforcement for correct responses during three phases of instruction: individual word phase, oral reading phase and silent reading and comprehension phase. Both dyslexic and non dyslexic students receiving the behavioural intervention significantly improved in reading achievement to approximately the same degree, and the dyslexic students
improved in several perceptual and attentional measures as well.

Lovitt and Hansen (1976) found that the reading performance of learning disabled boys could be substantially affected by making rapid progress contingent on performance (i.e., token or even social praise). They established a programme called 'contingent skipping and drilling' in which rapid, accurate reading and answering resulted in the opportunity to skip sections of the text but slow, inaccurate reading and answering resulted in required repetition and practice on materials. The skipping and drilling programme resulted in substantial improvement in the pupil's reading performance.

The Lovaas (1977) and Monterey (e.g., Gray & Ryan, 1973) language programme are among the most clearly behavioural language intervention programmes. They incorporated detailed control of re-inforcement schedules, small step sequencing of tasks and precise specification of teacher modeling behaviours. Evaluations of the Monterey language programme have revealed that they are effective.

Jenkin, Barksdale and Clinton (1978) found that contingent reinforcement led to improvement in the reading rate and comprehension of elementary age learning disabled boys and that the improvements transferred across settings and were maintained.
Malamuth (1979) evaluated a broad-based self-management programme using assorted materials, the students were shown how to direct themselves to scan materials during reading. Although conventional significance levels were not reached, Malamuth interpreted the results as indicating that pupils receiving the experimental programme performed better on reading tasks than those in a control group.

Rose and Sherry (1984), Rose (1985) used behaviour analysis procedures to examine the effects of previewing procedures on oral reading performance. He reported that listening procedure resulted in fewer oral reading errors for both elementary and secondary students.

Swanson (1981 a & b) examined the effects of self recording and re-inforcement techniques on the reading of elementary age, learning disabled pupils. In a series of these three studies, Swanson (1981 a) found that self recording and re-inforcement contingencies influenced oral reading accuracy, silent reading rate and comprehension question accuracy.

In contrast, Lloyd, Kneedler and Cameron (1982) reported that requiring learning disabled pupils to verbalize the strategy they were to use in reading words did not facilitate word reading accuracy.

Bereiter and Scardamalia (1989) used cognitively based intervention to remediate the reading disability of a
male of 3rd grade. The approach assumes that cognitive strategies of LD children represent adaptive solutions to immediate problems that confront them. It facilitate the student’s insight into his own learning and promote intentional learning.

Pavchinski, Peter, Evans, Joseph and Bostow, Darrel (1989) conducted a two part experiment in which a severely learning disabled 12 years old boy was treated for lack of reading and maths skills. Token re-inforcers were delivered for correct responses to a structured set of maths problems and sight words. Following implementations of a changing criterion experimental design in part I, the students achieved 90% correct responses level on maths and word recognition item after exhibiting an initial baseline of only 34% correct.

In part II of the study the procedures produced a 100% correct responses level in the items (multiplication, division) that were most difficult for the students following 3 weeks later indicating that students retained most of the knowledge gained from the treatment, showing that some learning disabled may effectively remediated using token reinforcement as motivational tools.

In his paper Stephen (1990) describe the psychotherapy of a severely dyslexic adult whom he saw in concurrent psychotherapy remediation. Subject was 33 year
old and evaluation found him to functioning only at the second grade level in reading, spelling and maths; he exhibited specific deficits in visual recall, visual motor integration and auditory recall. Most of his emotional problems, such as his lowered self esteem, depressed mood, temper out bursts, alcohol use and limited social life, were largely in reaction to his significant learning problems.

Shortly after evaluation, began twice weekly remediation in which he made excellent progress. Only three months after beginning the work, word recognition skills had risen from late second to middle fourth grade. He was highly motivated. Psychotherapy was terminated after two years. Finally, he had begun to formulate some positive goals and enrolled in a part-time diploma programme at public high school, where he earned a diploma in about three years.

**Impact of Behavioural Modification on Writing**

Handwriting problems have been extensively studied by behaviourally oriented special educators. The procedure they have used is based on differential reinforcement contingencies: When the student writes a target better, numeral or word correctly, provide reinforcement (praise); when the student writes an item incorrectly, require him or her to correct it. Six studies of this type of procedure or one very similar to it have repeatedly shown its effectiveness (Fauke, Burnett, Powers & Sulzer - Azaroff, 96

Behavioural approach has been effective only in parts. Results of the studies by Brigham et al. (1972), Maloney et al. (1975) show that reinforcing a certain aspect of writing results in improvement only in that aspect.

In the area of handwriting, it has been recommended that pupils learning to write should verbally guide themselves through stroke sequences as they form letters. Studies conducted by Robin, Armel and O’Leary (1975) and Hayes (1980) have shown that verbal self-guidance produces small, beneficial effects on handwriting.

Ballard and Glynn (1975) found that the combination of self-evaluation and self-reward had positive effects on the students writing.

Peer-editing and self-evaluation are techniques that have been found to be effective in teaching composition. Students in the peer-editing condition had higher scores on a post-test than students in a comparable condition in which the editing was done by teachers (Ballard & Glynn, 1975). Additionally, the Kausan group (Moran, Schumaker & Vetter, 1981) has incorporated self-evaluation in their writing programme for adolescents.

Harris and Graham (1985) used cognitive behaviour modification to improve the use of verbs, adverbs and
adjectives in the written composition of 6th grade learning disabled children.

According to Swarup and Sharma (1988), the cognitive-behavioural training will have a positive effect on syntax usage in the written expression of the learning disabled children. They conducted a study on 5 learning disabled children aged 10-14 years to improve their written syntactical deficiency by cognitive behavioural training. The post-test Syntax Quotion (SQ) scores increased by 17 points registering 22% improvement over the pre-test SQ scores. The t-value indicate a high level of significance (df4, p>.01) in the mean differences after a lapse of 8 days after treatment.

Eclectic Method

Eclectic means not following any one system, but selecting and using what all considered the best elements of all systems. A teacher may choose two or three approaches that provide broad-range remedial instruction i.e., instruction that can afford a basis for teaching almost any aspect of reading such as sight word recognition, word analysis skills, use of context clues, comprehension, fluency and so on. With these broad-range approaches as a base, the teacher may add two or three variations that are essentially supplementary methods to be used compatibly with one or more of the broad range approaches. Then if an approach seems to fail with a student, the teacher can
select another. If one part of the second approach seems ineffective, the teacher can delete that portion and use a compatible supplementary method to teach the skills needed.

**Impact of Eclectic Method on Reading**

Cotterell (1970 a) favours a writing approach to reading. She sees reading, writing and spelling as going alongside one another. She bases her methods of helping dyslexic children to learn the main structure of written language on Spalding’s (1957) 'writing road to reading' method.

Cotterell (1970 b) described Fernald method basically look-say-do method rather then Kinaesthetic. She considered this method useful alongside the Edith Norrie letter case.

Cashdan (1974) reported that Initial Teaching Alphabet Method (i.t.a.) would be successful with either phonic or look-and-say methods. It would improve reading and lead to much freer, and earlier writing on the part of the child.

Chomsky (1971) suggests that children who are unable to read, should be introduced to reading through writing as a first activity. Shedd (1969) and Hooton (1976) stressed the need to teach, right from the beginning, by the multisensory method utilizing the advantages of phonic, whole word and reading experience methods.
Cotterell (1976), Pollock (1976) and Sartin (1976) summerized the treatment given by specialist as providing motivation, re-teaching specific skills, giving practice in consolidating sight words, using multisensory methods, offering kinaesthetic practice and maintaining interest by using tapes and a variety of aids.

Clay (1977 b) noted that the ability to analyse words into sounds is a prerequisite to writing and thus a logical sequence in learning to read. Clay (1979 a) developed a Reading Recovery Programmes and trialled in Auckland, New Zealand. The Reading Recovery Approach is derived from an information processing model of reading behaviour. The child is not only taught sets of items (letters, words, sounds) but also taught how to carry out different kinds of operations on print. The goal is the development in children of self-motivated, self correcting reading strategies rather than the inert reception of information about reading and thus to do it. Research has demonstrated that reading disabled are not a homogeneous lot in their perceptual and processing skills (Wagner, 1986). A multidisciplinary approach is desirable for reading disabled, recognizing the fundamental importance of phonological processing abilities.

Mather (1992) reported that dyslexic children do need different special methods. She viewed that there is no single best method for teaching, reading. She suggested a
combination of methods that would help the dyslexic children to learn to read.

Because of the dearth of literature on Electric method (combined approaches) for learning disabled children, there is a need for further research to substantiate the effectiveness of this teaching methodology.

**IMPACT OF OTHER INTERVENTIONS ON READING LIKE COGNITIVE-PSYCHOLINGUISTIC INTERVENTION, MEDICINE, COMPUTER, MUSIC THERAPY**

**Cognitive-Psycholinguistic Interventions**

Cognitive-psycholinguistic interventions are closely associated with nativistic theories of language development. In practice it usually translates into recommendations for less structured, more developmental, student directed learning environments and programs.

**Impact of Cognitive-psycholinguistic Interventions on Reading**

Pascarella and Pflaum (1981) assessed the effects of two different programs designed to teach students to use context clues in reading. One of the programs was mostly teacher-directed and the other required greater student self-direction. The result of their analysis indicated that elementary pupils whose attributions for success emphasized internal factors benefited relatively more from the self-directed than from the teacher directed treatment. On the other hand, pupils with more external attributions for success benefited relatively more from the teacher directed treatment.
The Reading Assistance Tutorial Pack (R.A.T. Pack) is one psycholinguistic and social semiotic approach to literacy which was used in three catholic primary schools with grade 4 students near the University of Sydney in Australia. The university students acted as tutors for eight weeks during the R.A.T. Pack for three 20 minutes periods a week. At the end of the teaching sessions, the experimental and control children were retested on all earlier tests. Experimental group scored significantly higher than the control group on the comprehension subtests of the Neale Analysis of Reading Test ($t = 2.39; p<.05$) and sound discrimination was significant at the five percent level ($t = 2.09; p<.05$). A third subtest of the Stanford Diagnostic Reading Test - Blending almost reached significance ($t = 1.96; p>.05$) (Butler, 1989).

In 1989, a study was carried out with a class of 22 reading-disabled boys (10 and 11 years of age) in grade 5 at a suburb of Sydney, Australia. After four months the differences between the pre and post-tests result for both the control and experimental groups were examined. There was a significant difference between the groups means, with the experimental group showing greater gains ($t = 3.289, p<.01$). Eleven of the parents reported that their children had more confidence in reading and had improved comprehension. Nine of the parents reported improvement in
word attack skills and fluency and positive attitude towards reading. The students themselves all reported that the programs had helped and that they had enjoyed using it.

It is (R.A.T. Pack) currently being used in hospitals in Australia and United States with varying ages from 5 to 16 years old children having various reading problems. As a whole the program did effect a positive change when used in the home by parents as well as at the centres by tutors with minimal training (Butler, 1990).

Impact of Cognitive Psycholinguistic Interventions on Spelling

Bendall, Tollefson and Fine (1980) identified an aptitude by treatment interaction similar to the one reported by Pascarella and Pflaum (1981). Bendall et al. (1980) found that adolescent learning disabled males with relatively internal attributions learned more spelling words in a program which allowed them to study the words in any way they wished than in one in which their study methods prescribed for them. However, similar students with relatively external attributions for success learned more words in the high structure than in the low structure condition.

Impact of Medicine on Reading

Recent reviews of chemotherapy for the treatment of learning disabilities have emphasized that the perceptual and behavioral changes induced by drugs do not necessarily lead to improved academic performances (Aman, 1980, Werry,
But Piracetam has been studied in many neuropsychological paradigms and in many different populations. Although a definitive study to show a particular hemispheric effect of Piracetam has not yet been performed, there is a growing body of evidence showing a superiority of certain types of effects. In many of these studies, the measures that have been shown to be affected are those of vigilance, coding, short-term memory (verbal), naming and verbal learning.

Dimond and Brouwers (1976) used lateralized tasks in their studies of right-handed students. Sixteen healthy university students were given a verbal learning test consisting of a series of two-syllable words (matched for frequency, etc) presented on a memory drum. The students were given a daily dosage of 4.9 gms of Piracetam or placebo in a double-blind schedule. After one week of treatment, no significant difference was found between groups. After two weeks there was a major difference, with the Piracetam group showing significantly better performance ($p < 0.01$). When a delay was introduced (counting backward to avoid rehearsal), the Piracetam group’s performance did not deteriorate as much as the placebo group’s.

Wilsher (1978) tried to replicate Dimond’s study as normal university students. Using a dichotic listening procedure, fourteen university students were treated with
Piracetam (4.8 gm per day) or placebo in a double-blind crossover design consisting of 21 days' treatment. The students used, free recall of lists of words presented simultaneously to each ear. At the end of study, no drug-related ear effect could be found. Infact a small (non significant) right ear increase was found.

This study by Kunneke and Malan (1979) differs from the other studies mentioned here because these children had severe medical problems relating to their epilepsy. Piracetam -treated group (1.2 gm to 2.4 gm per day) showed only a small improvement in post-ictal recovery time, these children did experience beneficial effects upon their learning problems.

The original work of Simeon et al. (1980) was somewhat disappointing. Although the neuropsychologist had rated some children as improved, and the children with small verbal/performance IQ differences were rated as globally improved (p<0.05) there was no significant difference on the many neuropsychometric tests administered. Simeon et al. (1980) claimed that this may have been due to (a) the short-treatment period, (b) the small number of patients in each group, and (c) possible carry over effects in the crossover.

Wilsher and Milewski (1983) used the similarities and vocabulary subtests of the WISC-R to compare 30 dyslexic boys treated with Piracetam to an equal number treated with placebo. They found that in this short treatment verbal
conceptualizing ability (similarities) was enhanced by Piracetam whereas vocabulary (word definitions) was not. They interpreted this as evidence supporting Dimond and Brouwers (1976) contention that Piracetam improves verbal learning.

Rudel and Helfgott (1984) found that Piracetam both enhanced recall on the first trial and reduced the amount of forgetting on the delayed trial. This would clearly be beneficial to the dyslexic child, who not only has trouble remembering what has recently been learned but also forgets a great deal of verbal material with time.

Chase et al. (1984) demonstrated that placebo group had slowed down to improve accuracy, but the Piracetam group had increased in both speed and accuracy. The results of the reading test (Gilmore Oral Reading) showed a marked improvement in speed of reading ($p < 0.003$). They also found a significant decrease in spelling mistakes in the free writing samples ($p < 0.008$). They also found very highly significant results on both effective reading accuracy ($p < 0.001$) and effective reading comprehension ($p < 0.003$).

The data of Dilanni et al. (1985) allowed a much bigger sample ($n = 257$). A covariance analysis showed a significant drug-induced increase in speed of reading ($P = 0.04$, Gilmore Oral Reading Test) but no change in reading accuracy. Another finding of Dilanni et al. (1985) was a
trend (p< 0.10) in favour of Piracetam for short term memory (STM) recall on digit span (WISC-R). Upon further scrutiny it was found that there was a relationship between baseline scores on digit span and drug-induced improvement. This showed that dyslexics with poor STM recall on the Digit span (-ISD and below) made significant gains in memory due to Piracetam (t = 2.05, p.<0.02).

The results of the second large-scale collaborative study involving 225 dyslexic children and using a 36 week double-blind design were reported at the 36th Annual Conference of the Orton Dyslexia Society in Chicago (1985).

Many studies have been performed on Piracetam, the first of the "Nootropic" agents. The results of these studies are certainly encouraging, demonstrating a degree of concordance that suggests that Piracetam favorably affects the reading ability of dyslexic children. However, no therapy offers a panacea and any real amelioration of dyslexic symptoms must rely upon a combination of effective treatment.

**IMPACT OF COMPUTER BASED STRATEGY ON READING**

There has been a considerable interest over the last ten years in the use of computer speech synthesis systems to aid reading. Most studies of speech synthesis for reading have addressed the use of this technology to
help people developing reading skills (Hillinger, 1992; Olson and Wise, 1987; Wise et al., 1989).

Other studies have used computer speech synthesizer to provide pronunciation of requested or selected words and sentence structures to aid reading (Leong, 1992; Wise and Olson, 1992). These studies show that speech synthesis technology can serve as a helpful remedial reading tool in building reading skills.

Cohen et al. (1989) conducted a pilot study in which the Kurzweil Personal Reader (KPR), a computer reader developed for people with impaired vision, was used by a group of three dyslexic students to read assigned and personally selected literature. She observed improvements in reading comprehension test scores when the (KPR) was being used and gains in unaided reading test scores after several months use of the (KPR).

Elkind et al. (1992) used Bookwise systems for class II and class I and compared the progress during each semester of the class using Bookwise with that of the class not using Bookwise. Each class devoted an hour each day to reading and discussing literature. Each student in the Bookwise class used the system for approximately half of this reading period (30 minutes), four days a week during an entire semester, and accumulated about 20 to 25 hours of experience with the system during the semester. Students in the other class spent this period reading, discussing and
answering questions about their reading as they would normally. Both classes read many of the same books. The average improvement was 1.2 grade level equivalent and is statistically significant (p< .0001). More than 70 percent of the students showed gains of at least one grade level; more than half of these, about 40 percent of the students, showed gains of more than two grade levels, and a small number of students, 11 percent, gained 3 to as much as 5 grade levels. All students did not benefit from the use of the system: 14 percent showed no improvement, another 14 percent actually had poorer comprehension scores when they used the system.

Impact of Music Therapy on Reading

Roskam (1979) tested the effectiveness of music activities designed to expand auditory perception and improve language skills in 36 learning disabled children. Students were divided into three groups that were treated by prescriptive music therapy, language development activities, or a combination of both. The music therapy group showed the greatest mean difference between pre- and post-test scores, but ANOVA showed no statistical differences among the three groups. Investigator did not come across with more such studies on reading, writing and spelling.