CHAPTER - IV

4.1 Introduction

The method used in solving a scholarly problem is of utmost importance. An approach is axiomatic and a method is procedural. It is the testing of the hypotheses that is meant by methods of research. Accordingly scientific method implies an objective, logical, and systematic method. A scientific method is free from personal bias or prejudice. It is a method to ascertain demonstrable qualities of a phenomenon capable of being verified, and a method wherein investigation proceeds in an orderly manner. Research method consider the logic behind the methods and explain why it has been used in a particular method or technique, what data have been collected and what particular technique of analyzing data has been used and a host of similar other questions are usually answered in research methodology concerning a research problem or a study.

This chapter deals with the methodology followed in this study. It comprises of identification of ADHD, construction of Reading, Writing and Spelling Difficulties Diagnostic Tests, establishing reliability and validity of the diagnostic tests, procedure, to identify ADHD children with learning difficulties, development of instructional strategies like cognitive, metacognitive and behavioural approaches to overcome ADHD behaviour which in turn overcomes reading, writing and spelling difficulties in children, construction of achievement test, sampling techniques, data collection and statistical techniques used in the study.

In any mode of scientific research the researcher has to select appropriate methods to achieve the objectives. According to Lewin (1952) “although it appears to be possible to study certain problems of the society in an experimentally created smaller laboratory groups, we shall have to develop research technique that will permit us to do real experiments within existing ‘natural’ social groups”. Greenwood (1973) suggests that an experiment is the proof of a hypothesis which seeks to help up develop an insight into a casual relationship through the study of contrasting situations which have been controlled on all factors except that one of the interest the latter being either the hypothetical case or the hypothetical effect.
In any research work, depending upon the nature and purpose of the study, one has to select the method or combination of different methods that are to be used for collection of required data. In this study, one of the prime objectives is to identify children with ADHD behaviour. For this the investigator had to gather data from the primary school class teachers, the concerned parents of the children with ADHD behaviour and the peer group of that particular ADHD children. For this purpose, the investigator used case study method and this case study approach facilitated her to gather more qualitative information on every child with ADHD behaviours. Such information plays a vital role in the development of a cognitive, metacognitive and behaviour modification approaches in such a way that it facilitates the child’s intrinsic and extrinsic motivation to overcome the specific learning difficulties as well as ADHD behaviour.

In the next stage, to see the effectiveness of cognitive, metacognitive and behaviour approaches to overcome ADHD behaviour as well as to reduce specific learning difficulties in ADHD children, an achievement test was constructed for conducting pre-test and post-test. The scores of ADHD children with SLD in pre-test and post-test were collected and recorded for a scientific analysis.

4.2 Construction of the Research Tools

Any scientific investigation requires data gathering tools or techniques which may vary in their complexity, design, administration and interpretation. Each tool is selected appropriate for the collection of certain types of information. Depending upon the nature and purpose of the study, the investigator has to select the type of tool required for the investigation.

4.2.1 Procedure adopted for Identifying of Children with ADHD

One of the major objectives of the study is identification of children with ADHD behaviour in standard IV and V. For this purpose, at the first stage, the investigator discussed with class teacher about the ADHD behaviour that children are exhibiting.

4.2.1.1. Development of Rating Scale to Identify Children with ADHD

To develop the rating scale to be given to teachers to study ADHD behaviour
among IV and V standard primary school children, the investigator had to prepare the statement related to ADHD behaviour of the children inside and outside classrooms. For this the investigator made a thorough review of literature, consulted special education experts and examined the statements already used in western as well as Indian context. Thus a draft pool of statements was developed. These items were given to some subject experts and special education teachers with a request to out point ambiguity, repetitions and inaccuracies, if any. Further, the experts were asked to group these items under three major headings – inattention, hyperactivity and Impulsivity. Based on their suggestions all statements were edited, reviewed and arranged under these three headings.

In its final edited form, the rating scale to identify ADHD behaviour among IV and V standard of primary school children consisted of 26 statements (10 for inattention, 09 for hyperactivity, and 07 for impulsivity). Against each statement three ratings were given namely ‘Always’ ‘Frequently’ and ‘Sometimes’ having the scores 3, 2 and 1 respectively. Information pertaining to gender, age, community, and location of residence, birth order, nature of family, parental occupation, monthly parental income and mode of stay were also collected through this rating scale. The Rating scale developed by the investigator to identify the ADHD behaviour among primary school children is given in Appendix – I.

4.2.2. Identifying SLD in Children with ADHD

Another major objective of the study is identification of specific learning difficulties in children with ADHD. For this purpose, it is necessary to appraise their current skills and knowledge. The starting point of any literacy intervention should be based on the result on some form of assessment of the child’s current abilities. Such an assessment need not involve the use of highly sophisticated tests and lengthy procedure, but the assessment should give reliable and valid information.

Assessment leads to diagnose the learning difficulties in English especially reading, writing and spelling. For this purpose, at the first stage, the investigator discussed with class teacher about the child, his past and current level of performance, his strengths and weaknesses in order to identify the SLD in ADHD Children. Proper assessment of the specific learning disabled child is very important, because it must be
relevant to the goals and objectives, the teaching methods, and the kind of help the
child will receive. Generally identifying SLD in ADHD Children falls into two groups.
formal and informal. Formal tests are generally of three kinds (1) General intelligent
and aptitude test, (2) General achievement tests and, (3) Personality test. The most
frequently used informal procedures are observations, interviews, questionnaires and
tests. And this information is vital to develop diagnostic test to identify the SLD in
children with ADHD behaviour.

4.2.2.1. Development of Reading Difficulties Diagnostic Test

The diagnostic test is to determine the nature and extent of the reading
difficulties in children with ADHD. In order to do this, it is important that the
investigator should be clear about the nature of the reading process and the way in
which proficient readers read. Many theories and assumptions about reading influence
the investigator’s perception of the reader’s difficulties. Researchers have found out
that there are three stages of reading called logographic stage, where words are
identified by distinguishing visual features; the alphabetic stage based on phoneme
awareness where the letter- sound system is mastered; and the orthographic stage which
is based on visual analysis and is independent of sounds (Snowling, 1985) these three
stages come under two routes of reading namely phonological and visual. The
phonological route corresponds to Frith’s alphabetic stage and the visual route
corresponds to the Orthographic stage. Based on these two routes, the investigator
constructed the Diagnostic Test in Reading. The Reading Difficulties Diagnostic Test
(RDDT) covers the following components.

- Word attack (Auditory visual Association).
- Analogues (Auditory Sequence).
- Sound Identification (Auditory Discrimination).
- Word Recognition (Visual Motor Difficulties).
- Oral Reading (Auditory Visual).
- Complete the Rhyming Words (Visual Motor Difficulties).
- Word Analysis and Synthesis Comprehension (Perceptual Sensory Information).
- Segregate the Sounds (Auditory Segmentation)
- Cloze test (Perceptual Sensory Information)
In order to obtain specific information about the learner’s current states in reading aspects such as – phonic knowledge, word recognition and comprehension, the phonic awareness, visual discrimination and short term auditory memory were assessed. The test items were developed keeping the above said components of reading difficulties. The developed reading difficulties diagnostic test items were given to the English teachers working at schools and collegiate level, with a request to review the items about their suitability to identify the particular aspect of reading difficulty. Based on their comments, certain items were reworded and certain items were deleted or incorporated. At this stage, the test comprised 50 objective type questions such as; multiple choice, fill in the blanks, choose the correct answer etc. Each question carries one mark. For each correct answer ‘one’ mark is awarded and for each wrong answer ‘zero’ is given. The Reading Difficulties Diagnostic Test and its scoring key are given in Appendix - IV and IV (a) respectively.

4.2.2.2. Development of Writing Difficulties Diagnostic Test

From the first stumbling copying of the child’s name to the following style of the adult, there is a gradual development of automaticity. Luria (1973) has described the development of the precise skill as a functional development of various parts of the brain. He refers to the kinetic melody of handwriting as the functional integration of hand, the sensory and motor parts of the brain controlling movements, the eye and visual cortex, the language areas and the association areas and the frontal cortex, the thinking part. Though handwriting needs all the senses as mentioned above, writing is chiefly based on motor skills such as; fine motor skill, gross motor skill, laterality directionality etc. The Writing Difficulties Diagnostic Test covers the following components.

i) Letter Formation

ii) Letter Slope

iii) Letter Size

iv) Letter Spacing

v) Word Spacing

vi) Letter Word Alignment and

vii) Letter Joining
The test items were developed keeping the above said components of writing difficulties in mind. The developed test items were given to the English teachers working at school and collegiate levels with a request to review the items about their suitability to identify the particular aspect of difficulty in writing. Based on their comments, certain items are modified, recorded, deleted and incorporated. The test score is 50 and each question carries one mark. For every correct answer one mark is given and for every wrong answer zero is given. The Writing Difficulties Diagnostic Test and its Scoring Key are given in Appendix – V and V (a) respectively.

4.2.2.3. Development of Spelling Difficulties Diagnostic Test

Spelling error analysis is a way of analyzing students’ spelling in order to identify the student’s strengths and weaknesses which is the process of diagnostic dictation at the appropriate level for the student is more likely to reveal the extent and pattern of the student’s difficulties in spelling. Spelling errors are classified as logical phonetic alternatives, which follow English spelling convention, visual sequential errors which are usually two letters out in order. These errors are to do with visual rather than auditory memory. Rule based errors show lack of awareness of spelling rules or phonetic alternatives; sounds missing; misheard or missequenced can be very disordered and motor errors may take the form of handwriting errors, repetitions or omission of letters. Based on this analysis the diagnostic test in spelling was constructed. The components such as visual memory, visual discrimination, visual sequence, visual verbal association, visual perception, auditory memory, auditory discrimination and auditory perception play a vital role in diagnosing a student's difficulties in spelling. The Spelling Difficulties Diagnostic Test in English covers the following components.

- Circle the correct spelling (Visual Verbal Association)
- Word Recognition (Visual Discrimination)
- Plurals and Syllabification (Visual Memory Motor Co-ordination)
- Track the following words (Visual Sequence)
- Add prefix and suffix to the roots. (Perceptual discrimination)
- Spell and match the syllables (Auditory Perception)
- Finding words by using the clues given (Visual Perception)

- Dictation based on the spelling rules ‘e’ silent, ‘kn’ silent ‘ught’ sounding as ‘t’ doubling final consonants, irregular words, etc (Auditory Visual Memory).

The test items were developed keeping the above said components of spelling disabilities. The developed test items were then given to the English teachers working at school and collegiate levels with a request to review the items about their suitability to identify the particular aspect of difficulty in spelling. Based on their comments, some of the test items were modified, deleted or incorporated. Multiple choice, match the following and fill in the blanks were the patterns of test items. The test score is 50 and each answer carries ‘one’ mark. For every correct answer ‘one’ mark is awarded and for wrong answer ‘zero’ is given. The spelling Difficulties Diagnostic Test and its Scoring key are given in Appendix VI and VI (a) respectively.

4.2.3 Development of Rating Scale to Assess the Parental Practices of Children with ADHD

To develop the rating scale to be given to parents to identify the parental practices of children with ADHD behaviour, the investigator developed statements pertaining to parental practices by reviewing the literature and consulting child development personnels and special education personnels working at university and field levels. Based on the suggestions of subject experts, 32 accurate and unambiguous statements were framed to represent the parental practices of children with ADHD behaviour. These statements were arranged under three subdivisions namely; child parent interpersonal relationship, parent interpersonal relationship and parent child medication. Against each statement, two ratings have been given namely, ‘always’ and ‘sometimes’ having scores 2 and 1 for each of the 10 positive statements and 1 and 2 for each of the 13 negative statements. For the remaining 9 statements, two ratings have been given namely, ‘yes’ and ‘no’ having score 2 and 1.

A copy of the Tamil and English version of the rating scale to study the parental practices of the children with ADHD behaviour is given in Appendix – II and II(a) respectively.
4.2.4 Development of the Rating Scale to Identify the Peer Group Association of Children with ADHD

One of the objectives of the study is to identify the peer group association of children with ADHD behaviour. For this, the investigator developed a checklist. To develop the checklist, the investigator made a thorough review of literature and studies conducted in similar situations, consulted the experts in education, special education and psychology. A list of 24 statements that represent the peer group association of students with ADHD behaviour was thus prepared after verification with experts for their accuracy, unambiguousness and correctness. Against each statement ‘yes’ or ‘no’ were given with 2 and 1 as scores respectively to know the children peer group influence. A copy of the list check to identify peer group influence of ADHD behaviour of primary school students is given in the Appendix-III.

4.2.5 Reliability of the Tools Used

The test reliability means the consistency with which a set of test scores measures what they do measure. It relates to the accuracy with which skills and knowledge are measured (Slavin, 1987). Reliability is a necessary condition for validity. Reliability co-efficient provides the most revealing statistical index of validity that is ordinarily available. There are different methods to estimate the reliability of a test. Some of the commonly used methods are: Test – retest reliability, Split half reliability, Alternative or Parallel form reliability and Kuder – Richardson Estimates. In the present study, the split half method is used to estimate the reliability of the tools used. The split – half method is considered to be one of the best methods for measuring reliability because all the data for computing reliability are obtained by one testing. Also, the variations likely to be brought about by difference between the two testing situations are eliminated. In this method, the whole test is divided into two equivalent halves by pooling the odd numbered and even numbered items. The correlation was calculated between these two halves. From the half test correlation, the self – correlation of the whole test was worked out by using spearman – Brown’s prophecy formula.
i) Reliability of the Rating Scale to Identify the ADHD Behaviour in Children

The reliability of the Rating Scale to identify ADHD behaviour among children was established by administering the scale to a random sample of 5 teachers who are dealing with the children with ADHD behaviour. Similarly, rating scale was administered to a random sample of 10 parents with ADHD children. Likewise, the reliability of the rating scale was assessed from the researcher’s point of view. The obtained reliability of the tools used in the study was as follows:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Tool</th>
<th>Half test reliability</th>
<th>Whole test reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Rating scale to identify ADHD behaviour in children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Teacher Point of View</td>
<td>0.97</td>
<td>0.98</td>
</tr>
<tr>
<td>b)</td>
<td>Parents Point of View</td>
<td>0.84</td>
<td>0.91</td>
</tr>
<tr>
<td>c)</td>
<td>Researchers Point of View</td>
<td>0.81</td>
<td>0.89</td>
</tr>
<tr>
<td>ii</td>
<td>Diagnostic test to identify</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Reading difficulties</td>
<td>0.88</td>
<td>0.93</td>
</tr>
<tr>
<td>b)</td>
<td>Writing difficulties</td>
<td>0.84</td>
<td>0.91</td>
</tr>
<tr>
<td>c)</td>
<td>Spelling difficulties</td>
<td>0.92</td>
<td>0.95</td>
</tr>
<tr>
<td>iii</td>
<td>Rating scale to assess the Parental Practices of children with ADHD</td>
<td>0.76</td>
<td>0.86</td>
</tr>
<tr>
<td>iv</td>
<td>Check list to identify the Peer Group Association</td>
<td>0.85</td>
<td>0.92</td>
</tr>
</tbody>
</table>

The reliability values of the rating scales used in the study were high (Rating Scale to study ADHD behaviour in Teacher point of view = 0.98, Parent point of view 0.91 and Researchers point of view = 0.89). Similarly, the reliability values of reading, writing and spelling difficulties diagnostic tests (0.93, 0.91 and 0.95) are high. Likewise, the reliability values of the rating scale to assess parental practices (0.86) and check list to identify the peer group association (0.92) are also high indicating their suitability for the study.

4.2.6 Validity of the Tools Used

A research tool is said to be valid when it measures what it purports to measure. Any research tool should possess validity. Validity indicates how adequately the
content of the test is sampling that domain about which interference is to be made. The rating scales and checklists developed by the investigator possess content validity, face validity, and intrinsic validity.

**Content Validity:** It shows how adequate is the content of a test sampling about each reference to be made. As already mentioned, the statements for the rating scales developed by the investigator to study the ADHD behaviour in children, diagnostic tests developed by the investigator to find out the specific learning difficulties in i) reading ii) writing iii) spelling iv) rating scales to access the parental practices and checklist to identify the peer group association on ADHD behaviour in children were framed after thorough review of literature related to the area. A logical examination of statement in the rating scales and checklist was done by a panel of experts. The panel consisted of one Professor in education, one Professor from psychology department and four noteworthy principals of Chennai educational district in addition to teachers serving in the school where the experiment was carried out. Their suggestions were incorporated to enhance the content and quality of the statements. In view of the changes made in language, content, coverage, format of the items etc, it can be said that the rating scales, diagnostic tests and the checklist used in this study possess content validity.

**Face Validity:** Face validity refers to the way the tool looks to the examiners, test administrators, educators and the like. The investigator assumed that, by the opinion of the experts who are familiar with the tool development, the rating scales, diagnostic tests and the checklist used in this study have face validity.

**Intrinsic Validity:** Intrinsic validity is nothing but the square root proportion of true values (Square root of its reliability) The coefficient of intrinsic validity of the tools used in this study are as follows

i) Rating scale to identify children with ADHD behaviour-
   a) Teacher Point of view $\sqrt{0.98} = 0.99$
   b) Parents point of view $\sqrt{0.91} = 0.95$
   c) Researchers point of view $\sqrt{0.89} = 0.94$
ii) Diagnostic test to identify the

   a) Reading difficulties in children with ADHD behavior. √0.93 = 0.96
   b) Writing difficulties in children with ADHD behaviour. √0.91 = 0.95
   c) Spelling difficulties in children with ADHD behaviour. √0.95 = 0.97

iii) Rating Scale to assess the Parental practices of children with ADHD behaviour.
        √0.86 = 0.93

iv) Checklist to assess peer group association of children with ADHD behaviour.
        √0.92 = 0.96

The co-efficient of the intrinsic validities of the rating scales, diagnostic tests and the checklists are rather high indicating the validity of the tools used in the study.

4.3. Development of Cognitive, Metacognitive and Behavioural Approaches to Overcome Specific Learning Difficulties in ADHD Children

The major objective of the study is to develop cognitive, metacognitive and behavioural approaches to reduce ADHD behaviour which in turn to overcome specific learning disabilities in children. As stated earlier, the discussions with the primary school teachers, concerned parents, peer group and by direct observation, the rating scale was developed to identify children with ADHD, diagnostic tests were developed to identify children with reading, writing and spelling difficulties.

In the past, many researchers have done studies to increase the children’s attention span, control impulsivity, decrease distractibility and activity motor and improve visual - motor integration. Researchers like Barkley (1998), and Rappley et al., (2004) used cognitive, metacognitive and behavioural approaches to overcome specific learning difficulties in children. Though medication, through its action on the neurotransmitters improves the child’s attention and scholastic performance reduces the hyperactivity and impulsivity. Infact, the cognitive metacognitive and behavioural approaches can be effectively used for primary school children as the age group is only 9 to 10 years, and the human mind at this stage is susceptible for change. There are so many activities considered to be interesting for children. But, all activities do not possess cognitive, metacognitive and behavioural approaches fully. Keeping this in mind, the investigator once again discussed with the concerned primary school teachers, parents, psychologists and special education field experts. In the discussion
with parents, primary school teachers, psychologists and special educational field experts, the investigator put forward the idea of generating the cognitive, metacognitive and behavioural approach awareness in children. For this purpose the investigator first tested out the characteristics of children with ADHD and these are presented below.

Clinical Characteristics - inattention, impulsivity and hyperactivity.

Associated Characteristic of ADHD - intellectual Impairment, academic problems, deficit cognitive executive functioning and social and conduct problems.

ADHD and Co-occurring Disorder - learning difficulties, oppositional defiant disorder, conduct disorder and aggression.

A classic look at the above presentation indicates an overlap of the characteristic of children with ADHD, with ODD and CD. In this study, as the children identified with ADHD exhibit the other two disorders (ODD and CD), there was no need to develop separate strategies, for each disorder. On the whole single strategy like cognitive, metacognitive and behavioural approach has been developed with a proper mix to overcome ADHD behaviour among children.

Comprehensive Intervention Strategy – Cognitive, Metacognitive and Behavioural Approaches Used in the Study

If the primary goal of treatment is to optimize the probability of decreasing rates of ADHD, then treatment approaches must have the flexibility to attend to the multiple known determinants of ADHD while enhancing protective factors. That is, effective treatment must have the capacity to intervene comprehensively at individual, family, peer, school and possibly even neighbourhood levels.

The aforesaid discussion clearly reveals the need for comprehensive interventional strategies like cognitive, metacognitive and behavioural approaches to overcome ADHD in children. This strategy was applied to the individuals with ADHD, the parents of children with ADHD and the peer group association. At every level, attempts were made to strengthen certain existing situations and weaken or separate existing situation or incidents in order to make the children to overcome his/her ADHD so as to decrease the specific learning difficulties.

Initial strategies used were meant to identify the strengths and weaknesses of the children, the family and their transactions with extra familial systems (eg. peers and
school). At the family level, parents display high rate of conflict and low level of affection. Similarly, parents (mothers) become negative, quarrelsome and unrewarding. Broader indices of family malfunctioning are also associated with ADHD. Excessive parenting stress, lowered sense of parenting competence, increased alcohol use, increase marital conflict are the resultant problems especially when the child is associated with ADHD. Family intervention in this study attempted to provide the parent (s) with the resources needed for effective parenting and for developing increased family structure and cohesion. Such intervention includes introducing systematic monitoring, reward and parent training. Since ADHD involves a deficit in self-regulation and frequently oppositional defiant behavior, the parent-training programmes / intervention can result in improvement of children’s functioning of self-esteem with regard to parenting.

At peer level, School based behavioural intervention programmes are effective in producing improvement with regard to attention disruptive behaviour, and academic performance. At school level, the teacher administered the school based behaviour intervention programmes which were effective in producing improvement with regard to attention, disruptive behaviour and academic performance. Generally, the school-based interventions include token reinforcement, punishment and contingency contracting. In the last procedures the child and the teacher sign a written agreement specifying how the child will behave and the contingencies that will accrue. Teachers are given training and consultation to conduct these programmes. In furtherance, parents and teachers can work together to improve the child’s behaviour in the classroom.

Interventions aiming at cognitive-behavioural treatment have also been successful. They focus on enhancing self control and self regulation, which would seem a natural target in treating ADHD. Self control can also increase generalization and maintenance of appropriate behaviour. Several techniques have been employed to enhance self-regulation. Some of them are self monitoring ,self instruction, self statement, and self- guidance. Social skill training is another cognitive behavioural intervention. It is highly effective, when it is combined with intensive behaviour treatments. Self control and self analysis were given due importance through activities such as yoga, meditation and modelling. Individual counselling sessions conducted at
the school level not only helped the children with ADHD behaviour to identify their specific learning difficulties but also to find means and ends to find measures to rectify them by observation and limitation techniques.

**Description of Comprehensive Intervention Strategy (Cognitive, Metacognitive and Behavioural approaches) Used in the Study**

i) Parent Level

ii) School Level

iii) Peer group level

**a) Parent Level:** The goal of parent training is to teach parent how to attend to and, provide positive reinforcement for control of ADHD behaviour and how to provide consequences for ADHD behaviour in the context of a warm and caring family environment.

Forehand et al., (1984) reports on a large number of outcome studies in the literature. They stress maintenance of positive change over a period of time, the change often generalizing to other areas such as sibling behaviour. Subsequently, parent training has been frequently employed as part of multifaceted approach treatment. Parent training modes have been applied to a wide variety of childhood behaviour problems. Social learning / behavioural perspective has contributed much to parent training procedures, in term of systematic applications and research.

Parents usually were taught how to define observe and record behaviour at the beginning of treatment because once behaviours (eg., Has difficulty is sustaining attention, leaves seat appropriately) are defined concretely, reinforcement and punishment techniques can be applied. The investigator detailed the concepts and procedures derived from positive reinforcement (eg., contingent delivery of attention praise, points) and punishment (eg. time out and loss of privileges). Reinforcement for ADHD behaviour is central to any treatment eg. self regulation. Parents were taught how to use reinforcement and punishment techniques contingent on the ADHD behaviour, to provide consequences consistently, to attend to appropriate behaviours and to ignore inappropriate behaviours, to apply skills in curing prompting, shaping and fading and to use these techniques to manage future problems. There was an extensive amount of practice and shaping of parent behavior within the sessions to develop skills
in carrying out the procedures. As the immediate goal of PMT is to develop parenting skills, the investigator began by having parents apply new skills to relatively simple problems (eg. sustained attention knocking over the objects, disorganized and lacking in goals). As parents became proficient in using the initial techniques, the child’s most serious problem behavior at home and in school were addressed (eg. acting without thinking, intellectual impairment academic problems, cognitive deficits, social and conduct problems). The investigator maintained close telephone contact with the parents in-between session’s follow-ups were done through parent-teacher meetings. Parent-Teacher Associations were used to strengthen the effectiveness of such programmes. There contacts were used to encourage parents to ask questions about the home programs, to provide an opportunity for the investigator to prompt compliance with the behavior change programs and reinforce parent’s use of the skills, to strengthen the rapport with the parents, and to allow the investigator to problem-solve when programs were not modifying children behaviour effectively.

**Social Learning Techniques**

The parent-child interactions were modified in ways that were designed to promote social behaviour and to decrease ADHD behaviour. In this, a standard package of videotaped programmes of modelled parenting skills has been developed. The package contained 10 vignettes of about two minutes each, including examples of parents interacting with their children’s in both appropriate and inappropriate ways. They are shown to group of parents with ADHD children and also given home work assignment that allows them to practice parenting skills at home with their children. Then researcher found this programme is very successful in reducing the ADHD behavior in children and the parents to be found to have developed better parenting skills. Further, these improvement were maintained at the follow up evaluations over many years.

**b) School level:** School based behavioral intervention programmes are effective in producing improvement with regards to attention, disruptive behavior, and academic performance. Generally, the teacher administers the school-based interventions. The procedure includes token reinforcement, punishment and contingency contracting. In the last procedure, the child and the teacher sign a written agreement specifying how the child will behave and the contingencies that will accure. Teachers are given training
Interventions aiming at cognitive behavior treatment have also been successful. They focus on enhancing self-control and self-regulation, which would seem a natural target in treating ADHD. Self-control can also increases generalization and maintenance of appropriate behaviour. Several techniques have been employed to enhance self-regulation. Some of them are self-monitoring, self-instruction, self-statement and self-guidance. Social-skill training is another cognitive-behavioural intervention. It is highly effective when it is combined with intensive behaviour treatments.

c) Peer Group Level: Problems in peer relations are often reported in ADHD children in general population. Problems with peers are one of the most frequently mentioned problems in referrals to mental health centres. Problems in social relationship are also part of the diagnostic criteria for a wide variety of disorders such as ADHD, autism and conduct disorder. On the otherhand, successful peer relations may help to ensure the development of social competence in the face of multiple adverse factors. They may thereby serve a preventive function and reduce the likehood of disorder (Cicchetti, Toth and Bush, 1998). Therefore, the treatment of problems in peer relation is gaining momentum in recent times.

Many programmes have been designed to improve the social skills and in peer relations of children. The studies on such programmes reveal that the interventions to improve children’s social competencies concentrate on the development of specific social skills and / or the cognitive process presumed to underlie the peer difficulties. Molecular approaches emphasize the training of discrete skills such as eye contact, responding positively to peers, and initiating interaction. Molar approaches focus on training skills such as participation in group activities, co-operation and sharing based on situation. On the other hand, social cognitive approaches stress straining in social problem solving, taking another’s perspective, self-control and the like. Many interventions have been successful in producing long-term effects and generalization across time and setting. Such interventions have concentrated on reinforcing increase peer interaction (Allen et al., 1964 and walker etc., 1979), imitation, coaching and instruction (e.g. exposure to filmed models) (O'Connor, 1972) and the use of peers in treatment.
Much of the research on interventions has occurred in a school context. Inclusion of teachers in intervention planning is important because of their potential role in monitoring peer behaviours and providing appropriate consequences. Teachers can also provide interventions such as peer pairing or co-operative group assignments that have the potential to foster the social skill of a child. (La Greca, 1993), Parents too play an important role in ADHD children relation development. For instance, they arrange opportunities for peer interactions, monitor and supervise peer contacts. Such type of multi componential interventional strategy brings positive peer interaction which in true reduces the ADHD behaviour.

4.4 Remedial Instructional Strategies to Overcome SLD in ADHD Children

The cognitive, Metacognitive and Behavioural approaches used at school level, parental level and peer group level facilitate the children to overcome ADHD behaviours. Such children are to be trained to overcome their specific learning difficulties such as reading, writing and spelling. Keeping in mind the nature of the specific learning difficulties, the investigator developed the remedial instructional strategies. The learning difficulty children need highly skilled and personal teaching. There is a great need for children’s learning difficulties to be individually assessed and provided for in terms of individual progress. Helping the learning disabled to read, write and spell correctly is a mammoth task for an ordinary school teacher. Hence, utmost attention was given instructional strategies like cognitive, metacognitive and behavioural approaches. Cognitive, metacognitive and behavioural approaches play a vital role in learning. When children do not comprehend what the teacher says or teaches, then the teacher has to change his/her method according to the student’s taste. This will stimulate the student’s interest in learning. Monotonous teaching never succeeds in learning.

Johnson and Myklebust (1967) states that teaching should be on strengths while remediating the area of weakness. Generally, the difficulty lies in the area of visual perception (what the pupil actually sees on page), visual discrimination (how the pupil is able to see differences between words, letters and members), visual sequencing (the ability to perceive letters and words in the correct order), visual categorization (knowledge of visual similarities between words and letters) and visual memory.
Another area of difficulty is auditory perception, auditory discrimination, auditory sequencing, auditory categorization and auditory memory. The other areas are visual motor processing and fine motor control of early number concepts and early phonological awareness.

In the past, many researchers have done studies to overcome the specific learning difficulties in ADHD children. At this juncture, it is appropriate to mention some of the western studies attempted in this area. Researchers like Kazdin (1985), James; A and Wells,A (2003) used metacognitive, cognitive strategies and behavioural approaches to overcome learning difficulties in ADHD children. In Indian context, studies are also reported on the use of metacognitive strategies to overcome language – learning difficulties among high school students Santhakumari(2003). A couple of specific studies have been made on the effectiveness of cognitive and metacognitive strategies to overcome behavioural difficulties in children Jayaprabha (2003), cognitive-behavioural Intervention Strategy to overcome antisocial behaviour in children Shyamala (2004).

There are so many activities considered to be interesting for children, but all the activities do not posses cognitive, metacognitive and behavioural strategies fully. Keeping this in mind, the investigator once again discussed with the concerned primary school teachers, parents, and education field experts and put forward the idea of the description of visual discrimination, perception, sequencing the letters, categorization and auditory perception, discrimination, sequencing, phonological awareness. Fine motor control which generally promotes cognitive and metacognitive skills in ADHD children.

As the children are sensitive, they will be able to learn, adopt and change the learning pattern and sustained their learned things permanently. Researchers like Sivakami (2000) made attempts to develop comprehensive strategies to overcome specific learning difficulties in children. A close look at the studies concluded in this area reveal that the study done by Sivakami (2000) is of much use and the strategies used by the researcher are as good enough to overcome reading, writing and spelling difficulties experienced by the children with ADHD. Hence the strategies followed by Sivakami are adopted for the present study. Further, it is observed in the pilot study that the same strategies have proved to be effective in overcoming SLD in ADHD children.
A brief description of such strategies is presented here under.

**a) Strategies to Overcome Reading Difficulties in ADHD Children**

The students with significant intellectual impairment or perceptual difficulties should be taken to the threshold of simple word recognition (Choate and Rakes, 1993). Training in listening skills, encouraging a liking for stories, ensuring familiarity with language pattern all form of the important parts of the programme. Visual-aural-oral language enrichment activities from the basis of beginning reading programme. The following visual and auditory components must find place in any remedial programme to overcome reading difficulties in ADHD children.

**i) Visual discrimination:** The investigator centred reading activities on word to word matching, word to picture matching and letter and word matching. The child who needs to improve in visual discrimination is likely to be of maximum benefit if letter and word matching are utilized rather than matching of pictures and geometrical shapes. The appropriate words or captions on slip of card or on the magnetic board enable the child to learn.

**ii) Visual perception:** For the children with visual impairment or those with neurological perceptual problems, form – perception had to be improved. If the ADHD child is very poor at form-perception, the teaching has to be started with the fitting of hard- board shapes into form boards, matching and sorting simple regular shapes and feeling those shapes hidden within a puzzle box, where the child can handle but not see them. Their can be reintroduced by using small plastic letters of the alphabet in the puzzle and being handled and identified in the same way. This activity is useful for holding attention through active participation. Other useful activities which develop awareness of shape and form and encourage attention include copying regular shapes using drinking straws, drawing around templates, drawing within stencils, ice cream sticks, tracing figures and completing unfinished figures worksheets.

**iii) Visual Retention and Visual Security Memory:** It is helpful for some children to be trained in careful observation of material which they are then required to reproduce from memory in correct sequential order. The picture/ letter cards can be arranged to spell words. After brief exposure on a flashcard, the child has to write the sequence. This aids early spelling skills as well as word recognition skills for reading.
The gradual opportunity to construct and reconstruct meaningful sentences from word cards as well as picture to develop sentence building.

This procedure which has been strongly advocated by Kemp (1987) reveals much about the student’s language competence and memory for words.

iv) Auditory Training: Auditory skills play a major role in the process of learning to read. Auditory training need not always precede any introduction to reading unless a child’s auditory perception is markedly deficient Frost et al., (1999). The principal aim of auditory training is to increase awareness of sound pattern within words which can be obtained only by training listening skills along with sight vocabulary. Finding the ‘odd one out’ among rhyming words is of much ease in this regard (sand, hand, land, and feet).

v) Auditory Discrimination: For the child who can not discriminate the sounds, it is useful to collect picture in games requiring auditory discrimination. The pictures may be set out in pairs and the child must quickly touch one of the pairs of pictures, when the word is called for example. ‘ice’, ‘eyes’, ‘sun’ ‘son’.

Worksheets made with pictures of objects for the learning disabled child’s identification, help a lot in improving auditory discrimination. For example, the child has to be asked to give names of object beginning with any one sound say/c/.
The picture which belongs to the sound /c/ should be circled and the pictures which do not say /c/ should be crossed. The child has to be taught the sound with written symbol. The child has to identify each picture, say its name, and circle the letter that symbolises the beginning sound.

**vi) Auditory Segmentation:** Auditory segmentation can be taught by taking words apart into their component sounds, raising the actual process to the level of awareness in the child.

For example:

What is this picture? Cat
Say it very slowly Cc...aa...tt...
Stretch it out as ca....t....cat

This involves listening too

**vii) Reversal Problems:** If a child is confusing p, b, d, g, u, h, it is essential that the learning disabled should be given a motor cue (kinesthetic training) to establish the correct direction for these letters. Finger tracing the letters until mastered is probably
the most positive way to overcome the problem. While tracing, letter should be simultaneously sounded. If the child is given the correct motor cue for the letter and numeral formation, many reversal problems would not persist.

viii) Sensory Perception: Comprehension and close procedure enhance the reading skill. Close procedure involves learning the initial letter of the deleted word to provide a clue or deleting several consecutive words, thus requiring the children to provide a phrase which might be appropriate. The overhead projector plays a vital role in displaying the paragraphs. Another useful activity which aids comprehension and study skills is that of word webbing. Charts containing key words encountered in the text are prepared in advance.

Brain storm ideas and keywords should be on the board. Tentative connections are made between some of the words and these connections are discussed. As the reading proceeds, new connections are made. eg. Man changing the tyre on his car on road.

Words webs help students to organize their thought and link new idea with what they already know.
b) Strategies to Overcome Writing Difficulties in ADHD Children

Perhaps, more than any other of the curriculum, writing present major problems for the students with learning difficulties. They have problems with the more mechanical aspects of handwriting. Kamiskty and Powers (1981, pp.21) identified five problems that may lead to poor writing.

i) Disorders of visual perception – the inability to recall how a letter looks.

ii) Failure too integrate visual image of a letter with the correct motor response.

iii) Poor efficiency and control of the intrinsic muscles in the hand.

iv) Faulty motor memory related to the storage of motor information in the brain.

v) Difficulty in perceiving the spatial requirement of a task.

vi) Overcoming the aforesaid problems will strengthen their writing.

Handwriting should be specially taught as it should be, so that children know where to begin and how to form the letter. Italic, cursive, printed, looped plain or scripts are some of the patterns of handwriting. Recent research evidences suggest that handwriting problems could be reduced if cursive writing is taught before manuscript writing Strauss and Lehtinen (1947). These researchers claim that teaching cursive writing first helps to increase fluency of movement, reduces reversals and improving spacing between words. The following six simple shapes which make up all our letters should taught first.

| A rounded letter ‘C’ is a good starting point for improving handwriting. Having achieved this, it can be then joined in a unit of three CCC this leads naturally on to a then d,g and finally with a slight change to ‘e’ A combination of curves and angles is reasonable to make loops on g,j, , y and z as a direct link back to the base line. The angular printed k,x, and z needs new directional strokes. |

i) Motor control: A person who finds extreme difficulty in manipulating and guiding the pen who has neurological deficit should be taught in such a way to develop motor-
control. These students will benefit from colouring and completing dot-to-dot picture or doing exercises to practise pencil control before attempting writing.

Attempt should be made to practise these shapes in three units, the larger, the better initially. A board is useful for this, as is writing in the air, progressing on to sheets of paper. It is well to remember that some children experience problems in charging from the vertical to the horizontal place. A really large thick felt pen or wax crayon which offers little resistance to the paper may be useful for those with poor motor control or those who have difficulty in holding a pencil correctly. It can be helpful for some children to use triangular pencils and pencil grips which are easily obtainable.

ii) Improving Hand-Eye Motor Co-ordination: Control of eye movements and co-ordination of hand and eye are obvious pre-requisites of efficient reading and writing. Games and toys which encourage hand-eye co-ordination should be used. Encourage the child to draw continuous line which gives practice in moving from left to right, up and down, through upward and downward curves, and through right angle.

The prescribed exercise provides practice in hand eye movements and help to develop in the child, a sense of direction from side to side and up down. Combined with training the discrimination of reversal drawings and models, they also appear to
overcome the reversal difficulties which are often associated with backwardness. (e.g.) ‘no’ for ‘on’ ‘saw’ for ‘was’.

The reversal of individual letters is a major area of difficulty. Crossed laterality, lack of firmly established lateral preference and poor directional sense frequently result in a marked tendency to reverse shape. The most effective strategies to correct reversals are offered by kinesthetic and multi-sensory programmes. Orten (1937) recommends kinaesthetic training to first establish motor-movement. The child has to close his eyes when writing, so that he can attend to the motor patterns and not using vision strokes should be practised on the palm of the hand, to give kinaesthetic feedback to the learner. Verbal rehearsal strategies are also helpful. For example, reversals of ‘d’ and ‘b’ are overcome by verbal rehearsal of C comes before d (that is c). Using a transparent overlay containing the model, letters will allow the learner to self check his writing.

iii) Improving kinesthetic Techniques:

a) Trace the letter ‘C’ using a finger or a pencil.

b) Join dots to form letter.

c) Write the letter in clay or sand.

d) Copy the letter from a model.

e) Write the letter from memory.

f) Let the child walk over a large letter drawn on a floor.

Analysis of common faults in writing is the basis of improvement. It is useful to have sample, or a teacher may write a few well-chosen words on the board for comment, each showing a single fault and each exaggerated. Use the same word in each and read them out so that the pupil can concentrate on the writing rather than the context. Make sure that the pupils find out the fault themselves.
1. Writing that is too small.
   The car was slipping and sliding as they drove down the newly built.
2. Writing that is too big.
   The car was slipping and sliding.
3. Uneven size of lower-case letters.
   The car was slipping and sliding.
4. Upper-case letters and long strokes out of proportion.
   The car was slipping and sliding as they.
5. Inadequate or uneven spacing between letters.
   The car was slipping and sliding as they.
6. Inadequate or uneven spacing between words.
   The car was slipping and sliding.
7. Erratic slant.
   The car was slipping and sliding.
8. Malfomed letters.
   The car was slipping and sliding.
   The car was slipping.
Thus finding fault in the sentences given will make them realize the correct way of writing.

c) **Strategies to Overcome Spelling Difficulties in ADHD Children**

“The contention that learning to spell should primarily take place through incidental learning from reading and writing is highly questionable for students with special needs as well as for many normally achieving students. In our opinion, advocates of incidental learning in spelling are overly optimistic” (Graham and Harris 1994: 283). For many low achieving students, spelling continues to present a problem long after reading skills have improved. This is sometimes due to the fact that too little attention is given to the explicit teaching of spelling skills and strategies. Instruction in spelling is no longer feature a prominent now in the primary school curriculum. Spelling actually involves the coordinated use of several different complementary process and strategies, including listening carefully to the component sounds and syllables within the word and by developing kinaesthetic images of most commonly written words. Hence, teaching should be on strength while remediating the auditory, visual and motor areas of weakness.

**(i) Improving Auditory Perception:** It is clear that one of the most common problems exhibited by dyslexic students is an inability to analyse words they hear in
terms of syllables units and separate phonemes (Clark, 1988). The process of writing an unfamiliar word confuses the child first to identify the common sound units within the word and to match these sounds units with the appropriate letter clusters stored as visual images (Jorm et al., 1983). The child who lacks this skill can be trained in letter sound correspondence by VAKT (Visual Auditory Kinaesthetic and Tactile) approach.

(ii) Developing Kinaesthetic Technique: The kinaesthetic techniques and SOS (Simultaneous Oral Spelling) whereby a child says the letters as he writes them, strengthen the memory for letters and the kinaesthetic flow. So indeed does, the Fernald technique, (1943) and Charles Cripps and Margaret Peters, Look – Cover- Write-Check. However, it is important to include Look – Say – Cover – Write – Check. Otherwise, some children are unaware of what the word actually is that they are learning to spell.

(iii) Improving Visual Perception: Visual clues are extremely important for accurate spelling. Strategies which involve the deliberate use of visual imagery such as look – cover- write- check are very important for learning irregular ‘words those with unpredictable letter – to – sound correspondence. Any student who lacks visual perception is given the necessary instruction and practice.

(iv) Improving Visual Recall: To learn spelling, use the strategy of looking carefully at a word, covering it, and trying to form a mental picture of it – Then the teacher can use the following steps:

E.g.: Umbrella

1. How many letters are in the word?
2. Is there a vowel or more than one vowel – or, if vowels are in red, is there any other red letter?
3. Are there more letters before or after the vowel/red letter?
4. Are there any tall/ascending letters?
5. Are they any descending letters?
6. What are the letters in the word?
7. Can you give me the letters of the word backwards, i.e., from right to left?
8. Can you now write the word in joined- up-writing?

It is necessary for the teacher to start with familiar objects like cycle, can and sun rather than with unfamiliar words. In enables the pupils to decode words (to read) and to encode (to spell).
v) Improving Visual Memory: Visual memory can be increased by the figures and patterns at first. The figure to be remembered is displayed for about five seconds and then the child is asked to reproduce it from memory. When difficulty arises, specific training accompanied by language is given research experience shows that giving each figure a name helps recall.

vi) Improving Visual Rhythm: Graded series of repeating visual patterns enrich visual rhythm. The child has to discover the pattern and continue it across the page of an exercise book or prepared strips of paper. The child is encouraged to talk about the pattern and thereby learns to make an association between auditory and visual sequences.

vii) Improving Visual Sequencing: An ability to remember visual sequences is obviously involved in the mechanical reading process, and particularly in the more difficult process of spelling. In both processes, there is close association, particularly in phonically regular words, between visual and auditory sequencing. For training in visual sequencing, use individual cards with pictures of well known objects and geometric figures. For instance, show the child card picture of a ‘ball’ and a ‘bat’. These are placed side by side, the child looks at them for about five seconds and after the cards have been scattered, he is asked to place them side by side in correct order. Introduce another picture card of a cat. Now place them side by side to choose. Likewise, too many picture cards can be shown to the children to arrange in sequence. The same progression of sequence may be used for training auditory memory.

viii) Improving Visual Discrimination: It is very likely that the ability involved in discriminating between almost identical pictures is trainable. Use series of cards ‘programmed’ in order of difficulty. The cards are in set of five or six with two cards in each set identical. The child is shown one of the identical cards and has to search another in the remaining cards. In every case, he has to explain the reason for his choice and for his rejection of all other cards in the set. The differences in the cards involve omissions, rotations, lateral inversions, size variation and colour differences. Other variations of this type of exercise could well be used, eg., find which is the ‘odd’ man out which is correct or which is silly, which is the missing piece or feature etc.
This type of training is extremely useful in avoiding reversal difficulties particularly if it is given at the time when the child is in the process of structuring his ideas of laterality and directionality. If provides excellent opportunities for language development.

Gillingham and Stillman’s (1960) “Simultaneous Oral Spelling” is generally based on visual, auditory, kinaesthetic and tactile senses which overcomes spelling errors. This approach has been greatly applied by Bryant and Bradley (1985) for remediation of spelling problems. This approach involves five steps.

- Select the word you wish to learn, and have the teacher pronounce it clearly.
- Pronounce the word clearly yourself while looking carefully at the word.
- Say each syllable in the word (break a single syllable word into onset time)
- Name the letters twice.
- Write the word, naming each letters as you write it.

This approach has the combination of all senses to function intact.

d) Need for Comprehensive Remedial Instructional Strategies to Overcome Reading, Writing and Spelling Difficulties

In any classroom, one can find students with specific difficulties and more than one difficulty. In a classroom where there are 50 to 70 students particularly in developing countries, it is not possible for the teachers to adopt the specific separate remedial strategies to each kind of children with specific difficulties. Instead of such procedure, it is practical and feasible to develop a comprehensive remedial strategy covering the salient features of reading, writing and spelling difficulties and thereby the teachers can save the time and at the same time, the students with specific difficulty as well as the students with more than one difficulty can bypass their difficulties by benefiting from such comprehensive holistic strategy.

The tasks of reading, writing and spelling almost involve all of our sensory functions. The receptive and expressive channels of hearing, vision, speech and movement are in constant interplay. As far as English is concerned, learning disabled children can be taught to read and spell most words, if they receive systematic instruction in the sounds made by individual letters and combination of letters. In this
connection, it is better to quote the wise words of great American pioneer Margaret Ranson; what is needed in her view is “a programme that is structured, sequential, cumulative and thorough. The skills are to be learned through all the avenues of learning open to the student – visual, auditory and tactile – kinaesthetic in interaction”.

When dealing with learning disabled who have difficulty in immediate learning, retention and later recall of sound symbol information, it is sensible to use all possible ways to facilitate the task. Multi sensory procedures are an essential feature of the teaching strategy where- in two or three senses have to be engaged simultaneously. In this way stronger channels are utilized to the full and each channel supports the others. If an individual has a weak channel, it is not usually profitable to ignore it but by using it along with the others, a teacher would aim to strengthen it. It is highly advisable to attack a problem from as many sides as possible, because learning through one sense reinforces learning through another.

A fairly wide spread multi-sensory method is popularized by Grace Fernald (1943). She presented a historical review of how sensory systems were used for reading and spelling as early as Plato. (427-347 B.C). Her method is known as V-A-K-T because it uses Visual – Auditory – Kinaesthetic- Tactile sense. The V-A-K-T method is briefly described as follows;

- A word is selected from a word- list
- The teacher writer the word on paper / on the black board.
- The teacher reads out the word and the children repeat it.
- The children trace each letter with the finger or a pencil until they can write it from memory.
- The children write the word with out looking at the model.
- The new word is typed out and included in the children’s word list.

**According to her, the children must**

- Look carefully at the word and pronounce it correctly (Visual Auditory Perception)
- Note which parts of the word are spelled differently from how they sound (Auditory Perception).
- Closes their eyes and visualize the word (Visual Perception).
- Use vocal cues or motor movement to reinforce portions of the word. (Auditory Kinaesthetic Movement).
- After the visual image in class, write the word from memory saying each syllable as it is written (Perceptual Memory and Tactile).
- Trace the word if it is spelled correctly.
- Continue to write this procedure and the word image is retained.
- Enter the word learned in a personal dictionary.

This method encourages systematic observation of words, basic syllabification, and consistent left-right reading. This helps to direct attention to sequencing of letters, an area that most dyslexic students have difficulty with. The method of teaching strongly reinforces the visual impression of words. This method is also used for overcoming reversals. Multisensory approach which plays a predominant role in language teaching is depicted in the figure given.

(Extracted from Tacking Dyslexia: The Banger way by Ann Cooke 1993)

Multi – media programme are multi-sensory. In addition to text, they can contain high quality auditory information, photos and other types of visuals and even on-screen videos. Auditory output is particularly important for individual with learning difficulties. Among the types of auditory information available in multimedia and music, sound effects, colour photos, animated diagrams, audio recording and video
clips play a predominant role in overcoming the auditory and visual deficits. It has greater impact on the learning disabled.

Multi-sensory approach does not mean that all the available technology should be blended with the approach. Depending upon the nature of purpose, one can use and blend the appropriate media in the approach. Keeping the nature of reading, writing and spelling difficulties in ADHD children, the investigator selected the high technology such as computer, multi-media software kit, TV, V.C.R, Over head projector and Tape recorder and the low cost technologies such as flash cards, chart with relevant materials, magnetic and flannel boards, word wheel, co-centre double and triple cards and puzzle box in constructing the comprehensive remedial instructional strategies to overcome reading, writing and spelling difficulties in children. Developing such comprehensive strategies and using the same to overcome the learning difficulties by the children naturally leads to better integration of these children with their normal peers.

The nature of specific difficulties in Reading, Writing and Spelling and the type of educational device/assistive technology used in the comprehensive remedial instructional strategies to overcome the specific learning difficulties is given below.

<table>
<thead>
<tr>
<th>Nature of Difficulties</th>
<th>Specific difficulty</th>
<th>Type of device /Assistive Technology used to Overcome to difficulties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>1. Letter Identification (visual auditory perception)</td>
<td>Alphabet kit, Computer with multimedia, V.C.R chart with diphthongs, alphabet flash cards with corresponding sounds.</td>
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<tr>
<td></td>
<td>2. Word attack (Auditory visual association)</td>
<td>Chart with word fame OHP, sight words, word game (Scrabbles)</td>
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<td></td>
<td>3. Analogues (Auditory sequential memory)</td>
<td>Tape recorder, chart with certain analogues, OHP</td>
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<td></td>
<td>4. Listen and write whether they are same or different. Do these word begin with same sound (Auditory Discrimination).</td>
<td>Homophone charts, Tape recorder, OHP Flash cards with rhyming words.</td>
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<tr>
<td>v. Oral Reading</td>
<td>Chart with picture to represent words for Rebus approach OHP, Hooked on phonics Audio. cassettes, Tape Recorder, Multi-media</td>
<td></td>
</tr>
<tr>
<td>vi. Word recognition (Visual motor difficulties)</td>
<td>Sight words in the board and charts, word puzzle with picture, Track the sequence game.</td>
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</tr>
<tr>
<td>vii. Complete the rhyming in the picture (Visual verbal association)</td>
<td>Magnetic board displaying rhyming words with picture, word families charts.</td>
<td></td>
</tr>
<tr>
<td>viii. Word analysis and Synthesis (Perceptual Sensory information)</td>
<td>Computer, OHP, Tape Recorder</td>
<td></td>
</tr>
<tr>
<td>ix. Read and underline the following sounds (Auditory segmentation)</td>
<td>Computer VCR, Jolly phonics. Video castles, Hooked on phonics audiocassette, Tape recorder.</td>
<td></td>
</tr>
<tr>
<td>x. Verbal analysis cloze test (Sensory perception)</td>
<td>Word webs-OHP, charts, containing key words, creatives series on story telling step by step.</td>
<td></td>
</tr>
<tr>
<td><strong>Writing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Letter formation</td>
<td>Fundamental six strokes in the charts, Four lined papers</td>
<td></td>
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<tr>
<td>ii. Letter slope</td>
<td>Flannel board displaying the alphabets in four lines</td>
<td></td>
</tr>
<tr>
<td>iii. Letter Size</td>
<td>Different sized letter cards, OHP</td>
<td></td>
</tr>
<tr>
<td>iv. Letter Spacing</td>
<td>Variety of handwriting parades to identify the correct one, OHP</td>
<td></td>
</tr>
<tr>
<td>v. Word space</td>
<td>OHP exhibiting the passages without space between words, passages in four lined papers with equal space between words, Flannel board and magnetic board.</td>
<td></td>
</tr>
<tr>
<td>vi. Letter word alignment</td>
<td>Magnetic board, individual letter cards in cursive strokes to form a word.</td>
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<tr>
<td>(1)</td>
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<tr>
<td><strong>Spelling</strong></td>
<td></td>
<td></td>
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<tr>
<td>i. Circle the correct Spelling (Visual verbal Association)</td>
<td>Word families, charts, flash cards with correct spelling and wrong spelling, picture Cards, Hooked on phonics kit.</td>
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<tr>
<td>ii. Find the word on the right which is the same on the left (Visual discrimination)</td>
<td>Chart with right words, word game, Identical pair of flash cards</td>
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<tr>
<td>iii. Write down the plurals. Divide the words and write them By syllables (Visual memory Motor co-ordination)</td>
<td>Co-centre double cards, charts with plural rules, OHP, Word Wheels</td>
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<tr>
<td>iv. Track the following (Visual sequence)</td>
<td>Disjoined picture cards JigJaw puzzles, word play</td>
<td></td>
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<tr>
<td>v. Add prefix and suffix to the roots. (Perceptual discrimination)</td>
<td>Co-centre triple cards, word wheel.</td>
<td></td>
</tr>
<tr>
<td>vi. Match the syllables to make the syllables to make a real word. Say each word aloud as you write it (Auditory Perception)</td>
<td>Tape recorder, TV, VCR, Alphabet cassettes.</td>
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<tr>
<td>vii. Dictation based on spelling rules and irregular words</td>
<td>Hooked on phonics cassettes, chart with spelling rules, computer, and spell checkers.</td>
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</tr>
<tr>
<td>viii. Find the word by using clues (Visual perception)</td>
<td>Picture cards with words, Charts, Computer VCR, Multimedia software kit.</td>
<td></td>
</tr>
</tbody>
</table>

The above table clearly shows that the comprehensive remedial instructional strategies to overcome learning difficulties used in the study incorporated all aspects of visual, auditory, kinaesthetic and tactile method.

To overcome the reading difficulties, an inexpensive alphabet kit with plastic letters, charts with diagraphs, flash cards with corresponding sounds helps to recognize
the 44 sounds of 26 letters in English. The multi-media software kit, the video tape, ‘Alphabet films’ and the audio cassette ‘C’ for ‘Cat’ C says [s] enhance to recognize initial and final sounds, and thereby strengthen visual auditory perception of the children. The sight words in the classroom, ‘word families’, charts, word game such as scrabbles’ and computer programme based on ‘word recognition' enrich the auditory visual association skill.

Auditory discrimination is strengthened by the phonetic kit ‘Hooked on phonics’, tape recorder and flash cards with rhyming words. Visual motor difficulty is bypassed by the sight words in the charts and the word puzzle with picture. ‘Track the sequence game’ also plays a greater part in enriching visual motor ability.

The magnetic board displaying rhyming words, the chart with word families such as Cat, Bat, Rat, Sat, Mat etc., and the Over Head Projector which picturises the word families and the picture cards corresponding to the word families and the picture cards corresponding to the word develop visual verbal association. The Guidebook of ‘Hooked on phonics' narrates quite a lot of rhyming words. Exercises based on auditory sequence are word cards, picture cards, and the charts which display the sound patterns.

The investigator made the instructional programmes to meet comprehensive activities involving questions literal, interpretive, critical and creative level. The portrayal of the comprehensive passage in the Over Head Projector stimulates perceptual sensory feelings. Word analysis and synthesis are made easy through the aforesaid devices.

The Video Cassette Jolly Phonics Volume I, American Gateway of Educational Products “Hooked on Phonics” is remarkable in enriching auditory segmentation. Besides these high level technologies, flash cards, charts and flannel board play a vital part in promoting auditory segmentation. The Over Head Projector is used for cloze exercise. The picture matching cards which narrate the story focus the learner’s attention on visualizing the picture shown and it leads to visual perception.

Motor skill is the key element which takes a great part in one’s handwriting. The blending of visual, auditory, kinaesthetic and tactile channels in writing needs the low cost devices rather than high level technology. The investigator solely depends on the strips of the charts in which four lines are drawn. The selected six strokes on the cards are used for letter formation. The large arm movements in blackboard and the
large size letters in the charts by using felt pen and crayons catch the learner’s attention.

The cursive form of a, b, c… in the charts are used by investigator to have Kinaesthetic mode of tracing the letters. Sand plays a vital part where the children scribble as they like and it promulgates the learner’s free handwriting. The large letters drawn on the floor kindle the visual motor co-ordination by making the child with handwriting difficulties to walk on the line. Different sized individual letter cards, help the child to identify the actual size of the letters.

The three letter joining of ‘alphabet Cards ‘abc, def, ghi…..etc,’ and individual letter cards with joining strokes help the learners to join letters. The variety of handwriting displayed in OverHead Projector and the different kinds of writing in the charts strengthen their visual perception and pave way for visual discrimination.

The selected passage in the Over Head Projector and the same on the Computer Screen depicts ‘letter spacing’ and ‘word spacing’. A well presented matter in the chart increases grasping of ‘word spacing’ by the child with handwriting difficulties.

In a nutshell, though the world shoots up with variety of high technology, the investigator depends on the low cost technology which renders a great service in stimulating the senses of the child in writing.

Most of the activities in spelling centre on phonic awareness. Finding out the correct spelling needs visual verbal association skill which is geared by the word and picture cards, word families charts, the flash card with correct spelling and wrong spelling. The Hooked on Phonic kit presents spelling rules. Visual discrimination is successful when the identical pair of flash cards is used. The cards with pictures charts with sight words help to find the words on the right which is same on the left. The co-centre double cards and, Over Head Projector exhibit the plural rules. The flash cards of singular nouns to be fixed with another flash cards of the suffixes such as’s’. ‘e’, ‘ous’ ‘ies’ and the charts showing the exception of uncommon plurals help the children to overcome visual memory motor co-ordination deficiency.

Dividing a single syllable word into a beginning sound (on set) and a unit comprising the vowel and all that follows it (rime) are displayed in the flash cards, for example, dog=on set [d] rime [og]. Word cards with mono syllabic, disyllabic, trisyllabic and polysyllabic are helpful in splitting the words into syllables. Disjoined
picture cards and word puzzle box lead to visual sequence of the children. The co-
centre triple cards with the root word at the centre and the prefixes and suffixes,
encircling the root word help in attempting trial and error method which increases the
children’s perceptual discrimination.

The structured programme in tape recorder stimulates auditory perception. The
Over Head Projector and the charts depicting silent letters such as ‘e’ ght’ etc and the
spelling rules help a lot in learning irregular words. The flash cards with irregular
words ‘to look-cover-write’ increases the sensory perception.

4.5 Validation of Remedial Instructional Strategies

The adopted instructional strategies are subjected to expert opinion and
scrutiny. Based on the expert opinion with regard to content, coverage and correctness
of the strategies keeping in mind the specific learning difficulties identified in ADHD
children, the strategies to overcome the reading writing and spelling were validated.

To know whether these strategies are effective or not, the strategies were
applied to a random sample of 5 ADHD children for a period of 3 months. It was
observed that the ADHD children bypassed their specific learning difficulties to a
greater extent within three (3) months, and it was felt that the adopted strategies were
good enough for ADHD children.

4.6 Sample of the Study

The area of the study is the Chennai Metropolitan; for the purpose of the study
the investigator selected Balajee Vidhyasharam Matriculation School located at
Perambur of Chennai District. The selected school is located in Semi urban area where
both low and middle socio economic group are living. The investigator selected 4th and
5th standard children purposively as the sample of the study. There were 200 children
studying in IVth Std and 193 children studying in Vth Standard.

At the first Stage, the investigator identified children with ADHD behaviour in
IV & Vth Standards based on ADHD behaviours as pointed out by the teachers and
also on the basis researchers close observation within and outside the school. In the
second stage, such children and the parents of these children are contacted to ascertain
the ADHD behaviours of the identified children. At this stage, the investigator found that there were 27 children with ADHD behavior. It was also pointed out by the teachers and parents that all these children were experiencing specific learning difficulties in reading, writing, and spelling. These students were the sample for the present investigation.

4.7 Application of the Cognitive Metacognitive, and Behavioural Approaches along with Remedial Instructional Strategies to Overcome SLD in ADHD Children

As the purpose of study to see the effectiveness of cognitive and metacognitive and behavioural approaches remedial instructional strategies to overcome specific learning difficulties in ADHD children, the investigator first identified the intensity levels of ADHD in children and the extent of specific learning difficulties in children. This data forms as the data for pretest or the data before adopting the CMB approaches. In the second stage, the investigator applied strategies like cognitive, metacognitive, and behavioural approaches to reduce the ADHD behaviour by training the parent to interact with children in an appropriate way. For that purpose, they were trained in verbal communication by showing vignettes and express of emotion. Parents were asked to motivate the appropriate behaviour of ADHD children by using token and positive reinforcement.

At the School Level, teachers used training to enhance the self control and self-regulation among ADHD Children. The same will be supported by parent at home environment, and the same will be influenced by peer association in a positive manner, which help to overcome ADHD behaviour. The parent training and teachers training towards ADHD children were aimed at Cognitive, Metacognitive and Behavioural orientation of children with ADHD. In the progress of the training the ADHD Child is more sensitized about the behavioural deviation and the ways and means to overcome ADHD behaviours. The cognitive behavioural techniques to enhance self control self regulation and self monitoring of the ADHD children are emphasized. Stress is given in social skill training both within school and the home environments. Desirable behaviours are promoted through behaviour modification techniques such as modelling, shaping, chaining and task analysis etc. Simultaneously the remedial instructional strategies adopted for the study are used to overcome specific learning difficulties such as reading, writing and spelling.
The remedial instructional strategies to overcome specific learning difficulties in children with ADHD was based on V-A-K-T approach. At every point, the ADHD children were supported by teachers followed by the parents with healthy parental practices and positive peer group association. A combination of cognitive, metacognitive and behavioural approaches followed by remedial instructions with positive supportive systems within and outside the school were provided to the children to come out from ADHD behaviour and to overcome specific learning difficulties. The experiment was conducted for a period of six months.

4.8 Data Collection and Scoring Procedure

The required data were collected by administering the following tools to the following sample.

i) Rating scale was administered to the class teacher, parents to identify the children with ADHD Behaviour in children of IV & V STD.

ii) Rating scale was administered to identify parental practices of children with ADHD behaviour.

iii) Checklist was administered to identify the influence peer group association of children with ADHD behaviour.

iv) Reading, writing and spelling diagnostic tests was administered to identify SLD in ADHD children.

The rating scale to assess the ADHD behaviour in children is scored with three point rating scale with ‘Always’ ‘Frequently’ and ‘Sometimes’ having the scores 3, 2 and 1 respectively. For Parental Practices, the scoring 2 and 1 is given for ‘Always’ and ‘Sometimes’ respectively for positive statements, and the scoring is reversed for negative statements. For Peer Group Association Checklist, 2 and 1 is given for ‘yes or ‘No’ answers respectively. Similarly, for Reading, Writing and Spelling Diagnostic Tests, 1 mark is given for right answer and 0 is given for wrong answer.

4.9 Statistical Techniques Used in the Study

The obtained data were analysed by using appropriate statistical techniques such as mean, SD, percentages, mean ±1/2 SD, t-test, F-test and correlations.

At the first stage, the number and percentage of children with high, moderate and low intensity of inattention, hyperactivity, impulsivity and ADHD as a whole were
calculated keeping in mind their background characteristics. The intensity of each aspect of ADHD behaviors (inattention, hyperactivity, impulsivity and ADHD behaviors as a whole) was identified based on mean ±1/2SD. Likewise, the number and percentage of children with low, moderate and high intensity of inattention, hyperactivity, impulsivity and ADHD as a whole were identified based on mean ±1/2 SD. Similarly, the number and percentage of children on each aspect of reading, writing and spelling difficulties were calculated based on the diagnostic tests used in the study. To know the parental practices, the parental practices scores were divided into three groups i.e., poor, moderate and good based on mean ±1/2 S.D

In the second stage, to know the effect of gender, age, community, birthorder, nature of family, parental occupation, parental practices and peer group association on the reading, writing and spelling difficulties, mean and SD of each group in a variable has been calculated. Wherever where two groups are involved in a variable, t-test was used. In case of more than two groups, F-test was used. Likewise, to know the relation between ADHD behaviors and SLDs, parental practices and SLD, peer group association and SLD, Karl-Pearson Coefficient Correlations were calculated for the scores of pre and post tests.

In the third stage, to know the effectiveness of the developed CMB approaches in overcoming ADHD behaviors and specific learning difficulties, mean and SD scores were calculated before and after adopting the CMB approach. Based on mean and SD, t-test was used to know the difference between the means. Likewise, the number and percentage of children on each aspect of reading, writing, and spelling were calculated to know the effectiveness of CMB approach in overcoming SLDs in children.

Similarly, to know how far and to what extent the developed CMB approach nullified the effect of variation in independent variable in overcoming SLD in children, mean and SD for each group in a variable has been worked out, after implementation of CMB approach. Based on mean and SD, t-test or F-test was carried out appropriately depending upon the number of groups involved in a variable. The obtained results are tabulated and the details of analysis and interpretations are presented in the succeeding chapter.