CHAPTER 2
REVIEW OF RELATED LITERATURE

A perusal of literature provides the researcher with an insight into the various perspectives, complexities and creative concepts in the field in which the study is to be undertaken. It leads the researcher to establish cause and effect relationship and helps to analyse various inputs and place them in structural order and establish certain thrust lines, bases, so that important trends of previous results can be drawn therein, which suggest areas for further investigation and analysis and if needed the formulation of a hypothesis. It indicates areas of scant information and helps to eliminate duplication. All this leads the researcher to evolving a framework from which ideas take shape and propel the researcher towards the needed innovation. For the present study this has been the endeavour.

Although the investigation is focused upon effectiveness of Token economy (TE) on reading, writing, spelling, literature on other academic areas, i.e. the effects on non-attending behaviours having indirect bearing on the present study has also been reviewed. This is because a survey of the same may suggest factors that have implications for education of the Learning Disabled. For instance it is, commonly accepted that impulsive behaviour and inappropriate attending behaviour need to be controlled before academic behaviour can be changed, (Bryant & Budd, 1982; Whitman & Johnson, 1980). Similarly some of the researches in the area of classroom management – techniques involving reinforcement focusing on improving the accuracy of student’s academic performance could become relevant for LD students (e.g. Conlon, Hall, Smith, 1972; Lovitt & Blattner, 1969; Sulzer, Hunt, Ashby, Komarski, Kraus, 1971). For the present study the review has been broadly organized under the following sub-heads.
2.1 TOKEN ECONOMY PROCEDURES RESEARCH

2.2 READING, WRITING AND SPELLING REMEDIATION RESEARCH

2.1 TOKEN ECONOMY PROCEDURES RESEARCH

Nolen et al. (1967) conducted a study with eight 12 to 16 year olds admitted to the experimental education unit on the basis of having serious learning and behaviour disorders. Individual programmes were arranged for each child in the classroom. Activities known to be highly interesting to the students were established as reinforcement contingencies used to reinforce academic activities. Functionally significant academic gains were recorded over a teaching period of approximately hundred days.

Hall, Luad and Jackson (1968) conducted a study of contingent teacher attention. On-task behaviour was recorded for one first grade and five third grade students who had high rates of disruptive behaviour. Treatment consisted of a reinforcement period in which teacher attention (e.g., the teacher patted the student on the back, moved to the student’s desk, or made a verbal comment to the student) followed on-task study behaviour. This reinforcement period resulted in sharply increased study rates. A brief reversal of this contingency produced low rates of study. The reinstatement of teacher attention as reinforcement for studying, once again markedly increased study behaviour of the students. Follow-up observations indicated that the higher study rates were maintained after the formal programme was terminated.

Orlando, Schoelkopf & Tobias (1968) designed a classroom programme for trainable and educable retardates. Token reinforcement was dispensed for behaviours such as number & letter identification, cursive writing and completing art work. The authors noted that generalized positive effects were evident beyond the particular situations in which tokens were
given and that individual reinforcement contingencies appeared to be superior to group contingencies.

Mc Kenzie et al. (1968) modified the academic behaviours of children in a learning disabled class of 10-13 year olds, by arranging for events such as amount of teacher attention, recess and quality of weekly grade reports to be consequences for academic progress. As academic behaviours achieved with these consequences stabilized at more than an optimal level, the children’s parents agreed to have the children earn their allowances on the basis of the weekly grade reports. This token reinforcement system with grades as tokens and allowances as added back up reinforcers significantly increased the children’s academic behaviours.

O’leary and Becker (1969) introduced the use of token reinforcement programme in a large class (n=17) of children with behaviour problems, in a public school. The intervention resulted in a decline in frequency of behaviour problems in five of the six target subjects. Withdrawal of the token programme then resulted in increased disruptive behaviours in these five children. The reinforcement of tokens reduced disruptive behaviour in four of the five subjects. Follow-up data indicated improvement in academic achievement.

Wolf et al. (1970) used a timer game for the management of out-of-seat behaviour of elementary school children in a remedial classroom. The timer-game allowed the students to earn token reinforcement by being in their seats whenever the bell of a kitchen timer rang. The bell rang about once every twenty minutes. In a second experiment, peer reinforcement was applied in conjunction with the timer game to manage one student out of seat behaviour. Both the experiments demonstrated an immediate decrease in the amount of out-of-seat behaviour that occurred during the non points conditions. It was concluded that the timer-game was demonstrated to be a
attending and study behaviour on a variable interval schedule and three minute interval schedule. Results indicated that a three-minute interval reinforcement increased attending behaviour.

Karraker (1977) compared the effects of self versus teacher selected reinforcers in a token economy for twelve pupils aged eight to twelve in a math curriculum. The rate of correct responses per minute in instructional booklets was recorded for each pupil. A token economy was then introduced in an ABAB design the conditions being baseline tokens one, reversal and tokens two. The groups self select and teacher select could choose a reinforcer from a menu that was compiled as a result of pupils’ requests. In both-token one and two, the academic achievement was higher than baseline for both teacher select and self select group. However the class ratings showed a more favourable rating of the class under the token system self select condition. This data would support a conclusion that pupils achievement and enjoyment of instruction are greatest in a Token economy when they are permitted to select their own reinforcers from a variety of possibilities.

Trap et al. (1978) analysed the effects of feedback and consequences on transitional cursive letter formation. The sample included twelve first-grade students who were employed to analyze the effects of (1) verbal and visual feedback, (2) verbal and visual feedback plus immediate rewriting of trained letters with one or more incorrect letter strokes, and (3) Potential reinforcement on cursive letter strokes. Students practised both a set of trained and a set of untrained letters during each session. Feedback and reinforcement was administered only for trained letter strokes. The percentage of correct trained letter strokes increased during all conditions. Performance on the untrained but practiced and trained letter strokes followed the same general trend in response pattern. No consistent pattern of generalization was demonstrated with untrained and unpracticed strokes.
Platt, Harris and Clements (1980) demonstrated the powerful effects of individual reinforcement schedules in maximizing the attending to task and math performance of twelve learning disabled adolescent students. A method of systematically determining an individual student's reinforcement schedule was devised. Results from the study supported “the concept that the optimum reinforcement schedule is necessary before an exceptional student can obtain his maximum level of academic achievement” (Platt et al., 1980). The above findings are in consonance with O’Leary (1980) as he pointed out that “short term effects on academic behaviour have resulted from behavioral interventions but not from psychological stimulants”.

Neef, Iwata & Page (1980) investigated the effects of interspersing known items during spelling instruction on new words for three mentally retarded students. Following a baseline consisting of the presentation of 10 test words per session, a multielement design was implemented. During interspersal training sessions, previously mastered words were presented alternately with each of 10 test words. During High-density reinforcement sessions, 10 test words were presented and additional reinforcement was provided for task-related behaviours. Throughout all conditions, test words were deleted and replaced after meeting a mastery criterion. Periodic retention tests were administered over mastered words and a cumulative retention test was administered at the end of the experiment. Results showed that high-density reinforcement did facilitate performance over baseline; however, interspersal training was superior to the other conditions in terms of both acquisition rate and short- and long-term retention. In addition, student preferred the interspersal condition when offered a choice.

A substantial and growing body of evidence about effective interventions exists. This literature reveals that it is possible to influence the academic performance of learning disabled pupils by very simple techniques.
in some cases (Lloyd, 1980) (Table 2.1). These techniques include reinforcing specific aspects of academic performance (e.g., accuracy, rate) and modeling certain academic behaviours (e.g., fluent reading).

**Table 2.1: Applied Behaviour Analyses Relevant to Learning Disabilities**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Independent Variable(s)</th>
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<tbody>
<tr>
<td>Billingsley, 1977</td>
<td>Self-and externally imposed reinforcement</td>
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<td>Blankenship, 1978</td>
<td>Modeling and feedback</td>
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<td>Broden et al. 1978</td>
<td>Parental tutoring</td>
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<td>Broughton &amp; Lahey, 1978</td>
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<tr>
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<td>Haring &amp; Hauck, 1969</td>
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<tr>
<td>Hasazi &amp; Hasazi, 1972</td>
<td>Teacher attention contingent on correctly written digits</td>
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<tr>
<td>Hendrickson et al., 1978</td>
<td>Modeling versus correction in reading</td>
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<td>Jenkins et al., 1978</td>
<td>Reinforcement of accurate reading</td>
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<td>Jenkins &amp; Larson, 1979</td>
<td>Reading error correction techniques</td>
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<tr>
<td>Kauffman et al., 1978</td>
<td>Contingent imitation of errors</td>
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<tr>
<td>Livingston, 1974</td>
<td>Promotion of question asking</td>
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<tr>
<td>Lahey et al., 1973</td>
<td>Reinforcement of accurate reading</td>
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<td>Limbrick et al.,</td>
<td>Using context in reading Reading aloud of arithmetic problems before solving</td>
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<td>Lovitt &amp; Hurlburt,</td>
<td>Phonics instruction</td>
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<td>Modifications of science materials</td>
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<td>Lovitt &amp; Smith,</td>
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<td>1980</td>
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<td>Reinforcement of word reading accuracy versus reinforcement of comprehension</td>
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<td>Rose, 1985</td>
<td>Preview by reading silently to self versus preview by listening to teacher</td>
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<td>read passage aloud (elementary age subjects)</td>
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<td>Illustrations in reading material</td>
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<td>1984</td>
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<td>Rose &amp; Sherry,</td>
<td>Preview by reading silently to self versus preview by listening to teacher</td>
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<td>1984</td>
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<td>Smith &amp; Lovitt, 1973</td>
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<td>Withdrawal of positive reinforcement for arithmetic errors</td>
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<td>Smith et al., 1972, Exp.2</td>
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<td>Stromer, 1975</td>
<td>Modeling, practice and differential reinforcement</td>
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<td>Stromer, 1977</td>
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<td>Swanson, 1981a</td>
<td>Self-recording, token reinforcement and contingent free time</td>
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<td>Trice et al., 1981</td>
<td>Contingent free time</td>
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<td>Van Houten &amp; Little, 1982</td>
<td>Allocation of less work time</td>
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Van Houten and Nau (1980) used tokens as fixed and variable ratio reinforcement on the behaviour of five children who were six to nine years old. Both reinforcement schedules produced significant results.

Kornsweet and Yarnall (1981) were successful in decreasing out-of-seat and inappropriate talking behaviours by reinforcing in-seat on-task responding and providing tokens for tasks completed.

Sindelar, Honsaker and Jenkins (1982) used response-cost procedures to increase on-task performance of a seven-year-old learning disordered girl.
and a ten-year-old behaviourally disabled girl. The authors concluded that response-cost procedures significantly reduced off-task behaviour.

Rosenberg, Sindelar, and Stedt (1985) evaluated the effects of token reinforcers on time-on-task and math performance of forty-four, eight to twelve year old distractible special education students. Intervention was given in four treatment groups: (1) given simple coding tasks and token reinforcement for attention and performance, (2) given simple tasks and reinforced for performance only, (3) given difficult math tasks and reinforced for attention and performance, (4) given difficult tasks and reinforced for performance only. The findings indicated that students given easy tasks did not need attentional reinforcement, whereas those given difficult tasks required frequent reinforcement of performance and attention.

Pigott, Fantuzzo & Clement (1986) evaluated the effects of reciprocal peer tutoring combined with group reinforcement contingencies on the arithmetic performance of 12 underachieving fifth-grade students. Results indicated that the intervention increased the students’ arithmetic performance to a level indistinguishable from their classmates during treatment and 12-wek follow-up phases. Pre, post, and follow-up sociometric data indicated that the students who participated in the treatment groups increased their amount of peer affiliation with other treatment.

Baechle and Lian (1990) investigated the effects of direct feedback and practice on metaphor performance in learning disabled children. Direct feedback and practice increased significantly metaphor performance of these children. Further, the grade and reading level of the subjects correlated with their metaphor performance.

Selinske, Greer & Lodhi (1991) studied the effect of a comprehensive application of behaviour analysis to schooling on the total trials taught correct student trials, and objectives achieved in a small school. The package was
implemented in a school for children with multiple disabilities and included a staff training program based on a personalized system of instruction, organizational behaviour management procedures for supervisors, regular assessment of teacher behaviors, and teacher assessment of all instructional trials received by the 38 children to a scripted curriculum. The design was a multiple baseline across four groups of teachers and included baseline, training and full treatment phases over a 2-year period. The results showed educationally significant increases in trials taught, correct trials, and student objectives achieved as a function of the introduction of the package. A 3rd year of follow-up data and an analysis of the turnover of staff showed that the effects of the package were maintained and that the package had social validity.

Kearney and Drabman (1993) evaluated a strategy of write say method for improving spelling accuracy. This method provides immediate feedback to dual sensory modalities (i.e. V + A) following the administration of a daily spelling test. 4 males and 3 females (Mean age = 11.61 yrs.) with learning disability were taken. Compared to control conditions, the experimental procedure significantly enhanced spelling accuracy of subjects in a brief period of time.

Northup et al. (1996) compared three methods of stimulus preference assessment for verbal children and specifically evaluated the utility of a verbal choice procedure for assessing relative reinforcer value. Using a token system, relative preference for five categories of reinforcers (representing 15 different stimuli) was assessed by three methods: a reinforcer survey, a verbal stimulus-choice questionnaire, and a pictorial stimulus-choice procedure. Results showed that for the verbal and pictorial stimulus-choice assessments accurately identified high- and low- preference categories for 3 of 4 participants. Survey results along with often rated multiple categories as high
preference, were less likely to identify low-preference categories, and were less likely to correspond with the results of a reinforcer assessment.

Melchiori (2000) conducted a study on first graders, preschooler special education students, and adults who received a reading program wherein they learned to match printed words to dictated words and to construct (copy) printed words. The students not only learnt to match the training words but also learnt to read them. In addition, most of the students learned to read new words that involved recombinations of the syllables of the training words. The results validated and extended the generality of a prior analysis of a reading program based on stimulus equivalence and recombination of units.

Eckert et al. (2002) employed an experimental design to evaluate the relative effectiveness of combining two consequences (contingent reinforcement or performance feedback) with an antecedent intervention (listening passage preview and repeated readings) on the oral reading fluency of 6 elementary students. The antecedent intervention increased the number of correctly read words per minute for all 6 students. For 4 of the students, pairing the antecedent intervention with either of the consequences resulted in higher reading rates over the antecedent intervention alone. Undifferentiated results were obtained for the remaining 2 participants. The results suggest that combining an antecedent intervention with consequences may enhance the oral reading fluency of students with reading problems. However, individual responsiveness to the different intervention components indicated further experimental analyses to identify the most effective intervention.

Bonfiglio et. al (2004) examined the generalized effects of three treatment conditions (performance based, skill based, and a combination of the two) on oral reading fluency by an elementary school student. Results
indicated equal effectiveness of all treatments, maintenance, and possible evidence of generalization across passages.

Davis & O’Neill (2004) compared the effects of hand raising and response cards during a writing instruction class in a middle-school resource classroom with students who were learning English as their second language. Response cards increased the rate and accuracy of academic responding, increased weekly quiz scores, and had mixed effects on off-task behaviour, but most students reported that they preferred hand raising.

Codd ing et al (2005) studied the effects of immedi ate performance feedback on implementation of behaviour support plans. A multiple baseline across teacher–student dyads (for two classrooms) design was used to evaluate the effects of performance feedback on the percentage of antecedent and consequence components implemented correctly during 1-hour observation sessions. Performance feedback was provided every other week for 8 to 22 weeks after a stable or decreasing trend in the percentage of antecedent or consequence components had been implemented correctly. Results showed that performance feedback increased the treatment integrity of antecedent components for 4 out of 5 teachers and consequence components for all 5 teachers. These results were maintained following feedback for all teachers across antecedent and consequence components. Teachers rated performance feedback favorably with respect to the purpose, procedures, and outcome, as indicated by a social validity rating measure.

Rodriguez et al (2005) reviewed the token economy procedures of the 19th century and found that in the present day “among rewards that can be delivered in schools, tokens are compatible as by nature they are applicable to all students.”

and early literacy. Across 2 years and 20 Head Start sites, 750 teachers participated (500 target, 250 control), with 370 classrooms randomly selected to conduct pre- and post test assessments (10 randomly selected children per class). Greater gains were found for children in target classrooms than for those in control classrooms for all skills, but particularly for language skills. The presence of a research-based early literacy curriculum, higher levels of teacher education, and full day versus half-day programs were significant moderators of intervention effectiveness.

2.2 READING, WRITING AND SPELLING REMEDIATION RESEARCH

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 reinforcement were provided. Although their design was not strictly experimental, their results were consistent with the findings of more recent research. When programmed learning materials, a more structured environment, and reinforcement were provided, the frequency of correct responding increased.

Eachus (1971) used token reinforcement and verbal remediation for modification of sentence writing with ten children (ten to thirteen years old). High response rates and high levels of accuracy were established and maintained, which demonstrated the success of the intervention strategy.

Ayllon, Layman & Burke (1972) increased math and reading performance in four teenage hyperactive boys using a token economy with food and games as back up as reinforcers.

Kaufman and O’leary (1972) studied the effect of tokens on sixteen adolescents with disruptive behaviour and reading skills. In the reward group,
students received tokens for appropriate behaviour. In the cost group, students lost tokens for disruptive behaviour. Both token programmes were successful in reducing disruptive behaviour and increasing reading skills.

Research has also indicated that behaviours identified with learning disabled children may be directly modified via a direct behavioural analysis. Hasazi & Hasazi (1972) clearly demonstrated that children’s written two digit reversals were controlled by the attention and special help they received from the teacher. When attention was contingent upon correct formation of numerals, reversals were reduced to a low level.

Brigham, Granbard & Stans, 1972; Maloney & Hopkins, 1973; Maloney, Jacobson & Hopkins, 1975 studied the effects of behaviourally oriented interventions with LD students manifesting problems in writing. The outcomes of these studies are: Reinforcement that is contingent on (a) writing more words increases the number of words written (b) writing more action words (e.g., run and swing) increases the number of action words students use in their composition; (c) using different words leads to wider vocabulary. However reinforcing a certain aspect of writing usually does not affect other parts. In a similar vein Smith & Lovitt (1973) successfully decreased written a-d reversal errors by using a flash card & social reinforcement procedure in a tutorial setting. Similarly Stromer (1975) employed flash card modeling and social reinforcement to alter a variety of letter and number reversal problems in both regular and special education children.

Fauke et al. (1973) worked with a six-year-old boy with behaviour problems and low academic achievement. Primary reinforcement and praise combined with different teaching methods were used for verbal recall of letters and handwriting skills. Results showed a substantial increase in rate of verbal recall and improved handwriting skills.

Lahey, Mc Nees and Brown (1973) evaluated the effects of simple reinforcement contingencies 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.

Wilson and McReynolds (1973) devised a systematic training procedure, using points as reinforcers for four children (6 to 14 years old) to increase oral reading rate. All children showed increases in oral reading rate.

Using a ABAB design Ayllon & Roberts (1974) employed a point system with back up reinforcers to increase the reading accuracy from 50 to 70% in five boys in the same fifth grade class.

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

Ayllon, Layman, and Kandel (1975) contrasted the effectiveness of drug and behavioral treatment of students’ hyperactivity in math and reading class. Token reinforcement was delivered not for reduced activity, but simply for correct academic responses in either math or reading. Following a baseline assessment the children were first given drug treatment, then the drug was withdrawn and the behavioral treatment was instituted. Medication alone
reduced hyperactivity from about 80 to 20%, but had little effect on academic performance. When the behavioral treatment was put into effect, hyperactivity also fell to 20% and there was also an increase in academic productivity (accurate performance went from an initial level of 12% to a level over 85%).

Lovitt and Hansen (1976) found that the reading performance of learning disabled boys could be substantially affected by making rapid progress contingent on performance, they established a programme called contingent skipping and drilling “in which rapid, accurate reading and answering of questions 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 improvements in the pupils reading performance.

Stromer (1977) assessed the effects of behavioural remediation with children showing academic difficulties associated with the learning disabled. In experiment one, the child showed reversals omissions, and substitutions under letter naming and letter dictation exercises. A child’s written two digit number reversals were selected for remediation in experiment two. During experiment three, a small group of remedial reading students displayed written letter reversals. The results showed (a) that flash card modeling and social reinforcement, procedures eliminated all childrens errors, (b) that tutorial treatment effects generalized to classroom addition exercises and (c) that treatment results were maintained in post experiment observations.

Kaur (1977) compared the differential impact of four remedial strategy methods for thirty dyslexic children aged seven to nine years in schools situated in Chandigarh. Multisensory structured Linguistic methods, Alphabetic Phonic method, Behaviour modification method and Eclectic method (a combination of all three) were used in a control group experimental
design to reduce reading difficulties of dyslexic children. It was observed that remedial strategies are effective in reducing reading difficulties of dyslexic children. The levels of reading comprehension improved after remediation and the reading age of children considerably increased after intervention. Considerable improvement was also seen in spelling for free writing after the remedial programme. It was concluded that behaviour modification method was as effective as multisensory structured linguistic method in reducing reading difficulties of dyslexic children.

Lahey, Busenmeyer O’Hara, and Beggs (1977) also found that reinforcement could modify academic behaviour. Four learning disabled children with severe deficits in hand writing made dramatic improvements when token reinforcement was made contingent upon correctly written words. There was increase in the frequency of correct printings, and a decrease in errors of sequence and orientation.

Schwartz (1977) employed college students as contingent managers in programme designed to develop the reading skills of retarded readers in the seventh grade. Comparisons with pretest scores revealed that the reinforcement treatment condition had accelerated the rate of reading growth three times the expected rate for average students and four times their previous rate.

Foxx and Jones (1978) used an overcorrection procedure as part of a comprehensive treatment package to remediate spelling deficits of elementary and junior high school students. Subsequent studies have also been conducted using only the overcorrection plus positive reinforcement components of the Foxx and Jones (1978) treatment package. In these studies following each spelling error, the student was required to listen to the word pronounced by the teacher, pronounce the word correctly, say aloud each letter of the word
and write the word correctly. This sequence was repeated five times for each error word. This procedure was found to be effective.

Similarly, Jenkins, Barksdale and Clinton (1978) found that contingent, reinforcement led to improvements in the reading rate and comprehension of elementary-age learning disabled boys and that the improvements transferred across settings and were maintained.

Malamoth (1979) compared the effects of modeling with self-instruction using fifth grade poor readers and found that despite the small samples (sixteen vs seventeen children) the responses to comprehension theme after reading a story were significantly better for the experimental group than the modeling control group, who were provided with models of the same target components but without the explicit instruction to employ their self-management behaviours via internal speech.

Smith (1979) found that rate of oral reading could be positively affected by simply, having the teacher model fluent reading before requiring the students to read. In a second study she also observed that modeling influenced oral reading rate and accuracy of an elementary – age boy identified as learning disabled, but that additional interventions enhanced these effects.

In one study, Ollendick, Matson, Esveldt, Dawson and Shapiro (1980) found overcorrection plus positive reinforcement to be more effective than overcorrection alone in remediating the spelling deficits of students with learning disabilities.

Robinson, Newby & Ganzell (1981) employing a BAB design, used a token system to change the reading and vocabulary performance of an eighteen member class of hyperactive third-grade boys. Four different coloured tokens which could be exchanged for fifteen minutes of play on
electrovideo games, were earned by successful completion of two tasks that involved learning to read and to use new vocabulary words in sentences and two tasks in which the student served as a proctor to a student who had not yet completed those tasks. The mean number of tasks completed during the intervention periods rose to over nine times the number completed during reversals. The average completion rate for the weekly reading level examinations rose from four to eight fold during the token conditions. All the eighteen students responded to the token programme by increasing their academic performance.

Kirby, Holborn and Bushby (1981) utilized a behavioral treatment package for improving textual responding to sight' words, on six third grade students identified as deficient in reading skills. The design was a modified multiple baseline in which treatment was implemented over three of four word sets and terminated on earlier sets when commencing treatment on later sets. Four sets of bindo cards were constructed on (7 x 9 cm) paper divided into twenty-five equal sized boxes. Sight words of each set were randomly placed into twenty-four of these boxes (the center box was marked ‘free’) Bingo, winners were given tokens which were traded weekly for reinforcing activities. Noticeable improvements occurred for the word sets receiving the game treatment. Mean percentage points of improvement from baseline to treatment were approximately thirty percent. Terminal levels of correct responding exceeded ninety percent.

Wong and Jones (1982) taught sixty learning-disabled students from grades VIII and IX and sixty normally achieving grade VI students a five step, self questioning training programme and found that training substantially increased subjects awareness of important units of text and their reading comprehension as well as their ability to formulate questions about target units.
Paris and Cross (1983) emphasized the conditional knowledge about when and why to use reading comprehension strategies in their study and found that meta cognitive instruction significantly increased both children awareness about reading strategies and their comprehension. They also found that before and after instruction, reading strategies and their comprehension. They also found that, before and after instruction, reading awareness and comprehension were significantly co-related, indicating the role of meta cognitive awareness in cognitive performance.

Short, Yeates, Feagans and McKinney (1983) in their study extended the previous findings of Short and Ryan (1981), with poor readers to a wider range of students and to a group setting skill acquisition was clearly demonstrated not only in the recall and note taking data, but also in the quality of summaries written. Evidence of generalization was also obtained in their superior free recall of a lengthy expository passage as compared to that of untrained readers.

Brailsford, Remshord, Das (1984) investigated the effectiveness of remedial strategy training programme on test of cognitive synthesis and tasks of reading comprehension. Sample constituted twenty four learning disabled students, each receiving fifteen hours of remediation. The experimental group was given cognitive strategy training and the control group got remedial reading. Results indicated significantly greater experimental than control group improvement on four tests of cognitive synthesis and on reading comprehension levels.

O’Shea, Munson, and O’Shea (1984) studied the effects of error correction, word supply & drill, phrase drill, verbal praise and stickers, on the oral reading performance of five learning disabled mainstreamed students. All procedures produced gains with phrase drill producing the best. Likewise
Singh and Singh (1984) also reported that previewing procedure in which the teacher used a brief discussion period to familiarize the students with the contents of a passage prior to their reading of it, reduced reading errors.

Rose (1985) & Rose & Sherry, (1984) used behaviour analysis procedures to examine the effects of previewing procedures on oral reading performance. They reported that a procedure in which the teacher reads a passage aloud to students was superior to one in which the students may examine it silently prior to the time when they are required to read it aloud. The listening procedure resulted in fewer oral reading errors for both elementary students and secondary students.

Teaching LD students to note similarities in the spelling of different words has been used by Gerber (1986) to promote the generalization of spelling skills to words other than those targeted during training. After presenting a list of words to the students, the teacher repeatedly imitated the students errors and then modeled the correct spelling until the students reached the learning criterion on the list. A second list was then used to test whether the students would recognize the similarities between the words in the two lists and spontaneously use these similarities to spell the words in the second list. Then, the words in the second list were also taught to criterion. However, before the third list of words was given, the teachers pointed out the similarities among the three lists and suggested that remembering previously spelled words may be helpful in spelling the new ones. This strategy, improved the students spelling proficiency because they required fewer trials to reach the same learning criterion.

Rosenberg (1986) used token economy and rule-review procedures on five mildly handicapped students enrolled in a public school resource room programme. Behaviours targeted for reduction were distractibility,
impulsiveness, verbal and physical aggression. Combining the token economy with rule-review procedures dramatically increased appropriate classroom behaviour.

Standford and Lloyd (1987) studied the effects of a self-instructional procedure for handwriting on two learning disabled elementary school boys using baseline design. Assessment of handwriting performance included letter formation, letter proximity to the line, letter height and word spacing. Results indicated that handwriting improved markedly when the card was introduced, the improvements persisted overtime while the card was still available to them and the effects were maintained even after the card was no longer available. Data from the regular classroom for one of the boys showed that his handwriting improved in that setting.

Swarup & Sharma (1988) conducted a study on five learning disabled children aged ten-fourteen years to improve their written syntactical deficiency by cognitive behavioural training (CBT). The post test syntax quotient scores increased with training by seventeen points registering 22% improvement over the pre-test syntax quotient scores. The t-value indicated a high level of significance in the mean differences after a lapse of eight days after treatment thereby concluding that CBT has a positive effect on syntax usage in the written expression of the LD children.

Harris, Graham, Freeman (1988) analysed the effects of spelling strategy training and variations in study conditions on learning disabled childrens meta memory performance. Results indicated that even without inclusion of specific meta cognitive training, strategy training can produce important meta cognitive improvement.

Outhred (1989) described the effects of using a word processor on creative writing of a small group of children with learning disabilities. He
found that the children with severe spelling problems using a word processor seemed to result in fewer spelling errors, while for the children who were still predominately concerned with the mechanics of writing task, using a word processor seemed to result in longer stories.

Diveta and Speece (1990) investigated on the effect of blending and spelling training on the decoding skills of two first grade boys with learning disabilities who were in phonetic cue stage of reading. Both of them received pre and post test administrations of a phonemic segmentation task. Although neither intervention proved superior but they improved their phonemic skills even when independent training in this area was not provided.

Blandford (1991) examined the effect of self-instructional spelling proof reading strategy on percentage of identified misspelling words of four learning disabled students. Results of the study were ambiguous with only participants clearly showing increase in accurately identifying misspelling at the onset of intervention. An encouraging finding of the study was that the students thought that strategy was “fun” to use and that it helped them spell better.

Cornwell (1992) studied the relationship of phonological awareness, rapid naming, and verbal memory to severe reading and spelling disability in 54 children with severe reading disabilities (48 boys and 6 girls; Mean age = 9 years, 7 months). They found that several independent processes interact to determine the extent and severity of reading problems.

Gorden et al. (1993) summarized 17 spelling intervention strategies for students with learning disabilities and provide implication for improving spelling instructions. The following spelling intervention were determined to be effective, the use of error limitation and modeling procedure, learning 3
word a day as approach to a long word list and use of computer assisted instructions, peer tutoring and instructional techniques.

Tezler (1993) aimed to compare the effectiveness of three types of modeling (i.e. Copying, mastery and no modeling) and two types of strategy attribution (i.e. with attributional experiences and without attributional experiences) on students’ use of self-regulated learning process (self-efficacy and self evaluation) and spelling achievement. Using a model of self-regulated learning as a framework for the investigation, 50 sixth and seventh grade students who had been identified as having difficulty in learning how to spell served as subjects. The subjects were randomly assigned to one of five treatment groups according to a 2 (copying vs. mastery modeling) x 2 (attribution vs no attribution) design. A control group formed the fifth group. The study involved four phases: training phase, a pre test phase, a learning phase and a post-learning phase. During the training phase subjects in the treatment group observed a video-tape of a peer model demonstrating a strategy for learning how to spell. The pre test phase comprised of subjects’ rating their self-efficacy for spelling and taking a spelling pre test. During the learning phase subjects practiced the observed strategy. The post test phase consisted of a spelling post test and subjects’ self-evaluative judgement. The dependent measures were: self-efficacy for spelling, spelling pre test, self-efficacy for learning, spelling post test and self evaluation for spelling. Results of the study showed that for two of the dependent measures, (post test and self evaluation), modeling and a type of modeling (i.e., coping) each affected student spelling performance and level of self efficacy. Attribution training did not significantly affect spelling performance or self efficacy. An additional finding was that observing a coping model (using a strategy with attribution) had a significant effect on post test spelling performance and self
evaluative judgement. There were no significant interactions between types of modeling and use of strategy attribution.

Mc Naughton, Hughes and Clark (1994) reviewed twenty seven studies (published 1978-1994) on spelling instruction for students with Learning disabilities and coded them for student characteristics, instructional activities, nature of the materials to be learned and criterial tasks. Most of the studies investigated the impact of instructional activities on the production of targeted spelling items by elementary grade students with learning disabilities. Seven activities that may enhance learning for some students with learning disabilities were identified.

Green (1995), while conducting a study on spelling test for teachers of students with learning disabilities found that imitation and modeling students spelling errors followed by writing the word correctly is an effective way for teachers to provide feedback to the students with learning disabilities. He emphasized the importance of the most effective and empirically validated instructional techniques in order to maximize student learning, time and effort.

Bose (1996) assessed the effectiveness of computer programmes as remedial strategies for overcoming specific learning disabilities in 60 LD children from six Delhi schools with computer facilities. The tools and techniques used were Teacher Rating Scale, Observation Schedule, Draw-A-Man Test, Wechsler’s Intelligence scale for children, Schonells Reading and spelling tests, Achievement Tests and classroom performance of the children. The collected data were treated with non-parametric statistical methods. Major findings that emerged were (i) the experimental group gained more than the control group by 5% in math, by 7% in English;(ii) the gain made by
the sub-groups of the experimental group were noticeably more than those made by the control group. This was true both for mathematics and English.

Stout (1996) reports that in a school wide restructuring programme called ‘success for all’, at John Hopkins university, student achievement was measured on reading. In assessing effectiveness of the assessment feedback as intervention a control group was compared with the students in success for all programmes. Comparisons were made at first, second and third grades. While assessments showed improved reading performance for all students, the most dramatic improvements occurred among the lowest achievers. It also demonstrated that with early and continuing intervention nearly all children can be successful in reading.

Rukmini (1997) studied the problems of children with learning disabilities with special reference to dyslexia as related, its relation to I.Q. and personality. The sample comprised thirteen LD male and female children and thirteen non LD children. Based on the score on pupil rating scale, LD and non LD were selected. Their age range was between eleven-twelve years. The tools used to collect data included a Pupil Rating Scale by Myklebust, Malins intelligence scale for Children, Locus of Control, Intellectual Achievement Responsibility Scale by Crandall, Self Concept scale by Saraswat, Achievement Motivation Scale by Mohan, and Bender Gestalt Test by Dwivedi. The collected data were treated with mean, SD and ‘t’ ratio. The major findings revealed a significant difference between the LD and non LD on the intelligence full scale score; the non LD obtained a higher mean in the verbal and non-verbal test scores than the LD; the score on the self-concept scale, locus of control and achievement motivation did not reveal a significant difference between the LD and non LD.
Goel (1997) designed remedial techniques for arithmetic errors of 300 class I and II students with Learning Difficulties in rural and urban schools of Orissa. Tools used included test booklets and concrete aids in the form of coloured beads, blocks, marbles, rods, discs, number boards, abacus, measurement devices cards and charts, geometric shapes, coins and currency notes and a model clock. Collected data were treated with mean, SD, ‘t’ test and correlation. The following learning problems were identified related to arithmetic difficulties memory problems, reading problems, language problems, cardinality problems, symbol confusion, inability to group sets and ordinarily problems. Significant reduction in errors revealed that concrete materials were effective means to develop mathematical concepts and skills. While comparing data between Rural Oriya and Urban Oriya schools no significant difference was found at any level and the sense of accomplishment helped sustain the interest of the child in mathematics.

Gupta (1997) investigated the incidence rate of children with Learning Disabilities and studied the nature of such learning disabilities in Hindi and Arithmetic. The sample consisted of forty LD children. The data were analysed using descriptive and inferential statistics. The major findings that emerged were the incidence of learning disabled children of grade III was found to be 7.4% covering 4% boys and 3.4% girls; Almost all children displayed deficit in Hindi especially in written language, oral reading and recognition of words, sentences and two digit numbers; Listening comprehension was found better than reading comprehension and understanding and use of spoken language was found better than written language. However potential dialect interference effect on various components of language was observed. In arithmetic children showed deficiency in basic operation. None of the children irrespective of locale and
gender could reach the mastery level of 80%. Their achievement in terms of MLL was found to be fifty/fifty only among LD.

Bruck, et al. (1998) compared the spelling skills of third grade children receiving either whole language or phonics instruction. The phonic children produced more positionally constrained spelling (e.g., spelling the nonword soice as “soice” or soyce as opposed to sois) than the whole language children. They suggested that positional constraints must be fundamental component of the English spelling system.

Khanna (1999) examined the effect of multisensory instructional and play way approaches towards the remediation of spelling in science of the elementary learning disabled children in relation to their anxiety self-concept and locus of control that (a) multisensory play way approaches were useful devices to remediate spellings of LD children and that the experimental treatment had long term effects on the achievement.

Swanson & Sachse-Lee (2000) synthesized 913 articles on single-subject design intervention research conducted in the last thirty years for students with learning disabilities and highlighted four major findings of importance.

1. Findings provided evidence that educational intervention for students with learning disability produces positive effects of a respectable magnitude. The mean effect size across all academic domains was 0.90.

2. The most important variance (15% of the variance) related to high effect sizes came from those studies that included the instructional components of drill-repetition – practice – review, segmentation, small interactive groups, and the use of strategy cues.

3. The magnitude of effect sizes related to strategy instruction was qualified by variations in IQ and reading level. Effect sizes were
significantly higher for strategy instruction studies that non-strategy instruction studies for participants with IQ’s in the eighty-five to ninety range and reading scores below ninety-one.

4. The combined strategy instruction and Direct Instruction model yielded higher effect sizes.

Gupta & Pavri (2000) studied the effectiveness of TAK/v and VAKT approach in teaching spelling to spelling disabled children they found that there was a significant difference in the spelling performance of spelling disabled in favour of TAK/v approach under the delayed recall condition and also found insignificant differences between the groups.

Bourass and Treiman (2001) reviewed that early spelling development is guided by linguistic factors. Fine-grained linguistic analysis of spelling errors can help one to understand the difference that may exist between normally developing children and children with spelling disabilities.

Darch (2002) reports that two programmes were used and compared to study spelling and its improvement. The first programmes, the spelling mastery programme (Dixon & Engelmann, 1990) wherein students are taught to use spelling rules, and the second Laidlaw spelling programme (Roser, 1987) that utilizes writing activities based on word families, practice and motivational activities. The results demonstrated that spelling of students with LD improved significantly.

Tijms et. al. (2003) evaluated short term and long term effects of treatment for dyslexia. The treatment was computer based and focusing on learning to recognize and to make use of the phonological and morphological structure of words. The results of the treatment were clear improvements in reading words, reading text and spelling. Following the treatment, participants attained an average level of text reading and spelling. The attained level of reading words and reading text was found to be stable over a four year follow
up period. Spellings showed a slight decline one year after the treatment, but remained stable thereafter.

Fitzpatrick, et al. (2004) examined the effects of one and two day read over lessons in a reading master. The participant was a fifth grade male with learning disability. Data were collected on his correct responses and errors rate across various lessons. The results indicated a sharp decrease in errors with a smaller increase in corrects.

Falk, et al. (2003) conducted a study to improve students’ sight word vocabulary through the use of reading racetracks and flashcards. The participants were three nine-year old males diagnosed with a learning disability. The research was carried out in resource room of an elementary school. The outcome measured was number of correct words and errors said per minute from flashcard directly after completing a reading racetrack. The reading racetrack procedure was evaluated in an ABAB single case design. The results indicated that reading racetracks was effective in increasing children’s sight word vocabulary.

Thompson & Iwata (2005) conducted a review of reinforcement control procedures and found that applied behaviour analysis has a wide of therapeutic impact on socially significant behaviours. Academic performance being one of them. In a similar vein the remediation in spatial perception was found to be significantly and positively related with the achievement in academics in general and maths and spellings in particular Bansal (2005)

Devi (2005) reported that rather than being aberrant or idiosyncratic spellers, LD students perform similarly to younger normal children in spelling. The type of errors LD children make in spelling are typical errors normal children make for their developmental stage.

Wanzek, et al. (2006) conducted a synthesis of spelling and reading intervention and their effects on the spelling outcomes of students with LD.
This included an extensive search of the professional literature between 1995 and 2003 and yielded a total of 19 intervention studies that provided spelling and reading interventions to students with LD and measured spelling outcomes. Findings revealed that spelling outcomes were consistently improved following spelling interventions that included explicit instruction with multiple practice opportunities and immediate corrective feedback after the word was misspelled. Furthermore, evidence from spelling interventions that employed assistive technology aimed at spelling in written compositions indicated positive effects on spelling outcomes.

Thompson Vaughn, Prater & Cirino (2006) studied the response to intervention (RTI) of English language. Learners identified as at risk for reading difficulties in the fall of first grade was examined at the end of first grade and at the end of second grade. Students at risk for reading problems were randomly assigned to intervention or control groups. Intervention students received supplemental reading intervention daily for 50 minutes in small groups from October to April. Students in the comparison condition received the school’s existing instructional program for struggling readers. Criteria were established to determine adequate RTI at the end of first grade and at the end of second grade. The results indicated that greater number of students who participated in the first-grade intervention in either Spanish or English met the established RTI standards than students who did not, and this finding was maintained through the end of second grade.

Patel & Laud (2007) used songs to strengthen reading fluency. Their study evaluated the use of songs with lyrics to increase the reading fluency rates of three middle school students. In the first condition, students heard fluent reading modeled, read regular passages repeatedly and then received feedback on accuracy, phrasing and expression. After that, students received the same intervention, except that songs with lyrics were used instead of regular passages for the repeated readings. CWPM (correct words read per
minute) gains showed rate increases following re-readings of each passage and set of lyrics; however, greater increases in CWPM were made following the song lyrics passages suggesting that using song lyrics may be a superior way to strengthen fluency. Overall transfer, fluency rate gains, measured using new and unfamiliar passages, also showed rate increases, though these were less consistent.

The review of literature the researcher could lay her hands on as submitted above shows wide variations in design, age-level of sample and tools used in different studies. There is also a paucity of research as far as the reinforcers’ effect on retention and transfer is concerned. However, it provides some demonstration to identify the following trends of results for LD students.

(I) (a) Learning disabled pupils can be taught crucial academic skills, wherever reinforcement is an integral part of interventions and observable behaviour is the focus of treatments.

(b) Academic tasks are treated as the summed products of component behaviours and single subject methodology is frequently used as a research strategy.

(II) Although manipulation of consequences often improves performance, it is important that these pupils be shown how to perform as well.

(III) Contingencies that influence behaviour need not be simplistic and brazen (e.g., one gems for each line read) because learning disabled pupils respond well to more “natural” contingencies, provided that the contingencies are made clear;

(IV) Highly structured, carefully programmed instruction makes it possible to operationalize cognitive performance so that these can be
successfully taught to learning disabled pupils with reasonable prospects of transfer.

(V) (a) **Token reinforcers, enhance the accuracy of** LD students’ overall **academic performance** and increase the rate of study behaviour and reduce disruptive behaviour.

(b) **TE procedures** have a wide range of applicability and **can be used** among different populations i.e. normally achieving pupils, gifted, learning disabled and other exceptionalities and cater to different age groups.

(c) Functionally **significant academic gains** have been recorded on usage of token economy systems as compared to psychological stimulants.

(d) **Token reinforcers reduce/eliminate non-attending behaviours** (i.e., off-task behaviour, off-seat behaviour, impulsivity, non-compliance and the like) in children with learning disabilities.

(e) **TE procedures** have also been found to specifically **increase the reading, writing & spelling performance** of students with LD.

### 2.3 HYPOTHESES

In light of the scarcity of researches and replication studies on this hidden handicap (ie LD), null hypotheses have been formulated in the present study. The first four objectives do not require hypotheses as they have to be carried out by the investigator in order to commence the TE procedure.

1. No significant differences exist between the treatment and no treatment in the rate of learning to achieve the optimum level of expected academic performance in the three skill areas of reading, writing and spelling.
2. No significant differences exist between the groups treated by the TE procedure and without TE in the three skill areas of reading, writing and spelling.

3. No significant differences emerge in the academic performance of LD students due to variations in grade levels in the three areas of reading, writing and spelling.

4. There is no significant interaction effect on account of treatment (TE & Non-TE) into grade levels (I, II & III) on the academic performance in the areas of reading, writing and spelling.

5. There are no significant differences between TE treatment group and control group in the gains retained during the interval period between two phases of the experiment in the 3 skill areas of reading, writing and spelling.

6. There is no transfer effect of TE procedure from English language skill (i.e. reading, writing & spelling) to maths.

After having submitted the Introduction in Chapter 1 and the Review of literature in Chapter 2, Chapter 3 contains Method and Procedures. Chapter 4 has been devoted to the development of material along with its theoretical bases of Applied Behaviour Analysis. Details of the Conduct of the study have been given in Chapter 5. Chapter 6 deals with Results and discussion which contains 4 sections namely: Section A: Token economy and optimum level of learning; Section B: Token economy and performance in Reading, writing, spelling & total academic performance; Section C: Retention of gain in the scale of reading, writing and spelling; and section D: Transfer of learning of language skill to maths. Bibliography and appendices find their place after all these chapter in the thesis as is conventionally done.