Review of Related Literature
CHAPTER-II

REVIEW OF RELATED LITERATURE

The review of related research literature is a very important aspect in the planning of a new study. It helps us to know what other researchers have reported and what problem areas need to be explored. It helps researchers to eliminate the duplication of what has already been done and it provides useful suggestions for further research. The review of research studies has been divided into four sections as:

2.1 Research studies related to effectiveness of Inquiry Training Model.

2.2 Research Studies related to effectiveness of Mastery Learning Strategy/Model.

2.3 Research studies related to cognitive style.

2.4 Research studies related to self-concept.

2.1: STUDIES RELATED TO EFFECTIVENESS OF INQUIRY TRAINING MODEL

Many researchers have indicated that inquiry teaching results in greater student achievement and enhances positive attitudes towards science more than those strategies reflected in traditional science class rooms (Henkol, 1968; Richardson & Renner, 1970; Gabel, Rubba, and Franz, 1977; Russell and Chiappetta, 1981; Mulopa and Fowler, 1987; Saunders and Shepardson, 1987; Kyle, Bonnstetter, & Gadsden, 1988; Sidney, 1989; Hall and Mc Curdy, 1990; Geban, Askar, and Ozkan, 1992; Basaga, Geban & Tekkaya, 1994, Gupta 1995, Ertepinar and Geban, 1996; C.Y. Chang and Barufaldi, 1999). In contrast some studies have found that inquiry teaching strategies have no significant effects on the cognitive
achievement or learning of science process skills (Oliver, 1965; Orr, 1968; Germann, 1989).

Ivany (1969) and Collins (1969) probed the environmental factors which lead to increased effectiveness of Inquiry Training Model. They found that this model is more beneficial in elementary school science. When the puzzling situation arouse strong confrontations and also when the support material is of greater instructional value.

Schrenker (1976) reported that inquiry training resulted in greater comprehension of scientific content, stimulation of creative thinking and skills of gathering and analyzing information for elementary school science children.

Many studies have shown the relationship of inquiry teaching to cooperative learning instruction. Johnson (1976): supported a strong relationship between inquiry and cooperative learning structure and concluded that inquiry oriented classes tend to be more cooperative. Elefant (1980), studied the effectiveness of Inquiry Training Model with deaf students and found it successful. Here the findings suggest that this model can be tried with visually handicapped or with learners with any other kinds of handicaps too. Voss (1982) tried Inquiry Training Model with elementary as well as secondary level science students and found it to be beneficial at both the levels. Haukoos and Penick (1983) reported improved student achievement when using cooperation and inquiry learning in the science classroom.

Shymansky, Kyle and Alport (1983) reported a meta analysis of the impact of the National Science Foundation - reform inquiry oriented science curricula on student performance; they found that the science curricula improved student’s science achievement and process skills as well as their
attitudes toward science.

Pandey (1986) studied the effectiveness of Advance Organizer and Inquiry Training Models for teaching social studies to class VIII students. The objectives of the study were (i) to compare the effect of Advance Organizer Model, Inquiry Training Model and Conventional Teaching in terms of pupils' achievement in social studies, (ii) to compare the effect of Advance Organizer Model, Inquiry Training Model and Conventional Teaching in terms of pupils' attitude towards social studies and (iii) to study the pupil's reactions towards the Advance Organizer Model and Inquiry Training Model.

A purposive sampling technique was used in the study. The final sample comprised of 86 students of class VIII. Two experimental groups formed Advance Organizer Model group and Inquiry Training Model group consisting of 29 and 28 students. The control group consisted of 29 students. All students included in the sample were boys in the age group of 13-14 years. ANOVA t-test and chi-square tests were used for drawing conclusions.

The major findings were: (1) the treatments had different effect on pupils' achievement. (2) The difference in means of gain scores in achievement due to Advance organizer and Conventional Teaching was significant at 0.05 level. (3) Difference due to Inquiry Teaching Model and Conventional Teaching was significant at the 0.01 level and the difference due to Advance Organizer Model and Inquiry Training Model was not significant. There was no significant difference between the Advance Organizer and Inquiry Training Model, Advance Organizer Model and Conventional Teaching, and Inquiry Training Model and Conventional Teaching in terms of pupils' attitude towards social studies. (5) Pupils
reacted favourably towards the Inquiry Training Model and Advance Organizer Model.

Sidney (1989) studied the effects of the Inquiry method of teaching science on critical thinking skills, achievement and attitudes towards science. Four classes with 20 fifth grade students in each class were used. The same class teacher taught two classes using the inquiry method and two classes using the traditional method. The major finding were: (a) the Inquiry Method of teaching science as implemented in this study, did not yield significant effects on critical thinking skills, science achievement or attitude towards science (b) no significant effect was found when gender of the students was considered and (c) there was no significant interaction between method of instruction and gender.

Kyle, Bonnstetter and Gadsden (1988) reported that inquiry oriented instruction or curriculum materials significantly improved students attitudes towards science. Singh (1990) studied the effectiveness of Inquiry Training Model and concept Attainment Model and found that both the models were equally effective in teaching of physical science to class IX pupils. An elaborate three phase experimental study of concept Attainment Model and Inquiry Training Model was conducted by Passi, B.K. Singh L.C. and Sansanwal, D.N. (1991) under the guidance of Bruce Joyce, aimed at finding the efficacy of the training strategy adopting for training application in Indian classroom conditions. This was a workshop-based study on development of training in CAM and ITM, which brought about significant favourable changes in the attitudes of both - the teacher educators and the student teachers towards the models.

Vijay Kumar's (1990) study was on development of optimal models of chemistry curricula at collegiate level. Models of chemistry curricula were
selected, adapted and evolved and finally tested in order to determine the optimal models. 564 students (rural = 279, Urban = 285, Male = 260, and female = 304) and 315 teachers drawn from 10 colleges participated in the study. Vijya Kumar B, (1990) found the Inquiry Training Model the most effective, and the Advance Organizer, the least effective. Lazarowitz (1995) stressed that a combination of cooperative learning settings as an answer to students' social needs and the inquiry approach advocated by the science curricula can be one of the answers to the heterogeneity of today's secondary school class rooms.

Gupta (1995) conducted a study on relative effectiveness of some information processing models of teaching on mental process and attitude towards science. He found that Inquiry Training Model of teaching was effective in developing reasoning ability, scientific creativity, problem awareness ability and attitude of students towards science favourably. However this model could not bring significant gain in inquisitiveness or persistency. Concept Attainment Model, Inductive Thinking Model or Inquiry Training Model did not differ in effectiveness in terms of enhancing reasoning ability or scientific creativity. Inductive thinking model and Inquiry Training Model of teaching had been rated better than Concept Attainment Model in fostering problem awareness ability. However Inductive thinking Model and Inquiry Training Model did not differ in fostering ability to see the problems. Concept Attainment Model, Inductive Thinking Model or Inquiry Training Model did not differ in promoting attitude of the students towards science.

Ertepinar and Geban's (1996) study indicated that inquiry oriented instruction produces positive outcomes in student science achievement. Inquiry-group instruction was found effective for elementary mathematics teachers by Sassi, Morse and Goldsmith, (1997) and for first-
Louden, (1997) determined in a study whether teachers in block or traditionally scheduled biology classes (1) implement inquiry-based instruction more often or with different methods, (2) understand the concept of inquiry-based instruction as it is described in the National Science Standards, (3) have classes with significantly different student achievement, and (4) believe that their school schedule facilitate their use of inquiry-based instruction in the class room. Biology teachers in block and non-block scheduled classes were interviewed, surveyed, and observed to determine the degree to which they implement inquiry-based instructional practices in their classrooms. State biology exams were used to indicate students achievement. Teachers in block scheduled and traditional classes used inquiry-based instruction with nearly the same frequency. Approximately 30% of all teachers do not understand the concept of inquiry-based instruction as described by National Science Standards. No significant achievement differences between block and traditionally scheduled biology classes were found using the ANOVA analysis and a non-equivalent control group quasi-experimental design using same analysis techniques, significant achievement differences were found between biology classes with teachers who used inquiry-based instruction frequently and infrequently. Teachers in block scheduled believed that their schedule facilitated inquiry-based instruction more than teachers in traditional schedule.

Retzer (1998) examined the effects on learner attitude and development of using a cognitive apprenticeship approach to teach college level algebra. It incorporated inquiry teaching (focusing on interactive questioning of learners) and the use of writing across the curriculum.
strategies. Results of the study indicated no significant differences in either attitude or achievement; however, some aspects of the data suggested that the experimental group may have started at a lower point but were comparable in achievement by the end of the study.

Chastain (1998) conducted a study on six middle and high school science teachers who had participated in one or more summer institutes in Physics at the University of Washington and said they were implementing inquiry-oriented instruction in their classrooms were studied so that their instructional practices could be profited. Classroom observations, interviews, and teacher-used materials provided data for the six case studies. Each teacher's instructional practices were observed for two topics; one that teachers had studied in depth during the Summer Institute, another topic that they had not studied at the Institute. All of the teachers used worksheets minimally adapted from physics by Inquiry (1996, McDermott) for instruction in the topic they had studied in the summer institute and all had adopted the practice of oral 'check-outs' modeled by staff during the institute. Teachers varied widely in implementation of other inquiry teaching techniques, with the high school teachers following the model from the Summer Institute more closely than the middle school teachers.

Chang and Mao (1999) examined the comparative efficiency of inquiry-group instruction and traditional teaching methods on Junior high school student's achievement and attitudes toward earth science in Taiwan. A nonequivalent control group quasi-experimental design involving 16 intact classes was used. Treatment group students (n=319) received inquiry group instruction; control group students (n=293) received a traditional approach. Data Collection Instruments included the Earth Science Achievement Test and Attitudes Toward Earth Science Inventory (S. L. Mao & C.Y. Chang,
A multivariate analysis of covariance suggested that (a) students in the experimental group had significantly higher achievement scores than did students in the control group and that (b) there were statistically significant differences in favour of the inquiry-group instruction on students' attitudes toward the subject matter. The inquiry group instruction was superior in promoting student’s achievement and attitudes towards earth science because the treatment enabled students to plan their own investigations, gather and interpret data, analyze results, and share finding with their classmates. Or, superiority may have resulted because the pupils exposed to inquiry-group instruction had the opportunity to solve problems in a group, to share information, and to reflect on their inferences through small-group activities and discussions.

The results of the current study are consistent with the previous studies indicating that inquiry-oriented instruction produces positive outcomes in student science achievement. Moreover, this study supported the idea that the inquiry group approach enhances the study of earth science more effectively than does a more traditional teaching method. Students in the experimental group showed significantly more positive attitudes towards the subject matter than those students in the control group.

A perusal of the studies reveals that inquiry oriented teaching results in greater student achievement as compared to the traditional classroom, teaching in science (Henkel, 1968; Ivany, 1969; Collins, 1969; Richardson and Renner 1970; Schrenker, 1976; Gabel, Rubba and Franz, 1977; Rusell and Chiappetta, 1981; Voss, 1982; Haukoos and Penick, 1983; Shymansky, Kyle and Alport, 1983; Mulopa and Fowler, 1987; Saunders and Shepardson, 1987; Kyle, Bonnstetter and Gadsdon, 1988; Sidney, 1989; Hall and MC Curdy 1990; Geban, Askar and Ozkan, 1992; Basaga, Geban
and Tekkaya, 1994; Lazarowitz, 1995; Gupta, 1995; Ertepinar and Geban, 1996, Chastain, 1998 and Chang and Barufaldi, 1999), earth science (Chang and Mao, 1999), mathematics (Sassi, Morse and Goldsmith, 1997) social studies (Pandey, 1986), physical sciences (Singh, 1990); Chemistry (Vijay Kumar 1990), Biology (Louden, 1997) language arts instruction (Peck and Hughes, 1997) and College algebra (Retzer, 1998).

The Inquiry Training Model was also found effective for deaf students (Elefant, 1980).


It is also effective for developing critical thinking skills (Sidney, 1989), reasoning ability (Gupta, 1995), problem awareness ability (Gupta, 1995) and stimulates creative thinking skills (Schrenken, 1976 and Gupta, 1995). Also inquiry oriented classrooms tend to be more cooperative (Johnson, 1976; Chang and Mao, 1999).

In contrast, some studies have found that inquiry teaching strategies have no significant effects on the cognitive achievement or learning of science process skills. (Oliver, 1965; Orr, 1968 and Germann, 1989).

2.2 RESEARCH STUDIES RELATED TO EFFECTIVENESS OF
MASTERY LEARNING STRATEGY/MODEL

Mayo et al, (1968) in a six week summer session in
introductory, university level statistics emphasized the use of home work and weekly formative tests accompanied by individual and small group held as needed. Students were informed that their final grades would be determined by their performance rather than by their relative standing in the group. On a previously used final examination in 1966, 65 percent of the mastery learning students received a grade of 'A' in control with 3 percent of the 1966-comparison group. For final grades (based on mid-term and final examination) 65 per cent of the mastery group received A’s in control to 5 per cent of the comparison group.

Moore et al., (1968) conducted a study in which three courses, Biology, Psychology and Philosophy were taught by instructional materials, the students would use on their own. Students were tested as soon as they had completed each unit, they were directed to additional instructional materials and additional unit test until they achieved mastery. The students were informed that they were expected to reach an achievement level equipment to an A or B in the traditional grading system. In Biology and Psychology, the students were matched on aptitude scores and randomly assigned to either the experimental or the control group course, with 35 students in each group. On the final examination given to both groups, the experimental group was approximately one half standard deviation above the control group. In philosophy the grades of the experimental group were compared to those of a comparison group from a previous year. Approximately, four fifth of the experimental group received an A or a B compared to three fifth of the comparison group.

Airasian (1969) study shows that by conducting diagnosis for placing the learner at the approximate starting point in the learning of the content and also by arranging the learning experiences in a sequential way and then ensuring that the learner masters each learners' task before
proceeding to the next learning task of higher level, the excessive time spent in teaching higher level concept could be saved.

One of the large implementations of Bloom's mastery learning has been done in Korea under the direction of Hogwon Kim, Yung Dug Lee and their colleagues. They used B-MLS i.e. group-based mastery procedure for teaching students in Elementary and Secondary schools.

Kim et al. (1969) conducted his study on 272 seventh graders, while teaching Geometric figures. The results showed that 74 percent of the experimental group compared to only 40 percent of the control group students attained the master criterion of at least 80 percent correct answers on the summative achievement test. Based on these results, Kim expanded his mastery program. Kim et al. (1970) took 5,800 seventh graders from nine middle schools in Seoul, and taught Mathematics and English for eight weeks. In English, 72 percent of the mastery students attained mastery criterion, whereas 28 percent of the nonmastery students performed at the minimum pass level. In mathematics, 61 percent of the mastery program students performed at criterion and 39 percent of the nonmastery students performed at the criterion. Kim's next project involved teaching Mathematics, English, Physics and Biology to 25,887 seventh grade students from rural and urban schools over an entire school year. Again, similar procedure was used. 50 percent English, 48 percent Mathematics, 30 percent Physics, 20 percent Biology mastery students performed at criterion while 44 percent English, 26 percent Maths, 8 percent Physics and only 3 percent Biology nonmastery students performed at the criterion (Kim, 1971, 1974).

Collins (1970) investigated the effectiveness of B-MLS for teaching modern Mathematics at the Junior high school level. Research used six treatments i.e. $T_1$ (only list of objectives), $T_2$ (objectives plus test
problems), T3 (objectives, diagnostic test and review prescriptions), T4 (only problem and review prescription), T5 (only problem, and T6 (control group). The result indicated that T2 and T3 helped 80 percent while T4, T1 and T5 assisted 70 percent, 60 percent and 50 percent student respectively to achieve mastery as compared to T6.

Biehler (1970) examined the effectiveness of Bloom's mastery learning strategy for teaching introductory undergraduate Educational Psychology and reported that the strategy seemed to be effective, both cognitively and affectivity for students whose performance on the first course examination might ordinarily have led them to give up. Duncan (1976) also reported the effectiveness of B-MLS for a college elementary function course of Maths.

Lee et al, (1971) replicated Kim's procedure. This project involved 12,000 students of fifth and sixth grade enrolled in Arithmetic and Science course during one school year. In fifth grade Arithmetic 42 percent, and in Science 39 percent of the mastery students as compared to 12 percent and 7 percent nonmastery students of Arithmetic and Science respectively reached the criterion. In sixth grade, 45 percent Arithmetic and 46 percent Science mastery students as compared to 18 percent and 12 percent nonmastery students reached the criterion.

Block's analyses (1971) of forty studies carried out under different school conditions led him to conclude that inspite of the varying backgrounds possessed by the subjects, mastery learning strategy was effective in bringing most of the students to a high degree of achievement by the end of the course. He found that in general, mastery strategies enable about three-fourths of students to learn to the same performance standards as the top fourth of students learning under conventional, group-based instructional approaches. For subjects where most of the students
have achieved the pre-requisite learning, mastery procedures appear to be able to almost eliminate the effects of individual differences on level of achievement.

Tierney (1973) while taking undergraduates students of History course concluded that some students learned the material through the lectures while the others learned with the help of either a Bloom's or Keller's feedback procedure. Further his data indicated that Bloom's feedback correction strategy yielded significantly higher scores on items than Keller's strategy.

Myers(1975) studied the effects of mastery and aptitude on achievement in an Introductory College Geography course. The study showed some evidence indicating that the mastery treatment had some impact on achievement scores of low aptitude students. However, the investigator did not find it prudent to claim that the treatment was effective as the number of students involved in the study was very limited. The study also found that the mastery treatment took more time for the low aptitude students than it did for the middle and higher aptitude students. The amount of time needed for remedial treatment in tutorial sessions correlated negatively with achievement.

Swanson (1976) investigated the influence of different remediation strategies on student retention of cognitive achievement in chemistry. Three treatment groups taken were Keller group, Bloom group and traditional group. The results concluded were that achievement gain scores failed to produce a statistically significant difference between the three groups.

Bloom (1976) has provided a summary of results of studies carried out by Maye and Lango (1966), Kersh (1971) Pillet (1975), Jones, et al, (1975) etc. in different subjects and in different grades. These studies were
conducted on the learners of mastery and control groups. Both the groups were provided with similar conditions of group instruction. Mastery group was however provided with additional time and help following the formative evaluation at the end of each learning unit. The learners tutored under mastery learning scored significantly higher than those in the control group.

Kulhavay (1977) reviewed the research on feedback effects in written instruction. He concluded that feedback corrects error and error-correcting action of feedback is more effective when it follows response about which the student felt relatively certain he noted that delay of feedback increases the effectiveness of feedback and suggested that pre-search availability must be controlled if feedback is to be effective.

Denton and Seymour (1978) tried to determine if the acquisition of higher order intellectual processes is tenable for secondary level teaching candidates when the independent variables are unit pacing and different remediation strategies for mastery learning. The results of this investigation indicate that the remediation strategy which specifies in default how to correct deficiencies appears to be most appropriate for less intense pacing, while less specific remediations are appropriate for time compressed programmes.

Dunkleberger (1978) studied the cognitive consequences of internal and external achievement monitoring in mastery learning and found that repeatable testing components of mastery learning failed to promote achievement as theorized by Bloom.

Miller and Ellsworth (1979) investigated the effects of time constraints and unit mastery requirements. They examined the effects of prior academic achievement and instructional approach on the number of instructional units attempted and completed as well as the amount of
content retained for 180 University students enrolled in a mastery or modified mastery approach to instruction course. The mastery approach provided for unlimited resetting and relearning trials, over nine instructional units constrained by an end of the semester time limit. The modified mastery approach allowed for only two trials per unit and had no unit perfection requirement for advancement. They found that regardless of the learning approach used, higher prior achievement students attempted more units, completed more units and retained more information. The study further revealed that students under a limited, two trial approach attempted more units, completed as many, and retained more course content than unlimited trials student.

Bauman (1980) applied a mastery learning model to an undergraduate course in teacher education. Results of the study supported the use of the mastery learning model as an alternative method of teaching an undergraduate course in teacher education. It presented substantial evidences that the mastery learning strategy did have a positive effect on student's perceived cognitive development both at the module and course level.

Pharr (1980) shows the effect of feedback. His study shows that the various types of delay schedules do not differ significantly in their effects on time, level of achievement, retention and ability to predict the immediate next semester performance. However, they have influence on the presentation of wrong responses, thus revealing that the delay in feedback may cause the presentation of wrong responses.

At the University Level; Thompson (1980) examined Bloom's mastery learning strategy on the achievement of forty graduate students enrolled in Educational statistics classes in a private Midwestern University. The finding indicated support for the mastery learning strategy as a highly
favourable instructional component for enhancing student learning.

Mathews (1982) tried to find the effect of mastery learning strategy on the cognitive knowledge and unit evaluation of students in high school social studies. The content of the course consisted of 4 weeks unit on World War - II which was taught to students enrolled in a high school American History course. The experimental group received instruction by mastery learning strategy. The study showed (a) significantly higher scores on an end-of-unit summative test of students assigned to the mastery group (b) a significantly lower variance score exhibited on an end-of-unit summative test for students assigned to the mastery group (c) a significant higher number of mastery students of 90% on an end of unit summative test. It, however, did not support the hypothesis regarding significantly higher scores on an end-of-unit evaluation form for students assigned to the mastery group.

Benninga (1983) designed the study to determine the effectiveness of a group-based teacher-paced mastery learning instructional model in undergraduate educational courses and concluded that students in mastery learning scored higher in a common final examination than students taught by conventional methods.

Pratt (1983) investigated the effects of the application of the concepts of sequencing, mastery and reinforcement on students achievement in basic English skills. It was found that the effect of treatment was statistically significant to a high degree.

Soto (1983) worked to assess the extent to which group instruction supplemented by mastery of the initial cognitive pre-requisites approximates the learning effectiveness of one-to-one tutorial methods. Four different learning conditions were provided (a) enhanced initial cognitive entry behaviour plus mastery learning - a maximal group
instruction. (b) conventional group instruction, a minimal quality of instruction and two intermediate qualities of instruction (c) mastery learning, which used the feed-back corrective procedures and, (d) conventional group instruction, plus enhanced initial cognitive behaviour. It was revealed that the achievement attained is strongly determined by the learning conditions provided. It emerged that the average students in the maximal learning conditions group was above 95% of the students in the conventional group.

The study of Clark et al, (1983) was designed to examine the effectiveness of a group-based teacher-paced mastery learning instructional model in undergraduate education courses. Two of six sections of a required education course on teaching handicapped children in regular classrooms were imparted instruction by using mastery learning strategy. The results indicated that the students in mastery learning sections scored higher on a common final examination, achieved higher course grades, and were absent less often than students in sections taught by more conventional methods.

Srivastava (1983) found that instruction in mathematical modeling using mastery learning strategy results in greater acquisition and retention of modeling skills than instruction in mathematics modeling using a non-mastery approach. Instruction in mathematics modeling led to saving in time taken to master a physics unit and shortening of the time required to master each objective.

Dillashaw and Okey (1983), Luckemayur and Chiappetta (1981); and Loposer (1977) compared the student's achievement on one or more of certain (a) cognitive aspects like academic performance and retention (b) affective aspect like attitude towards science and strategy used, attitude towards science instruction and the effect of locus of control on it, and on
task behaviour and the effect of aptitude on it. The studies revealed the following findings:

1. The groups taught by the modified M.L.S. and personalized system of instruction outscored the groups taught by the traditional methods on the academic performance and on task behaviours (Dillashaw and Okey (1983)).

2. The modified M.L.S. and P.S.I. groups did not differ in the rating on the student teacher's performance related to higher order cognitive skills (Seymour, 1978) and on the task behaviour (Dillashaw and Okey, 1983).

3. The groups which received instruction through modified M.L.S. and traditional methods of teaching did not differ in academic performance (Loposer, 1977) and variation in academic performance (Luckemayer and Chiappetta, 1981).

4. The modified M.L.S. groups outscored the groups instructed through traditional methods of teaching in their academic performance (Luckemayer and Chiapetta, 1981) and their attitude to the strategy (Loposer 1977).

5. The modified and personalized system of instruction groups and the group taught through traditional methods of teaching did not differ in their attitude towards science.

Reed (1983) determined whether some of the concomitant variables namely, grade, level, grade point average, parent's educational level, previous experiences and sex would account for the variance in cognitive achievement of mastery learning group. It was found that only the grade point average could account significantly on the level of variance in the final
Tse (1983) attempted to investigate the hypothesis that a Mastery Learning Method in teaching introductory accounting would

i) Increase accounting achievement scores.

ii) reduce dropout rate.

iii) cancel out the effects of previous knowledge of accounting upon subsequent performance.

The results revealed that the differences between control and experimental groups with respect to achievement and dropout rate were insignificant. However, the study gave some evidence that prior accounting knowledge, contrary to expectations, did correlate with achievement.

Jones (1983) found that pre-service elementary teachers did grow in their development of logical reasoning when exposed to a one semester course in elementary school science methods which emphasized mastery of science processes.

Thompson (1983) study focused on four components of M.L.S. Efforts were made in this study to determine the degree of contribution of each of these components namely, feedback/correctives, participation on cues and reinforcement towards achievement. This study reveals that feedback/correctives contributed the most. It however does not indicate the degree of contribution of the other components on achievement. This finding reveals the existence of strong inter-relationship between the four characteristics.

Hooda (1983) studies the effect of mastery achievement in mathematics. The sample consisted of class VI in the city of Indore. One section constituted the control group and the other experimental group. Teaching of mathematics through mastery learning strategy was the
experiment treatment. Control group was taught through conventional method. It was found that the group of students taught mathematics through mastery learning strategy showed significantly higher gain in the achievement than the group of pupils taught mathematics through conventional method. Also students instructed through mastery learning strategy exhibited improvement in their self-concept and attitude towards mathematics but he found that the improvement was not significant.

Hooda and Jarial (1983) carried out a study aimed at finding out the effect of mastery learning strategy on different dimensions of verbal and non-verbal creativity of children. The study revealed that students in the experimental group scored significantly higher than those in the control group on all the dimensions of verbal and nonverbal creativity. This shows that teaching through mastery learning strategy helps in improving the different dimensions of verbal and non-verbal creativity.

Singh (1983) conducted his study on high school social studies students and found that there was a significant increase in the achievement motivation of the students after taking instruction through B-MLS as compared to programmed instruction and CG but there was no significant difference in the change of self-concept and test anxiety of the students taught through these three treatments.

Mathur (1983) made a comparative study of Individually Guided System of Instruction (IGSI) and conventional teaching approach on XI grade pupils in the subject of Physics. Twenty one units of Physics were taught. The mastery level to be attained in assessment of the unit by IGSI taught students was 70 percent or above for going on to the next unit. Results showed that 75 percent of the students taught by IGSI scored above 70 percent, while only 25 percent of the group taught by conventional method scored above 70 percent in summative test.
Clark, Gusky and Benninga (1983) reported that a group based, teacher-paced mastery learning group scored higher in common final examination, than students taught by conventional methods. Arlin (1984) attempted to assess both mastery proponents and mastery critics' claim in the context of learning time differences. His study indicates that if equal learning time is desired, as in many current forms of schooling, then inequalities of achievement outcome appears to be an inevitable concomitant if equality of achievement outcome is chosen as an end, as in mastery learning then inequality of time seems necessary as a means.

Jangira and Yadav (1984) applied the Indian model of mastery learning (IMML) to one group of IX class students. The other group was taught through conventional method. The two groups were matched on previous knowledge in mathematics, intelligence and socio-economic status. The result showed that pupils taught through (IMML) (Mastery Group) scored significantly higher on mathematics achievement test. It also revealed that different percentile achievement scores in mastery group were consistently higher than the conventional group.

Yadav (1984) investigated into the effects of mastery learning strategy in teaching mathematics. The sample consisted of Six rural Govt. High Schools. Three schools were assigned to the experimental group and three schools to the control group. It was found that the groups of pupils taught mathematics through mastery learning strategy showed significantly higher gain scores on criterion achievement test than the groups of pupils taught through the conventional approach. Further it was reported that 80 percent of the cases in experimental group scored higher than 72.89 percent of the total achievement score, while 20 percent of the cases in the control group scored less than 21.09 percent of the total scores.

Sethi (1985) conducted a study on fifth grade students in the subject
of Maths and found that Keller’s and Bloom’s mastery learning groups were equally effective in respect of percentage of obtained scores and at the learning type (comprehensive and skill) in immediate test. Blakemore (1985) investigated the effects of Bloom’s mastery learning strategy on students at Temple University in Philadelphia, as taught Recquetball skill in physical education classes and found that mastery technique produced some less than positive attitudes about grading and the class in general. High aptitude mastery students liked the way the class was taught the least while high aptitude non-mastery students liked it the best. In achievement, mastery group was significantly higher than non-mastery group at the midtest, which proved that ML was effective for producing quick results.

Kuhn (1985) conducted a quasi-experimental study of mastery learning strategies in the teaching of intermediate French in a suburban high school attempted to ascertain whether the concepts proposed by Benjamin Bloom were appropriate for foreign language study. The results indicated that there was a significant difference between the experimental and control groups on the summative examination.

Saners (1985) studied whether the mastery learning programme was more effective in improving reading achievement or not and concluded that ML was significantly more effective a programme. Koul (1986) examined the effect of mastery learning strategy on achievement motivation and test anxiety of socially disadvantage group in Himachal Pradesh. The results of the study revealed that the achievement motivation of the students taught science through mastery learning strategy was significantly higher than that of the group taught through conventional method of teaching. It was also found that there was a decrease in magnitude of the test anxiety of students imparted instruction through mastery learning strategy.

Larson (1986) concluded that most students achieved success at
improvisation in a Jazz content and were able to acquire skill in using seven chords. All students attained mastery score in the examination which tested cognitive knowledge of Jazz idiom as taught by ML. Fuchs, et al., (1986) assessed the effects of contrasting mastery learning on performance among high and low-achieving students. They found that when principles of mastery learning were adhered to more rigorously as in the alternative mastery learning system, achievement among low-achieving students was enhanced. In a more general way the result added to a growing body of evidence indicating that high and low achieving students perform differently under varying instructional conditions and that low achievers might require more direct, structured elaborated instruction and more frequent, detailed, clear feedback.

Ehlers (1986) noticed that utilizing modified mastery learning as an instructional method in college algebra may enhance mathematics achievement. He examined the influence of age on achievement and found that students in the 'under 21' age-group may demonstrate higher achievement than those in the "21 and over" age group. Lovullo (1986) attempted to determine the influence of mastery learning strategy on attitudes and achievement of sixth grade students. His purpose was to find answers to the following questions : (1) What specific student's attitudes towards school are a result of differences in schooling (i.e. mastery versus non-mastery approaches)? (ii) To what extent did a program utilizing mastery learning/outcome-based strategies enhance more positive attitudes in Sixth-grade students? (iii) Which specific components in a mastery learning/outcome-based-environment played a role in creating more positive attitudes? The results of the study revealed that attitudes are not significantly enhanced as a result of differences in schooling (i.e. mastery Vs non-mastery). The data were insufficient to determine specific attitudes
related to success or failure.

Jacobsen's (1986) study was to determine if student achievement could be improved and/or the number of remediations required for mastery were reduced by incorporating learning styles into initial instruction in a mastery learning classroom. The researcher concluded that by incorporating learning styles into initial instruction in ML classrooms, the number of remediations necessary for mastery could be significantly reduced.

Anuforo (1987) studied the effects of mastery learning strategy on pupil's attitude towards the study of English Language syntax found the attitude gain scores mean of the experimental group was significantly higher than that of control group.

Challahan (1987) chose a new field for experiment and conducted his study to test the effectiveness of mastery learning procedures as proposed by Bloom in Psychomotor area. The purpose of his study was to determine the effects of mastery learning approach on learner achievement of basketball shooting-skill and concomitant student state anxiety. The results indicated that the mastery learning students were somewhat higher in skill level and lower in anxiety level than traditional pupils, but not at a statistically significant level.

Naslund (1987) conducted a study to see the learning beyond mastery to automaticity and its effect on individual variation and retention. The group learned same behaviour but practiced mastery and automaticity in different manners. The results were that in psychomotor task the group that practiced components in a cumulative sequence took significantly less total trials (mastery+ automaticity) than the comparison group (that practiced the components in Union). Chand (1987) concluded that K-PSI and B-MLS had equal positive effects on performance in Geography of ninth grade, Adi
Tribe students and performance of K-PSI and B-MLS groups were superior than control group.

Patadia (1987) worked with fifth grade students with the objective of developing a strategy for mastery learning in geometry and to validate the effectiveness of the developed strategy. The strategy she developed consisted of (1) Introduction (2) Structured Lecture (3) Discussion Session, (4) Individualized Tutorials (5) Mathematical Models (6) Problem Solving (7) PLM (8) Text Books and Workbooks (9) Small group study sessions, (10) Mathematical games (11) Review and practice (12) Assignments, (13) Feedback Sessions, (14) Formative and Summative tests. Sample consisted of 94 pupils, 51 in the experimental group and 43 in the control group. Result showed that the achievement of the experimental group was significantly higher than that of control group. It also revealed that dependence of the achievement of pupils on their IQ could be reduced considerably by using the strategy for mastery learning developed by the investigator.

King (1987) investigated the effectiveness of Bloom’s and Keller’s mastery learning strategies on high school students and found no difference in Reading achievement between the two treatment groups.

Slavin (1987) reviewed the research on mastery learning, contrary to all previous reviews, indicating that the process had essentially no effect on student achievement. This finding surprised not only scholars familiar with the vast research literature on mastery learning, showing it to yield very positive results, but also large numbers of practitioners who had experienced its positive impact first hand. A close inspection of this review shows, however, that it was conducted using techniques of questionable validity (Hiebert, 1987), employed capricious selection criteria (Kulik et al. 1990), reported results in a biased manner (Walber, 1988) and drew
Mathur (1988) in his study found MLS as an effective strategy in terms of achievement, self-concept and attitude towards statistics for both undergraduate and post graduate students. Guskey and Pigott (1988) examined their study that implementing the essential elements of mastery learning does not require drastic change, extensive research evidence shows that the use of these elements can have very positive effects on student learning. Providing feedback, correctives, and enrichments, and ensuring congruence among instructional components can be accomplished by most teachers with relatively little time or effort, especially if tasks are shared among teaching colleagues. The Mastery Learning process also has been shown to yield improvements in the student's school attendance rates, their involvement in class lessons, and their attitudes towards learning.

Kulik and Kulik (1988) using meta-analysis, found that delay of feedback is beneficial only under controlled and somewhat artificial conditions and that immediate feedback is recommended for conventional education purpose.

Earnheart (1989) examined impact of enhanced initial cognitive entry behaviors and mastery learning on third grade students of different socio-economic status for teaching mathematics. All the experimental groups scored significantly higher than control group at the 0.05 level of confidence. So, the results of this study support Bloom's theory pertaining to ML and enhanced initial cognitive entry behaviours with regard to achievement. Although not tested directly, Bloom's theory regarding achievement was not supported by the findings of this study.

Monzer (1989) studied effectiveness of Bloom's MLS for elementary and middle school mathematics achievement and found that there was no
significant difference between achievement and subjects related effect for second and fifth graders. For seventh grade, control groups outperformed the experimental group in mathematics-concepts and total Mathematics. So Bloom's theory of ML was not supported by this study.

Slavin (1987, 1990) reviewed mastery learning literature and found that convincing evidence was still needed to prove that mastery learning can accelerate achievement in general in elementary and secondary schools. He argued that there were clear indications that the tests used as the dependent measures were designed to cover the objectives taught in the mastery learning programme without regard to what was taught in the control group.

Kulik, et al, (1990) described a variety of results from a variety of programmes. They covered cognitive and affective outcomes; effects of programme on course completion and student study time -finding from Grade-I through college and results from programmes modelled after Bloom's system of learning for mastery and Keller's personalized system of instruction. They also examined the effects on average performance and variation in performance as well as looked at main effects and interactions.

A meta analysis of findings from 108 controlled evaluations revealed that mastery learning programmes have positive effects on the examination performance of students in colleges, high schools and the upper grades in elementary schools. The effects appear to be stronger on the weaker students in the class, and they also vary as a function of mastery procedures used, experimental designs of studies, and course content. Mastery programmes have positive effects on students attitudes towards course content and instruction but may increase student time on instructional tasks.
Verma (1991) studied the effects of personalized system of instruction and Bloom's mastery learning strategy on the achievement and certain non-cognitive variables of students promoted by adopting lenient promotion criterion at school stage. His findings revealed that achievement in geography on summative criterion test of pass and promoted students was higher when taught by either Keller's personalized system and Bloom's mastery learning as compared to the conventional method. The time taken by the pass and promoted students in computing the task summative criterion test was higher for students taught by Keller's personalized system and Bloom's mastery learning in comparison to the conventional method. The pattern of study habits and attitudes of pass and promoted group of students following instruction through personalized system of instructions, Bloom's mastery learning strategy and conventional method was more or less similar.

Mohmmad (1991) studied the effect of competency based ML on aptitude, motivation, self-esteem, and mathematics anxiety. Results of the data indicated that significant differences existed between the two methods of teaching/learning. The research findings indicate that students in mastery learning class perform at a higher achievement level, had a more positive attitude towards learning mathematics and towards themselves, had less Math-anxiety and developed higher self-esteem.

Daniel (1992) studied group based Mastery learning strategies. The purpose of this study was to investigate the impact of group based mastery learning strategies on the outcomes at learning specifically. The study analyzed students achievement, affect and learning time in two sixth-grade mathematics classrooms taught by the same teacher. The participants were one class-room mathematics teacher and 41 students from two sixth-grade mathematics classes in a suburban middle level school. For an 8-
week sequence, the students in the treatment group were exposed to mastery learning instructional strategy, while the students in the control group were involved in a non-mastery program.

The following conclusions were drawn :-

1) Achievement was not significantly enhanced as a result of mastery learning.

2) Attitudes towards the learning of mathematics were not significantly enhanced as a result of mastery learning.

3) Differential time needs of students did not significantly change over successive units under mastery learning conditions.

4) The proportional amount at remedial time used by qualifying students did not significantly change over successive units under Mastery learning conditions, but remained stable.

Blackemore and others (1992) compared psychomotor skill performance in isolation and in competitive game situations with seventh grade boys, taught basketball using Bloom's mastery learning model and non-mastery procedures. Mastery subjects surpassed control and non-mastery groups on all skills performed in isolation. No significant differences existed in skills performance in competitive game situations.

Researcher has also indicated that frequent testing is also an effective teaching strategy for more efficient learning, Kulik et al, (1986) cited by Frank M. Kika et.al, 1992 stressed that testing not only promotes students learning but also encourages the development of extrinsic characteristics such as more frequent study increased interest in the subject area, and positive attitude towards the subject.

Kika et al. (1992) investigated the effect of frequent testing on the
performance of high school algebra students. The results of the study indicated a definite improvement in performance during the weekly-versus biweekly testing. This outcome was replicated each time that more frequent testing was in effect low and middle achieving students showed the higher gains.

Charles (1992) studied the effects of groups based mastery learning on first grade achievement. The purpose of this study was to compare the reading achievement of first grade students who were taught using mastery learning strategies with first grade students who were taught using more traditional teaching strategies. It was found that the experimental students in this study exhibited greater achievement on each of the three criterion referenced summative tests than the control students.

Stetson (1992) studied the achievement and affective effects of mastery learning. This study entitled as “Mastery Learning” Does it have the Robin Hood effect?” The findings of this study did not support the claim that rapid learners in Mastery Learning Classroom achieve a well as or better than rapid-learners in conventional classrooms while slow and average learners achieve significantly more in the Mastery learning condition. Not only did rapid learners in the experimental group gain less on the standardized measure, average and slow learners also gained less than their counterparts in the control group. No significant difference favouring the experimental schools were found on any measure and this lack of significant effect was found even when the data was desegregated to reflect achievement by achievement level group. The only significant difference detected in this study favoured the control classroom and only on the standardized test of achievement. Some evidence to support the “Robin Hood” effect theory was found in that low achieving students in the Mastery learning classroom did less poorly compared to their low achieving counter
parts in the control classroom than the average and high achieving students in the Mastery Learning classroom did compared to their average and high achieving counterparts in the control classroom.

Michael (1993) started a comparison of the performance of secondary school students utilizing mastery learning and PSI (Personalized system of Instruction). This study involved two-ninth grade classes in a quasi-experimental pretest post-test action research design. The investigator found that there was no statistically significant difference in students taught by mastery learning as compared with those taught by PSI. Recommendations supported the use of both instructional modes based on students learning styles and cognitive entry behaviours.

Coffey (1994) compared the effect of different remediation strategies on the cognitive achievement. These remediation strategies differed in their intensity. From this study it was found that the intensive remediation had strong positive influence on achievement and retention.

Ritchie (1994) used a teacher directed, videodisc-based programs for teaching fractions to fifth-grade students to examine the factor of accountability in ML programs. The video-disc-instruction was chosen to help minimize differences in instructional materials, instructional time, and instructional delivery. Researchers used a pretest, posttest, two group design to identify if knowledge of participation in a ML program was related to academic achievement. Ninety-six students in four classes participated in the study. Classes were randomly assigned to two treatments. All students received instruction in fractions via the teacher directed, videodisk based Mastering Fractions program. Treatment I students (n=50) knew that they were participating in a MLP and therefore were accountable for their progress and remediation. Treatment II students (n=46) were not aware that their teacher was using ML principles to determine progression and
remediation. Comparisons between treatment I and treatment II students scores, after adjustment for pretest results, using analysis of covariance, revealed standardized mean difference effect sizes of 0.67 for achievement favouring treatment I. These results provide some evidence that knowledge of being in a mastery based program contributes to increased achievement.

Bajaj (1994) studied the effect of the mastery learning strategies (Bloom's and Keller's) on teaching of Geometrical concepts for sixth grade students in relation to intelligence and found no significant difference between B-MLS and K.PSI.

Senemoglu (1995) conducted an experiment to determine the effect of several elements of mastery learning on student achievement in an undergraduate course on curriculum development and instruction, which is a less sequential course than the type of course used in prior studies. Learning in a less sequential course can be facilitated by previous learning, but the lack of prerequisites does not obstruct learning. Students were randomly assigned to three groups: Conventional teaching methods; enhancing cognitive entry behaviour plus conventional teaching methods and feedback/corrective procedures. The combination of feedback/corrective procedures, and initial enhancement of cognitive prerequisites, which in turn was significantly more effective than using conventional methods. The results indicate that using a combination of alterable variables effectively in the teaching-learning process may solve the subject series at the University level.

Kumar (1995) reported that achievement of +2 students of Economics was better when taught through K-PSI than students of B-MLS. Achievement of male students was higher than female students in Economics. Co-operative mastery learning strategies led to higher achievement gains as compared to MLS and conventional instruction.
(Kreider, 1992). Ahuja and Ogogo (1996) reported that modified MLS with different Advance organisers in initial instruction resulted into higher performance as compared to MLS or conventional instruction.

Su, Jaw-Sin (1996) conducted a study to determine whether low ability students enrolled in private universities in Taiwan in a mastery learning programme could attain the same level as high ability students from public universities enrolled in traditional program. An experimental design was used. As a part of the mastery learning strategy, a formative test, quizzes and homework were completed by the experimental group only, while the mid term examination was completed by both groups as part of the course. The dependent variable was the summative test, the final examination. It was completed by both the groups upon the course's completion. The results indicated that there were significant differences between the two groups results on the pretest. There were no significant differences between the two groups results on the posttest. These findings support the hypothesis of the study and reveal the effectiveness of mastery learning strategies with low learning ability students.

In a study by Jennifer & Genetile (1996), performance on successive units of achievement in graduate classrooms using ML procedures was used to test two variations of Bloom's decreasing variability hypothesis - namely, that under the favourable conditions of ML, differences in faster and slower learners will decrease over successive units, leading to (a) smaller variances on successive units and (b) smaller correlation between an initial measure of aptitude and achievement on successive units. The data from the four classrooms studied, do not support the decreasing variability hypothesis, rather, they show no change overtime.
Chaudhary and Vaidya (1998) in their book “Explorations in Models of Teaching” indicated that (i) Mastery Learning Model has been found to be superior to Concept Attainment model and Traditional method of Instruction in raising achievement in Hindi and self-concept of grade VI students (ii) Both the high and low intelligence students were found to benefit more by mastery learning model than CAM or TM (iii) MLM produced more favourable attitude toward the subject (i.e. Hindi) than either CAM or TM. (iv) MLM was more effective than the TM in enhancing the achievement and attitudes towards English (v) SES a a variable did not affect achievement of grade VI students in Hindi grammar. The three groups of high, average and low SES were benefited equally by the treatment, i.e MLM, (vi) Sex as a variable also did not affect achievement of students when taught Hindi by MLM.

Lee (1998) in his study evaluated the effect of the Mastery Learning Techniques of self-directed feedback, reinforcement, and remediation of knowledge on the performance of a work-related task involving 130 Navy recruits tying a Bowline Knot. The study utilized the randomized subjects, posttest-only control group design. The Mastery Learning intervention was conducted via a workbook which provided feedback to the student on his or her knowledge attainment after instruction, yet before the evaluation of the transfer task. The finding of the study supported the claim that the use of a Mastery Learning Technique can have a significant positive effect on the ability of participants to transfer knowledge from a classroom training context to a work related task.

De. Baar (1998) selected Mastery Learning as a basis for teaching Ecology for this study to provide lower learning capacity students with motivation for learning science. Mastery Learning allows the students the freedom to choose methods of learning that reflect their learning styles. The
results of the study indicated that the student's overall attitude towards science was increased with their success, and attendance also increased as a result.

Pezeshki (1998) examined the effect of an innovative approach of teaching college algebra on the achievement of Mexican - American students as compared to the traditional approach. The students in both the treatment groups and control group were administered the Brooks/Cole publishers Algebra pretest at the beginning of the course. Twelve weeks later, the same test was used as a post test to determine the success of the innovative approach. Results indicated that cooperative learning and mastery learning were effective teaching strategies. Studies conducted of the achievement effects of mastery learning and cooperative learning found significantly greater achievement in treatment classes than in control classes.

McKenzie (1999) conducted a study to investigate the effectiveness of a self-paced mastery learning computerized program on student mathematics achievement and confidence in doing mathematics, anxiety towards mathematics, and attitude towards mathematics. Gender differences in the variables were also investigated. ANCOVA statistical analyses were used to determine the findings of the study. The results of this research study indicated that students in the traditional classroom scored significantly higher than students in the self-paced mastery learning classes. Further more, the study suggested that self-paced computer-assisted instruction had a positive impact on reducing anxiety levels of males.

The results of the study by Sharma(1999) indicate that the mastery learning strategies viz. Bloom's mastery learning strategy and Keller's personalized system of instruction were more effective than traditional
method of teaching, Keller's personalized system of instruction was found more effective for longer retention as compared to Bloom's mastery learning strategy and conventional instruction and stress does not seem to differentially affect the attainments through mastery learning strategies.

Mastery learning was found to be more effective than traditional instruction in statistics at university level (Mayo et al., 1969), biology, psychology and philosophy (Moore et al., 1968), higher level concept learning (Airasian, 1969); sixth grade geometry students (Kim et al., 1969); seventh grade mathematics, English and Physics (Kim, 1970); Junior, high school modern mathematics (Collins, 1970), introductory undergraduate Educational Psychology (Biehler, 1970); college elementary maths course (Duncan, 1976), fifth and sixth grade Arithmetic and Science (Lee et al., 1971) in different school conditions (Block, 1971); undergraduate history (Tiernay, 1973); geography achievement of low aptitude students (Myers, 1975), retention of cognitive achievement in chemistry (Swanson, 1976) in different subjects and in different grades (Bloom, 1976), achievement of students (Miller and Ellsworth, 1979; Thompson, 1980 Soto, 1983), teacher education (Bauman, 1980), cognitive knowledge in high school social studies (Mathews, 1982); group-based teacher-paced undergraduate education course (Benninga, 1983; Clark, 1983), basic English skills (Pratt, 1983); acquisition and retention of mathematics modelling skills (Srivastava, 1983) science achievement (Dillashaw and Okey, 1983); introductory account (Tse, 1983); logical reasoning of preservice elementary science teachers (Jones, 1983) elementary mathematics (Hooda, 1983); verbal and non-verbal creativity ((Hooda and Jarial 1983); XI grade Physics (Mathur, 1983), IX class mathematics (Jangira and Yadav, 1984); high school mathematics (Yadav, 1984); physical education (Blacke moore, 1985), intermediate French (Kuhn, 1985), reading achievement
Feedback improved students' performance in written instruction (Kulhavy, 1977; Pharr, 1980); overall achievement (Thompson, 1988, Kulik and Kulik, 1988).

Remediation strategies for mastery learning were found effective (Tierney, 1973; Swanson, 1976 and Seymour, 1978; Thompson, 1983) in cognitive achievement and retention (Coffey, 1994). However, in some studies, mastery learning failed to promote achievement (Dickleberger, 1978; Slavin, 1987; Stetson 1992 and Livingston and Genetile, 1996); reading achievement (King, 1987); sixth grade mathematics (Brace, 1992); second and fifth graders mathematics (Monzer, 1989). Slavin (1990) stressed that convincing evidence was needed to prove that mastery learning can accelerate achievement in elementary and secondary schools.

Mastery Learning improved the attitudes of students (Guskey and
Pigott, 1988) in science (Laposa, 1977); English language (Anutoro, 1987); statistics (Mathur, 1988); achievement motivation of high school social studies students (Singh, 1983; Koul, 1986) ecology (De Baar, 1998).

However, Hooda (1983) reported that mastery learning did not promote class VI pupils attitudes towards mathematics. Lovullo, 1986 and Brace, 1992 also lent support as attitudes of sixth grade students did not enhance as a result of mastery learning. Also, Kulik, (1990) reported that mastery learning did not effect student attitudes towards course content and instruction.

Mastery learning strategies had no effect on self concept of high school social studies students and undergraduate and postgraduate statistics students (Mathur, 1988).

In psychomotor area, ML was found effective (Challahan, 1987; Naslund, 1987). Mastery Learning improved student’s school attendance rates, and their involvement in class lessons (Guskey and Pigott, 1988, DeBaar, 1998).

Integration of mastery learning with co-operating learning (Kreider, 1992) advance organizers (Ahuja and Ogogo, 1996); self paced mastery learning computerized program in mathematics (MC Kenzie, 1999) led to higher performance as compared to conventional instruction.

This review of the literature available on mastery learning strategy reveals that the range of researches conducted on various aspects of its effects is quite considerable. Although there is no complete unanimity of opinion, a vast majority of researchers agree that mastery learning strategy can provide answers to many of the questions faced by educators, parents, students and planners today if it is used systematically and sensitively. Results of most of the studies provide evidences of the effectiveness of this
approach in raising the achievement level of the learners.

The claim of the advocates of mastery learning strategy that 90.95% students can master 90-95% of content if they follow education through mastery learning procedure seem to stand indicated by a large number of the researchers. Improvement in cognitive outcomes shows its consequences in the form of improved self-concept of the students.

The evidences, both objective and subjective of their achievement change their view of themselves and the people and thing around them. The history of success builds in pupils a sense of self-confidence, a desire to learn more and to work systematically in order to achieve the goal of mastery. The development of positive self-concept in turn leads to higher motivation, deeper interest in the subject of study and a more positive attitude towards the teacher and the school. The information provided in several of the researches indicate that mastery learning strategy is more useful specially in improving the cognitive and affective outcomes of the relatively weaker students. It suggests that the use of mastery learning strategy can go a long way in helping to tackle the problems such as under achievement, stagnation and dropouts. It also emerges from this brief survey that the number and range of studies conducted to examine the effectiveness of mastery learning strategy in Indian situations are limited, leaving much scope for research.

2.3 STUDIES RELATED TO COGNITIVE STYLE

Witkin et al, (1977) has pointed that although cognitive style is not significantly related to overall school achievement, it is related to achievement in specialized areas whereas Makcie (1978) found that field-independent students had higher scores on all levels. Shrock (1979) studied the role of cognitive style in problem solving performance and concluded
that field independence contributed significantly to problem solving variance.

Van Duyne (1980) exposed the relationship among field-independence, achievement, withdrawal from the course and school-related attitude under mastery method of instruction. The study revealed that field-independence/dependence, attitude towards the subject matter and attitude towards mastery method of instruction were also related to achievement.

Stone (1981) found that teachers adapted to student cognitive style, both across and within instructional contexts, by providing the field-dependent students with more independent learning opportunities. Teacher adaptation was related to positive student behaviour in both subject areas. None of the adaptations were significantly related to differential achievement for either the field-dependent or field-independent student group.

Graffin (1982) conducted a study entitled “An investigation of the relationship between students cognitive style on the field-dependence/independence dimension and their writing process” and reported that field independent subjects obtained higher holistic scores than did field-dependent subjects.

Walker (1984) found that field-independent students performed at higher level of initial learning, retention and time on task behaviour. He suggested a significant main effect for cognitive style for the initial learning variables.

Peterson (1984) indicate that field-independent students perform better in mathematics than field dependent students while latter are better at learning material.

Mrasla (1984) investigated that low achieving mathematics students were more field dependent than high achieving Mathematics students in
both traditional high school and in the achievement variable and the sex variable with respect to field-dependence in both schools.

Kumar(1984) studied to ascertain the relationship of three cognitive style variables, viz. field dependence/independence, dogmatism and integrative complexity to curricular choices, and achievement in four streams of academic concentration. The findings of the study were (1) The students in science were significantly more field independent, followed by commerce and social sciences. (2) The field dependence/independence dimension showed little relationship to overall examination performance. The results indicated that the subjects dependence/independence was not significantly related to performance in mathematics and science, while it was negatively and significantly related with performance in social science. (3) The interrelationship among three indices of cognitive style, viz., field dependence/field independence, dogmatism, and integrative complexity, was found insignificant except for the fact that highly dogmatic students were found field dependent and cognitively less differentiated or concrete in the area of interpersonal conceptual complexity.

Randolph (1984) investigated the relationships among cognitive style, achievement in science, selected personality variables and the sex of students and found significant correlation among field independence and science achievements and self reliance and science achievement; no significant differences were found between the performance of males and females on the science achievement test.

Cogley (1984) studied field dependence/independence as a predictor of inferencing and problem solving abilities in community college students and found cognitive style as a minimal predictor of both. The results of ANOVA indicated significance (P>0.05) between highly field-dependent and
independent regarding problem solving but non significance (P>0.05) regarding inferencing ability among some students.

Dugger (1985) compared the effects of two contrasting instructional approaches representing the field-dependence/independence cognitive dimension on the mathematical problem solving performance and found statistical differences in the math problem solving post test gain scores of the two treatment groups, receiving field-dependent and field-independent instructions, over the control group. The conclusion supported the assumption that the field-dependence/Independence cognitive dimension applied to teaching improved the students performance in the math problem solving.

Roessler-Jacoby (1985) investigated the role of field-independence using an Analogy based problem solving method and found that field-independent subjects scored significantly higher on the problem solving task than the field-dependent. Field-independent subjects using an analogy scored significantly higher on the problem task than field-independent subjects who did not use an analogy. Result from the study indicated that the cognitive style of subjects may influence successful use of analogy based problem solving strategies in the solutions of new paradigm problems.

Atang, (1985) reported in his study that individuals field-dependence/independence was not a significant factor in their performance in the pre-test and the post-test. Fritz, (1985) reported in his study that neither locus of control nor field-independence/dependence was related to academic achievement in samples of gifted students; there was no difference in locus of control and field-independence/dependence between male and female gifted students; and there were grade level differences in
locus of control and field-independence/dependence among 4th, 6th, 8th
grade gifted students.

Panda (1985) studied the effect of cognitive style and adjunct
Question on learning from connected discourse. The findings of the study
were (1) Field independent students learn and retained prose significantly
more than field-dependent students (2) Field-independent students proved
to be significantly superior to field-dependent students in processing and
comprehending scientific textual materials, at all level of questions, and at
both the retention tests.

Nelson (1986) studied the effects of field-independence/dependence
cognitive style on achievement in a telecourse and found no significant
differences between the attitude of field-dependent and field-independent
students enrolled in a telecourse. Student with a field-independent learning
style scored higher grades than students with a field-dependent style.
There was no association between field-independence/dependence and
course completion.

Yore (1986) investigated "The effect of lesson structure and cognitive
style on the science achievement of elementary school children" His
findings are

(1) High structured lessons resulted in higher achievement than the low
structured.

(2) Field-independent students achieved significantly higher science
scores than field-dependent students.

George et al, (1987) found that field-dependent subjects scored
significantly on Kohs Block design test than field-independent subjects. Dutt
(1987) found that (i) Intelligence of the learner significantly affected the
problem solving ability irrespective of strategies of training. (ii) A bright
child trained in any of the two strategies scored higher scores on problem solving ability test than less bright students. (iii) Cognitive style of learner was also found to be significantly contributing to the variance of problem solving ability scores, there by showing that cognitive style affected problem solving ability irrespective of training strategies. (iv) The group having field-independent cognitive style scored higher mean than field-dependent group on problem solving ability test.

Bitterman (1988) indicated that nine subject variables were significant in explaining variance in self-directed learning preference alone and together acquainted for 61 percent of the variance in self-directed learning preference. Achieving style was the most significant; and cognitive style, though significant, was the least significant of the nine. The interviews indicated that the self-directed learning reading scale was valid to measure self directed learning preferences, and achieving styles were reflected in the dialogue of the subjects.

Stoeltje (1988) investigated the relationship between the field dependent field-independent dimension of cognitive style and reading performance. The result of this study supports the idea that cognitive style is an important factor in school learning. Specifically, the field-dependent/field-independent dimension of cognitive style appears to be significantly related to reading performance in the lower elementary grades. Cognitive styles test could become important diagnostic tools forth class room teachers.

Arrington (1989) investigated the relationship between cognitive style visualization and problem-solving in eight grade males and females. He found that problem solving was positively correlated to cognitive style
and concluded that field-independent subjects were more proficient problem solvers than field-dependent subjects.

The study of Gill (1989) revealed that (i) High intelligent subjects scored higher on originality than low intelligent subjects irrespective of training strategies. (ii) The group having field independent cognitive style scored higher on originality than field-dependent group on creative problem solving skill test. (iii) Levels of intelligence, personality types, cognitive style and training strategies when paired among themselves did not show any interaction in terms of performance in creative problem solving skills in mathematics.

Sayed (1990) studied the relationship between cognitive style and the personality variables of secondary pupil's revealing a definite difference between field-independent and field dependent groups on the factor structure in respect of personality variables. The field independent pupils were found to be more intelligent, emotionally stable, controlled and relaxed as compared to their field dependent counter parts.

Panda (1991) studied age and gender differences in the field dependent and field independent cognitive style of pre-school children, and examined its relationship with intelligence, receptive vocabulary and nine different aspects of autonomous achievement striving. The findings revealed no significant difference in the level of field independence of boys and girls whereas a developmental increase towards field independent was quite evident. Intellectual ability and the variable of autonomous achievement striving were generally found to be significantly correlated with field independents only for the five years old boys sample. For the four years and six year age samples none of the variables appeared to be correlated with field-independence.
Jen (1990) found no significant difference for the sixth and seventh graders. The regression analysis indicated that none of the selected cognitive style elements significantly predict mathematics achievement. The correlation analysis revealed that some of the selective cognitive style elements are significantly correlated with mathematics achievement. However, these findings should be interpreted with caution since the reliability and validity of the inventory are weak.

Rogers (1990) found cognitive style was related to some higher order aspects of production mastery but not to others. Subjects who were more field-independent tended to demonstrate more sophisticated programming strategies than field dependent subjects including the creation and debugging of fewer programming units, proportionately more use of the edit mode than the immediate mode. Field-dependence/independence was not related to any aspect of geometry knowledge gains, Logo command mastery, nor logo comprehension mastery. In addition, conceptual tempo was not significantly related to any of the learning outcomes in the investigation.

Rosa (1991) found that cognitive styles were manifested in certain aspects of reading comprehension of narrative and expository prose is likely to differ remarkably as a function of cognitive styles. The disposition to process information in a more articulated or less articulated manner is reflected in the reading comprehension of narrative and expository prose.

Vyas (1992) compared the effectiveness of exemplars and attributal strategies of concept learning in relation to the learner’s cognitive style in "pre-test," on-task, "post-test" and "retention test" conditions. The findings revealed that although the FI style appeared to be more effective than the FD style for learning in all the four conditions, its effectiveness for the "on-task" and "retention test" conditions was determined by the learning...
strategy employed by students.

Bal (1992) found that (1) the variables of intelligence had a significant effect on acquisition and retention of higher level writing skills in English. (2) The variable of cognitive style had a non-significant effect on acquisition; a significant effect on retention as measured by test totals and scores on supply type items but not when measured by scores on selection type items, (3) Intelligence and cognitive style had a non significant interactional effect on acquisition and retention of higher level writing in English.

Yoon (1993) results indicated that types of instructional control strategies interact with levels of prior knowledge and types of cognitive styles. This study suggests that instructional control strategies would be used differently based on students' aptitudes; also, instructional design should be considered with time on task.

Lin chi- Hui (1993)'s results were

1) The performance of subjects can be predicted by linking structure, cognitive style, and their interaction.

2) The performance of subjects can't be predicted by the interaction of linking structure types and cognitive style.

3) There is no difference in subjects' recall of verbal information when learning from hypertext systems incorporating different linking structures.

4) Field-independent subjects out performed field dependent subjects overall.

5) The attitude of the subjects can be predicted by the interaction of linking structures and cognitive styles.
6) The attitudes of the subjects can be predicted by linking structure type.

7) Students like hierarchical structures and hierarchical associative linking structures more than linear linking structures.

8) Field independent subjects tend to have better attitude about "Chinese Politics" than field-dependent subjects.

Krank (1993) found no statistically significant predictive power for cognitive style or treatment condition. Pre-service teacher's cognitive styles did not significantly contribute to enhanced critical thinking abilities. No significant differences were found for critical thinking performance between the three treatment conditions. The suggestion was made that the implementation of the research design rather than an ineffectual treatment contributed to the non-significant results. Nothing was found to refute extensive research that supported the supposition that cognitive styles are sensitive to learning environment and nothing was found to refute extensive research that predicted enhanced critical thinking abilities in environments that encourage dialogical encounters.

Custer (1994) indicated that students with strong independent learning styles showed significantly higher chemistry achievement and greater achievement gains.

Moore's (1995) results reported that no specific cognitive style was identified. Pre-major in health education were relatively the least field independent while students majoring in pre-medical, physics therapy, occupational therapy, optometry and dental hygiene were relatively the most field-independent.

Cognitive Style appears to be independent of intelligence. Riding & Pearson (1994) with 12-13 year old pupils found that intelligence as
measured by the subsets of the British abilities scale was not related to Cognitive Style.

Hota (1995) compared the performance of field independent and field-dependent boys and girls in mathematics and verbal reasoning test. The major findings of the study were that the field independent students had obtained higher scores on arithmetic reasoning test than the field dependent students. Field independent students scored higher in verbal skills than field dependent students. Field independent students were better at cognitive restructuring skills. The field independent boys were better in arithmetic reasoning measures where as field independent girls were found to be better in verbal reasoning measures.

Lynch (1997) studied the relationship between cognitive style, method of instruction, and visual skill on learning chemical kinetics. Participants enrolled in a general chemistry course were classified on each of the three factors: cognitive style, method of instruction and visual skill. Participants who were classified as field independents scored significantly higher than those classified as field dependent on the kinetics portions of the hour and final exams. No significant interaction effects were found for cognitive style and method of instruction. However a trend was discovered in that participants who were classified as field dependent or field independent and worked with the computer based lesson seemed to score higher than those classified as field dependent or field independent and worked with the teaching assistant. Finally, no significant difference was found for cognitive style and the percentage of time spent in the simulated environment component of the computer lesson. However, a trend was found in that participants classified as field independent seemed to spend a greater percentage of time in the simulated environment than participants classified as field dependent.
Nuckles (1997) conducted a study to find out if there is a relationship between certain personality factors, cognitive style, and self-directed learning among a group of adult learners. The results indicated that no prerequisite set of personality or cognitive style characteristics exists relative to self-directed learning.

Sawyer (1997) conducted a study to examine the relationship between cognitive styles and instructional leadership. The study indicated that predominate cognitive style tendency of principals and teachers was indeterminate closely followed by global. Teachers and principals in this study tended to be more alike in cognitive style. A significant negative correlation exists between teachers and principals cognitive styles and the teachers mean rating of the instructional leadership functions, provide incentive for teachers and provide incentive for learning.

Mathews (1998) conducted a study to investigate the relation between cognitive style and theoretical orientation, doctoral-level counseling and clinical psychology graduate students were administered the G.E.F.T. (Witkin, et al, 1971). The study revealed that the cognitive style dimension referred to as perceptual field - independence was negatively related to one's adhering to more of an objectives (vs subjective) framework in conceptualizing individual differences in behaviour. In addition, field independence was also negatively related to a preference for a behavioural (vs experiential) orientation and focusing more on the physical determinants that influence human behaviour.

Knappenberger (1998) conducted a study to determine the relative proportions of field-dependent and field-independent visitors in the museum audience, and to ascertain if the cognitive style of visitors interacted with instructional strategies to affect the educational outcomes for a computer based science exhibit. Two experimental treatments of a computer-based
exhibit were tested in the study. The first experimental treatment utilized strategies designed for field-dependent visitors and the other experimental treatment utilized strategies designed for field-independent visitors. The results of a multiple regression analysis indicated that there was a significant interaction between cognitive style and instructional strategy that affected visitors post test scores on a multiple choice test of the content. Field independent visitors out performed the field dependent visitors in the control, baseline, and both experimental treatments. Both field dependent and field independent visitors posttest scores increased in the field dependent experimental treatment and in the field independent treatment.

Ruzicka (1998) conducted a study to examine the co-relationship between community college students' cognitive style and their performance in a developmental composition course offered in an individualized instruction format. The study's purpose was to investigate the learning and writing strategies' field dependent and field independent students use in an independent study setting. The results indicated that the only significant difference between the writing processes and products of the field-dependent students and the field-independent students was that the field independent students prose employed more syntactical complexity than did that the field-dependent students.

Proctor (1999) conducted a study to investigate whether students' cognitive styles affect performance on two distinct types of tests; a standardized, multiple choice test of language skills (Iowa Test of basic Skills ITBS), and a state developed performance assessment of writing skill (Florida Writes). The measure of cognitive style was the Thinking style Inventory (TSI, Sternber & Wagner; 1991), a self-report instrument based on Sternberg's (1997b) theory of thinking styles. Participants were
administered the TSI and a measure of general cognitive ability, the Raven's Standard Progressive Matrices. The results indicated that cognitive style was not found to correlate with either dependent measure. An exploratory factor analysis of the TSI performed at the subscale level did not support Sternberg's five factor structure, rather, a two factor model was the best fit for the data.

Bhushan and Mehar (1999) conducted a study to compare the effectiveness of the Advance Organizer Model and Conventional Method of teaching with respect to cognitive style and learning types in High School Geography. The findings revealed that there was no difference between the mean gain scores of the field-dependent and field independent groups. The evidence leads to the conclusion that field dependent and field independent groups were not found significantly different for Geography.

A review of empirical evidence related to cognitive style indicates that some studies reported that cognitive style was not found significantly related with overall school achievement (Witkin et al., 1977; Kumar, 1984; Fritz, 1985), telecourse (Nelson, 1986); geometry knowledge gains (Rogers, 1990); acquisition of writing skills (Bal, 1992), learning environment (Krank, 1993); intelligence (Riding and Pearson, 1994), language skills and writing skills (Proctor, 1999) and high school geography (Bhushan and Mehar, 1999). But some studies reported that cognitive style was related to achievement (Duyne, 1980); inferencing ability (Cogley, 1984), school learning (Stoeltje, 1988) and reading comprehension (Rosa, 1991).

Field independent students performed better at all levels (Mackie, 1978; Lin Chi-Hui 1993), problem solving (Schorck, 1979; Roessler - Jacoby, 1985; Dutt, 1987; Arrigton, 1989), holistic scores (Griffin, 1982); task behaviour (Walker, 1984); mathematics (Peterson, 1984; Mrasla,
Field independent students were found to be more intelligent, emotionally, stable, controlled and relaxed as compared to field-dependent students (Sayed, 1990), developed better attitudes about Chinese politics (Lin Chi-Hui, 1993). Students of pre-medical, physical therapy, occupational therapy, optometry and dental hygiene were relatively more field independence than field dependent (Moore, 1995) and employed more syntactical complexity in prose. (Ruzicka, 1998).

### 2.4 STUDIES RELATED TO SELF-CONCEPT

Faye soften (1968) conducted a study on “Teaching for improvement of self concept”. This study undertook to investigate whether the self concepts of students in a teacher education programme could be improved by means of activities intended to increase self knowledge and self acceptance, in a course in educational psychology. If improvement of self concept could be achieved within the format of an undergraduate teacher education curriculum, there would be major implications for dealing with affective learning by preservice teachers, and consequently implications for the effect of this learning upon their prospective students.

Central hypotheses predicted: (1) that the self concept of preservice teachers can be improved significantly by means of learning activities - collectively the treatment variable-incorporated into an
undergraduate course in education psychology. (2) that the cognitive learning outcomes of the traditional course need not be compromised; and (3) that self concept scores are positively correlated with evaluation scores given by agency supervisors of the performance of subjects in providing leadership to groups of children.

Mohan (1979) studied the development of self concept in relation to Intelligence, learning ability, achievement and achievement motivation at adolescent level. The main objectives of the study were:

(i) to trace the general growth of self concept over years of adolescence, both longitudinally and cross sectionally, separately for males, females and for combined groups of adolescents for perceived, ideal and social aspects of the self and the discrepancies among them

(ii) to study the differential growth of self concept of high, average and low ability groups of intelligence, learning, achievement and achievement motivation; and

(iii) to establish the relationship of the variables of self concept with the correlates of intelligence, learning (verbal and non verbal), achievement motivation, achievement and originality.

In this investigation, the development exploratory survey of self concept was coupled with the longitudinal and cross-sectional techniques. The longitudinal growth was traced studying the same subjects for the successive years only. This was combined with gross statistical comparisons of self-concept from thirteen through twenty years, plotting graphically separate growth curves for males, females and total adolescent groups at each age level. The data were analyzed with the help of general and differential growth curves and descriptive statistics like mean, SD, standard error, product moment and partial correlation. Multiple regression equation and factor analysis were also
used in analyzing data.

The main findings of the study were as follows: (1) longitudinal and cross-sectional growth analysis revealed increasing trend of female perceived self, male perceived social self and decline of male perceived self and female social self; (ii) ideal self for both sexes indicated rapid increase; (iii) discrepancies related to perceived and social self suggested varying patterns, while those related to ideal self revealed upward rising growth throughout adolescence; (iv) most of the differential growth curves, low and average groups indicated parallel growth, while high groups scored higher on all variables of self; (v) in both general and differential growth analysis the best period of growth was found to be between sixteen and eighteen years, marking seventeenth year as the peak point in growth of self concept; (vi) females showed more stability of self than males during adolescence.

Mani and Gonsalves (1977) conducted a study of the self concept of student-teachers in relation to their performance in practical teaching. The major aim of the study was to identify the relationship between the student's teaching performance and the self concept, keeping in view the background variables of previous academic achievement, age, socio-economic background and previous teaching experience.

The sample comprised 100 students undergoing B.Ed. training at the Stella Matutina college of Education during 1976-77. The tool used was a self-concept inventory specially developed for the study. Product moment coefficient of correlation was used for data analysis. The major findings of the study were; (1) Teachers with more teaching experience had better self-concept than teachers with less teaching experience. (ii) Teachers with better self concept scored more on practice teaching than teachers with poor self concept. (iii) Age had some influence on self
concept. Lower age was accompanied by better self-concept and more effective teaching. (iv) Socio-economic background had a clear influence on self-concept and consequently on teaching effectiveness. In the case of teachers in the upper socio-economic status the correlation between self-concept and teaching practice scores was more than that in the case of middle socio-economic status group. (iv) The relationship between self concept and teaching practice scores in general was not significant.

Sarswat (1982) conducted a study to examine the relationship of self-concept measures with adjustment, values, academic achievement and socio-economic status of boys and girls and found that boy's self-concept was positively and significantly related to social adjustment, while the girls self concept was positively and significantly related to home, health, social, emotional, school, as well as total adjustment. The boys self-concept was positively and significantly related to political and religious values, while girls self-concept was not related to any of these values. Only intellectual self-concept was positively and significantly related to academic achievement in both the sexes. Boy and girls differed significantly on total self-concept and its physical, social and moral dimensions. Girls were found to be higher on all these dimensions.

Prasad (1982) conducted a study to analyze certain important factors of stability of the self-concept. Seven hypotheses were examined. The study was designed on the line of self-theory. Anxiety, insecurity, self-satisfaction, self-role incongruent and social change were analyzed. A comparison was made between older and younger generations to see the influence of social change. The sample included 132 college and university teachers (older generation), and 175
undergraduate and postgraduate students (younger generation). Teachers and students were selected randomly from different colleges of Bhagalpur University representing both rural and urban population. Sharan's Ideal self concept, self-satisfaction, and Role performance Inventories, Taylor's Manifest Anxiety Scale, and Maslow's Security-Insecurity Inventory were used. Non parametric statistics were used to see the significance of differences.

The major findings were: 1. Anxiety, insecurity, self-role incongruence and self-satisfaction were the factors which influenced stability of the self-concept. 2. Social change had not been identified as an independent factor of self consistency. 3. Older and younger generations differed significantly on anxiety, insecurity, self-role incongruence and self-satisfaction.

Kale (1982) studied the development of self-concept at preadolescent level with reference to some family and school factors. The major findings were: The perceived self did not show a downward trend throughout the preadolescent period. It showed a significant upward trend at the end of this period. 2. Boys and girls did not differ significantly in self-concept development. 3. Perception of family factors as well as school factors showed significant development in concept perception of parent-child relationship. 4. Girls showed more understanding for parent-parent relationship, teacher-student relationship and at the end of the preadolescent period, parent child relationship. 5. Teacher-student relationship was important in self-concept. 6. Parent-child relationship was significantly associated with self-concept. 7. Peer relations were important in development of self-concept. 8. Family factors jointly were significantly associated with self-
concept. 9. School factors jointly were significantly associated with self-concept.

Bharathi (1984) conducted a study on self-concept and achievement motivation of early adolescents. The major findings of the study were that (1) No age differences were found in self-concept with respect to adjustment. (2) No significant age differences were found in the personal social orientation aspect of self-concept in the real self-concept. (3) In the masculinitiy-feminity aspect of self-concept, age differences were not significant. (4) At different age levels, different self-concept measures were found to be related with n-achievement. (5) In the ability aspect on self-concept no sex differences were observed. (6) Middle SES groups showed greater satisfaction with self in general.

Panwar (1986) conducted a study to investigate the role of academic achievement and school background in self-concept, self-disclosure and inferiority feeling among the students of Kumaun Hills. The sample for the study consisted of 180 class XI students studying in three types of schools. Sixty of the students were low achievers, 60 were average achievers and 60 were high achievers. Mohsin's self-concept Inventory was used for assessment of self-concept, Singh's self-disclosure Inventory was used for measurement of self-disclosure, and Pati's Inferiority Questionnaire was used for measurement of feeling of inferiority.

The main findings of the study were (1) Academic achievement had significant effect on self-concept. (2) Home background had significant effect on self-concept. (3) School background had significant effect on self-concept. 4. Academic achievement had no significant relationship with feeling of inferiority. 5. There was no significant effect of school background on feeling of inferiority.
Jain (1990) focused on self-concept of adolescent girls, along with their identification with parent/parent substitute, as contributing to realization of academic goals. Positive self-concept, superior cognitive abilities and setting of high academic goals together favoured high achievement, as also did identification with parent/parent substitute.

Agarwal (1994) examined the relationship between sex and general self-concept in Grade IX students. The major finding were that the mean score of girls was greater than those of boys in the case of identity, self-satisfaction, behaviour, moral ethical, self criticism, total self concept and its instability dimension. The study found the superiority of girls over boys in their role specific self-concept.

Weigold (1999) conducted a study to explore the relationship between self-concept and attitudes about assessments including any gender differences. The results indicated that there was no significant difference in self-concept of mathematics and science for boys and girls. A moderate correlation was found between alternative assessments and self-concept in mathematics and science. No real gender differences were found.

Fleith (1999) studied the effects of creativity training programme on creative abilities and self-concept in monolingual and bilingual elementary classrooms. A pre-test-posttest control group design was used. The results indicated that effects of the creativity training program on the self-concept of students in the treatment group was small, and the control group students experienced a substantial decline in self concept between pretest and posttest.

Byer (1999) examined the effects of students' perceptions of classroom social climate in middle school social studies classes on academic self-concept. The results of this study indicated that a significant
relationship existed between student perceptions of classroom social climate and academic self-concept.

Mejia (1999) conducted a study to examine the impact of cognitive ability teaching strategies on the intellectual abilities and self concept of eighth grade Limited English Proficient (LEP) students. The study revealed that cognitive ability teaching strategies for staff development programme helped to build students' cognitive intellectual abilities and self-concepts.

A review of the relevant research studies on self-concept revealed that the period of growth of self concept is between sixteen and eighteen years (Mohan, 1979), intelligence and self-concept are related high intelligence students had higher self-concept as compared to their low intelligence counter parts also boys exhibited higher self-concept as compared to the girls (Sharma, 1978). Another study reported that girls exhibited superior self concept in all areas of self-concept (Saraswat, 1982; Agarwal, 1994); anxiety, insecurity, self role, incogruence and self satisfaction influenced the stability of self-concept (Prasad, 1982); parent-child relationship, peer relations and teacher student relationship was important in development of self-concept (Kale, 1982); middle SES adolescents exhibited better self-concept as compared to their high and low SES counterparts (Bharathi, 1984), academic achievement, homeback ground and school background had significant effect on self-concept (Panwar, 1986) students' perception of classroom social climate and academic self concept are significantly related (Byer, 1999); and cognitive ability teaching strategies help to build students' self-concept (Mejia, 1999).