CHAPTER - II

REVIEW OF THE RELATED LITERATURE
CHAPTER-II

REVIEW OF RELATED LITERATURE

INTRODUCTION

Review of related literature is an important pre-requisite to actual planning and then execution of any research work. Realizing the importance of review of literature, Best (1963) writes, "a familiarity with the literature in any problem area helps the students to discover what is already known, what others have attempted to find out, what methods to attack has been promising disappointing and what problems remain to be solved".

Therefore, Good, Bar and Scates (1941) suggest, "the careful student of education, the research worker and investigator should become familiar with location and use of the sources of educational information".

The investigator feels that the study of related literature helps in acquiring information about the studies carried out in the field, protects against unnecessary duplication, guides in carrying out the investigation successfully and makes him familiar with the steps.
The existing researchers that are directly or indirectly related to present study, may be conveniently classified under following broad categories:-

3.1.0 Studies concerning Mastery Learning Strategies

3.1.1 Mastery learning and academic Achievement.
3.1.2 Mastery learning and Creativity.
3.1.3 Mastery learning and Self-concept

3.2.0 Studies concerning Inquiry training model

3.1.1 MASTERY LEARNING & ACADEMIC ACHIEVEMENT

Review of researches in this field have shown that the investigators have tried to find/establish/reestablish or even some times attempted to evaluate the effectiveness of MLS in real classroom setting on academic achievement. In some cases their effects have been compared with the traditional method or conventional teaching. Efforts have also been made to see the effects of MLS on different conceptual levels.

Over the past twenty five years, Considerable interest has been shown in the concept of mastery learning. But the ideas of mastery learning are not altogether new. In fact the fundamental of mastery learning were traced back to as earlier years of twentieth century by Washburne (1922) and Morrison.
(1926), and can be traced to such early educators as Comenius in the 17th Century, Pestalozzi in the 18th Century and Herbert in the 19th Century (Bloom, 1976). The increased interest in the mastery learning strategy and its effectiveness in teaching is well documented by the growing body of literature on quality of instruction and effective schools, which provide numerous examples of successfully using various elements considered basic to mastery learning strategy. The variation of the individual learning time, the quality of alternative materials appropriate to the needs and capabilities of the individual constitute important elements of mastery learning strategy. Considerable attention has been given to them by educationists and researchers for the last one decade. The studies conducted by Block (1971, 1974) Block and Burns (1976) and Bloom (1976) have reported the effectiveness of mastery learning strategy at all levels of education and in different subjects such as Arithmetic, philosophy, physics, Geography.

Block (1971), summarised nearly forty studies conducted by Ausubel (1964), Airasian (1967, 1969), Bloom (1968), Keller (1968), Biehler (1970), Kersh (1970), Kim (1969, 1970), and reported that mastery learning strategies have significant
effect on students cognitive and affective development and rate of learning. Mastery learning methods also contribute in increasing the learner's interest and aptitude for learning the subject than traditional approaches. The studies as reported above also indicate that mastery learning strategy can compensate learning deficiencies of culturally and socially deprived children.

Bloom (1976) has provided a summary of results of studies conducted by Mayo and Longo (1966), Kersh (1971), Pillet (1975), Jones, et al. (1975) etc. in different subjects at different grade levels employing mastery learning strategies and traditional method. The learners exposed through mastery learning strategy were found significantly higher than those in the control group in achievement.

The above findings are further supported by the results of research carried out by Miller and Ells Worth (1979), Jones (1983), Arlin (1984), Mashal (1986) and King (1987).

Callahan (1987) conducted a study to see the effectiveness of mastery learning procedures in psychomotor area. The results depicted that the students taught through mastery learning were somewhat higher in skill level and lower
on anxiety level than traditional pupils, but the results were not statistically significant.

After reviewing literature on mastery learning Slavin (1987 and 1990) found that there was no convincing evidence to prove that mastery learning can accelerate achievement in general in elementary and secondary schools. He observed 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), however, found contrary results. They found different results from different investigations. They studied cognitive and affective outcomes; effects of programmes on course completion and student study time; findings from Grade-I through college; and results from programmes modelled after Bloom's system of learning for mastery and Keller's personalised system of instruction. In their study they also studied 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 of mastery learning revealed that mastery learning
strategies have positive effect on the performance of students at all levels i.e. colleges, high schools, and the upper grades in elementary schools. The effects are stronger on the weaker students in a class. The effect also vary as a function of mastery procedures used, experimental designs of studies, and course content. Mastery learning programmes have significantly positive effects on student attitudes toward curriculum and instruction.

Guskey and Pigott (1988) after making a meta-analysis of 46 studies on group-based applications of mastery learning strategies also reported similar findings. The results of meta-analysis revealed that such applications yield consistently positive student learning outcomes. Differences in the effect across studies was found to be quite large, however, and homogeneity tests indicated that the studies do not share a common effect size. The possible explanation for this variation, includes the subject area of mastery learning, the grade level of students and the duration of the study.

Drowns, et al. (1991) reviewed 58 effect sizes from 40 research reports. They concluded that feedback effects varies with control for research availability, type of feedback, use of pre-tests, and type of instruction and could be quite larger
under optimal conditions. This review suggests that elaborate feedback may be more important in the building of conceptual frameworks, drawing of inferences, or applying of rules in complex situations.

Researches have also pointed out frequent testing is also an effective teaching strategy for more efficient learning. Mulik et al. (1986), cited by Frank M.Kika, et al. (1992). Emphasized that testing not only promotes student 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.

Kikam et al. (1992) examined the effect of frequent testing on the performance of high school algebra students. The results depicted definite improvement in performance during the weekly versus biweekly testing. This outcome was replicated each time when more frequent testing was in effect. Low and middle-achieving students showed the higher gains.

Cognitive outcomes of mastery learning have been measured in term of realization of pre-determined specific objectives which deal with recall and recognition of knowledge, understanding and development of intellectual abilities and skills. Effects of mastery learning strategy on students
cognitive outcomes have been heavily researched in India and abroad. The researches reviewed for the present study have been reported in the following paragraphs.

Block's analysis (1971) of forty studies revealed 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 at the end of the course. He concluded that in general, mastery learning 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.

Fagan (1975) examined the relationship of mastery learning procedures and aptitude to the achievement and retention of concepts by seventh grade students. An eighty percent criterion level was fixed for mastery on the formative tests. The investigator found that mastery procedures did not facilitate achievement or retention.

Myers (1975) studied the effects of mastery and aptitude on achievement in an Introductory College Geography course. The study showed that the mastery treatment had some impact on achievement scores of low aptitude students. 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 the tutorial sessions correlated negatively with achievement.

A comprehensive summary of the effects of mastery learning school studies as well as Keller Personalized Instruction Studies (largely at the college level) was brought out by Block and Burns (1976). Experimental and control classes were compared on level of achievement as well as relative variability of achievement scores. The results of the study showed enhanced student achievement when taught through mastery learning strategy.

Bloom (1976) summarized the results of twelve carefully selected studies conducted by Mayo and Longo (1966), Lee et al. (1971), Kersh (1971), Pillet (1975), Jones et al. (1975). Both the mastery learning group and control group in these studies were provided with similar conditions of group instruction but the mastery students were given additional time task. In these studies both the groups were given a common criterion referenced summative achievement test. The results of this analysis revealed that under regular school conditions, mastery learning can produce sizable achievement differences.
Yildiran (1977) studied on the effects of levels of cognitive achievement on selected learning criteria under mastery learning and normal classroom instruction. The study was concerned mainly with retention, transfer, lower and higher mental processes and positive affect or interest in the learning task. The study reported that the three cognitive criteria (retention, transfer and level of mental processes) are influenced more by the level of learning than rate of learning, aptitude, I.Q or previous scholastic achievement.

Denton and Seeymour (1978) examined the influence of unit pacing and mastery learning strategy on the acquisition of higher order intellectual skills. The results indicated that the remediation strategy which specifies in detail how to correct learner misconceptions is optimal for instructional systems with few time constraints, while less specific remediation prescriptions are appropriate for intense, short-term instructional systems. However, the clarity and focus of the remediation activities and contingencies for reinforcement contribute substantially to higher order cognitive achievement.

Kim (1980) designed his study to investigate how teacher's instructional climate and instructional conditions interrelate to bring forth mastery implementation which in turn,
is associated with student academic achievement. The study reported that teacher expectations and evaluations for student performance are positively related to student academic achievement; the combined effectiveness of teacher climate plus instructional conditions on mathematics is more significant than that on reading.

Bauman (1980) studied the effect of mastery learning model to an undergraduate course in teacher education. Results of the study supported the application of the mastery learning model as an alternative method of teaching an undergraduate course in teacher education.

Burj nab and Brezin (1981) studied the effects of a modified mastery learning system on achievement in an individualised high school physical science course. The study reported that medium mastery standards were strongly associated with higher achievement for each dependent variable.

Hallada (1982) applied mastery principles in teaching General College Chemistry. A field experimental research was designed with 50 students in a treatment group and 300 students in a comparison group. The two groups showed at beginning significant academic difference, but at terms end,
both had completed the same syllabus, and both had achieved the same 83% level of satisfactory grades. Students achievement for the treatment group was significantly higher.

Brooks (1982) studied the effects of mastery instruction on the learning and retention of science process skills. The study indicated no non significant difference in levels of achievement between mastery and non-mastery groups, average or above-average students.

Mathews (1982) studied the effect of mastery learning strategy on the cognitive knowledge and unit evaluation of students in high school social studies. The experimental group was given 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 score exhibited on an end-on-unit summative test for students assigned to the mastery group. C) a significantly 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.
Schielack (1982) assessed the relative effectiveness of a modified version of Keller’s personalized system of Instruction (PSI) and a conventional lecture-discussion method with respect to achievement in mathematics. He concluded that achievement in mathematics can be expected to be higher for PSI than for lecture discussion method.

Reed (1983) studied the effects of a mastery learning strategy on student cognitive achievement in high school basic drafting classes. The concomitant variables of grade level, grade point average, parent’s educational level, previous experience, and gender were also tested to determine if they could account for a significant level of variance in students cognitive achievement in high school basic drafting. The study revealed no significant difference in the scores between the two groups.

Pratt (1983) assessed the effects of the application of the concepts of sequencing, mastery and reinforcement on student achievement in basic English Skills. Effect of treatment was found 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 instructions, (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) examined the effectiveness of a group-based teacher paced mastery learning instructional model in undergraduate education courses. 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 in comparison to instruction in mathematics modelling using a non-mastery approach there was a greater acquisition and retention of modelling skills when
mathematical modelling using mastery learning strategy was used. Instruction in mathematics modelling led to saving in time taken to master a physics unit and shortening of the time required to master each objective.

Holden(1983) tested the effectiveness of mastery learning in the foreign language classroom. Mastery-taught students had significantly higher scores than non-mastery taught students, regardless of the instructor. Mastery learning proved effective in helping students with different learning rates to master material and to develop positive attitude towards learning French.

Kuhn's(1985) in 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.

Royal(1986) conducted research to determine the effectiveness of PSI and conventional methods of instruction, to compare retention levels, and to examine perceptual gain. PSI was found superior in areas of immediate learning and
short-term retention. No difference in perceptual gain was noticed in either group.

Fuchs, et al (1986) studied the effects of contrasting mastery learning on performance among high and low-achieving students. The results indicated 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 instructions and more frequent, detailed, clear feedback.

Ehlers (1987) tried to see the effect of utilizing modified mastery learning as an instructional method in college algebra. After examining the influence of age on achievement he found that students in the 'under 21' age group may demonstrate higher achievement than those in '21 and over' age group in a college algebra class taught by modified mastery learning techniques.

Sullivan (1987) compared results of mastery math and traditional math among junior high school students. The results
revealed that test scores were significantly different according to the instructional method used. Full year gain scores revealed that the original mastery math group achieved significantly higher gains than the traditional group.

Mika (1987) reports that differences in learning rates between varying achievement groups will diminish over time when instruction adheres to the parameters of mastery learning theory. According to the theory, low achievers become more efficient as they build a knowledge base, reduce the time needed to learn and consequently increasingly close the achievement gap between themselves and higher achieving students.

Anuforo (1987) studied the effects of mastery learning techniques on student’s achievement in the study of English language syntax and recommended the use of mastery learning technique as method of teaching English language syntax.

Anderson (1988) examined the effects of group-based mastery learning and enhanced cognitive entry behaviours and traditional teaching on algebra achievement. The experimental groups were taught for eighteen weeks under mastery learning conditions. The control group received instructions through traditional method. During the final week of experiment all
groups were given both a teacher-made test as well as standardized, normative referenced test. Both of the experimental group performed better on the teacher made test than their control group counter-parts.

Olson (1988) studied the effects of mastery learning and wait time on student achievement in seventh and eighth grade mathematics. Three independent variables were studied; mastery learning, wait time, and gender. Mastery learning, wait time and gender had significant effects on student achievement at seventh grade. Females have the greater post-test achievement. The results for grade eight showed interactions with the independent variables. The interactions had females having the greater achievement when combined with the treatment of mastery learning and wait time and males having higher achievement as a control group and with mastery learning and wait time. Mastery learning was a positive and significant main effects for the CRT post-test. Wait time was a negative and significant main effect for the CRT post-test.

Salim (1988) studied the effects of mastery learning strategy on the chemistry achievement and found that the mastery learning students had significant achievement gains in Chemistry. Females and males were significantly better under
mastery learning and it appears that the instructional strategy reduces gender differences. The study further revealed that though, all aptitude students benefited from mastery learning, yet high and average aptitude students benefited more than low aptitude students.

Earnheart (1989) examined the impact of enhanced initial cognitive entry behaviours and mastery learning on student achievement and on student affect in this study. The study samples consisted of 93 black, low socio-economic status, third grade students in a rural public school in Tunica country, Missipi. These students were randomly assigned to four classes, each of which experienced different set of learning conditions, group I learning conditions were enhanced initial cognitive entry behaviour plus mastery learning, group-II used mastery learning alone, group-3 experienced enhanced initial cognitive entry behaviour plus conventional instruction, group - 4 control group experienced conventional instruction alone. All three experimental group scored significantly higher than the control group at 0.05 level of significance. The results of this study support Bloom's theory pertaining to mastery learning and enhanced initial cognitive entry behaviours with regard to achievement.

Mathur (1983) compared 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 selected for teaching. The mastery level decided to be attained in assessment of the unit by the IGSI taught students was 70 percent or above for learning the next unit. Result indicated that 75 percent of the students taught by IGSI scored above 70 per cent, while only 25 per cent of the group taught by conventional method scored above 70 per cent in summative test.

Hooda (1983) carried out a study to see the effects of mastery learning strategy on pupils' achievement in mathematics of class VI in the Indore City of Madhya Pradesh. Two sections of VIth were selected in which one section constituted the control group and the other experimental group. Experimental treatment was given by teaching
mathematics through mastery learning method. Control group was taught through conventional method. It was inferred 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.

Jangira and Yadav (1984) investigated the effect of the Indian Model of Mastery Learning (IMML) on IX class students. Two groups were formed. One group was taught through Indian Model of Mastery Learning and the other group was taught through conventional method. The two groups were matched on previous knowledge in Science, intelligence and socio-economic status. The result indicated 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 the effects of mastery learning strategy in teaching of mathematics to a 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 observed that 80 percent of the cases in experimental group scored higher than 72.89 per cent of total achievement scores, while 20 per cent of the cases in the control group scored less than 21.09 per cent of the total scores.

Chand (1984) carried out a study to see the effects of personalized system of instruction and Bloom's mastery learning strategy on the retention of high school students in a segment of science. Three groups randomised matched subjects design was used in this study. A sample of about 160 students were divided into three equivalent groups. One of the groups was taught through conventional method of teaching and the second was taught by PSI method. The third group was taught by Bloom's mastery learning strategy. The study evinced that PSI and Bloom's MLS have equal effect on immediate and delayed retention. Both of these methods of teaching proved superior to conventional method in their effects on immediate and delayed retention.

Patadia (1987) experimented with 94 fifth grade students with the objective of developing a strategy for mastery learning.

Vaidya (1989) concluded that the mastery learning strategy raises the achievement of the learners irrespective of the entry behaviour, aptitude and intelligence of the pupils. The study recommended that MLS can be used to reduce the number of under achievers, dropouts and failures.

Koul and Chand (1989) investigated the effect of PSI and conventional method of teaching on the retention of material in Science. The study showed that the students taught science through PSI show better retention scores than the students taught through the conventional method of teaching. These
results were found valid for immediate, two weeks and six weeks retention.

Maurer(1991) studied the effectiveness of a mastery-learning strategy in enhancing student cognitive achievement, problem solving skills and retention of concepts in Chemistry. The investigator found that the students who were exposed through mastery learning strategy were significantly better in cognitive achievement than those students who did not receive the treatment. However, the mastery learning strategy was not effective in improving the cognitive retention of the students.

Ghobrial(1992) studied the effects of mastery learning strategies on mathematics students achievement and attitude. The two mastery learning strategies were used i.e. interactive video mathematics (IVM) and individualised instruction (IND). It was observed that there was significant difference among the experimental and control group which suggested that mastery learning strategies have a positive educational influence on students' achievement in mathematics.

Charles(1992) investigated the effect of group-based mastery learning on first grade reading achievement. It was found that the experimental group exhibited greater
achievement on each of three criterion referenced summative tests than the central students.

Kulas(1992) studied the effect of mastery learning on achievement. The findings of this study are contrary to the earlier claim that rapid learners in Mastery Learning Classroom achieve better than rapid learners in conventional classrooms, while slow and average learners achieve significantly more in the Mastery Learning Condition. No significant differences favouring the experimental group were found on any measure and this lack of significant effects was found even when the data was disaggregated 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 counterparts 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.
Ranjna(1992) investigated the effect of mastery learning strategy in teaching science to Vth Class students. Two groups i.e. experimental group and control group were formed. It was found that the group of pupils' taught science through mastery learning strategy showed significantly higher gain scores on criterion achievement test than the group of pupils taught through the conventional approach.

Michael(1993) compared the performance of secondary school students utilizing mastery learning and PSI (personalized system of instruction). This study was carried on two ninth-grade classes in a quasi-experimental pre-test, post-test action research design. No statistically significant difference in students taught by mastery learning as compared with those taught by PSI was found.

Dahiya(1995) studied the effect of mastery learning strategies in teaching of mathematics at VIIth grade level. The sample comprised of 70 pupils studying in the seventh class of two different schools of Nangloi in Delhi city-35 pupils from each school in the age range of 11 to 13 were selected at random as the sample for the study. The study showed that group of pupils taught mathematics through mastery learning strategy have scored significantly higher on the criterion
achievement test than the group of pupils taught through the conventional approach. The results showed that the mean gain scores of the experimental group was significantly higher than that of the control group on the test of verbal and non-verbal creativity.

Renu (1997) studied the effect of mastery learning strategy and concept attainment model on pupils' achievement in science, their self concept and class-room trust behaviour. The results indicated that mastery learning strategy and concept attainment model helped in raising the achievement of pupils and also helped in improving the self-concept and classroom trust behaviour of the pupils. It was also found that concept attainment model is better than mastery learning strategy in improving the achievement of students in science, whereas both these models were equally effective in case of self-concept and classroom trust behaviour.

3.1.2. MASTERY LEARNING AND CREATIVITY

Very few researches have been conducted to investigate the effect of mastery learning strategy on verbal and non-verbal creativity.
Hooda (1982) studied the effect of mastery learning strategy on pupils achievement and creativity. The study was conducted with the following objectives:

3 To investigate the effect of MLS on different dimensions of non-verbal creativity of pupils, namely fluency, flexibility, originality and elaboration.

4 To study the effect of MLS on different dimension of verbal creativity namely fluency, flexibility, originality and composite creativity. Eight units of mathematics were selected for the experiment. Two groups i.e. experimental groups and control group were formed from the same school and were taught by the same teacher. Fifty pupils of two sections of class VI of a school formed the sample. They were from below average socio-economic strata and varied in age from 11 to 13 years. The tools used for the collection of data were Cattell's Culture Fair test of intelligence, Kuppuswamy's socio-economic status scale, Torrance test of creative thinking (Form A and B), Test of creative thinking by Passi for verbal creativity and an achievement test in mathematics developed by the investigator. The study was conducted in three stages. In the first stage, achievement test in mathematics,
intelligence test, socio-economic status scale, verbal and non-verbal creativity tests were administered. In the second stage the experiment was conducted over a period of six months in which eight units selected from the syllabus were taught. The final stage comprised testing of both the groups on achievement in mathematics, verbal and non-verbal creativity. The findings of the study revealed. (1) The mastery learning strategy for teaching mathematics was more effective in enhancing non-verbal creativity. (2) The mastery learning strategy for teaching mathematics was more effective in developing verbal creativity.

Hooda and Jarial (1983) investigated the effect of mastery learning strategy in teaching mathematics to VI class on the different dimensions of verbal creativity. The objective of the study was to find out the effect of teaching mathematics by mastery learning strategy on different dimensions of students' verbal creativity namely fluency, flexibility, originality and composite creativity. Fifty five students of grade VI were selected as the sample of the study. The sample was from below average socio-economic strata in the age range of 11 to 13+. The Passi test of
creative thinking (PTC) was used as pre and post-test measures of verbal creativity. The study followed the experimental and control group design of experimentation. The different dimensions of verbal creativity namely fluency, flexibility, originality and composite creativity were the criterion variables, whereas, teaching of mathematics through MLS was the independent variable. The two groups were matched on various dimensions of the Passi test of verbal creativity. One of these groups was taught by MLS, Whereas, the other group was exposed to traditional treatment. Teaching of mathematics through the strategy of mastery learning was the experimental treatment. Nine units from VI class syllabus were selected for experimental treatment. The criteria fixed for mastery learning was 80% of mastery over the content of each unit. The time for completing various units varied from 8 to 17 school periods and the experiment took nearly six months. The same nine units were taught to the control group by the same teacher utilizing the same amount of time. The experimental group took more time than the control group to learn the units, as the students have to attain the mastery level of the content, however the students of the control group utilized the
remaining time on supervised self study. After completion of all the nine units by both the groups, Passi test of verbal creativity was administered to them. The manuscripts were scored and the data were analysed by employing appropriate statistical techniques. The results revealed that the students of experimental group have scored significantly higher than the students of control group in fluency, originality and composite creativity dimensions of verbal creativity, which ultimately shows the effectiveness of the treatment, i.e. teaching through mastery learning strategy.

Hooda and Jariah (1983) carried out a study to see the effects 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 mean scores than those in the control group on all the dimensions of verbal and non-verbal creativity. This shows that teaching through mastery learning strategy helped in improving the different dimensions of verbal and non-verbal creativity. Hooda and Jariah (1983) studied the effect of MLS on non-verbal creativity and its dimensions namely fluency, flexibility, originality and elaboration. Fifty five students of one the section of the class VI of a middle school of Indore city
constituted the sample of the study. The age of the students ranged from 11 to 13 years and they belonged to below average socio-economic status of the society. The data was collected using figural form A and B of the Torrance test of creative thinking (TTCT). The teaching of mathematics through the strategy of mastery learning was the independent variable, whereas, the different aspects of non-verbal creativity i.e. fluency, flexibility, originality and elaboration were the criterion variables. First of all TTCT form A was administered to the students of both the sections. It was found that there was no significant difference in their mean scores. On finding these groups comparable on criterion variables, one of the groups was exposed to the experimental treatment, whereas the other was exposed to the control treatment. Experimental group was taught nine units of VIth class mathematics prescribed by Madhya Pradesh State text book corporation utilising mastery learning strategy. Each day a school period of 30 minutes duration was utilized for the purpose. Eighty percent mastery over the content of the unit was, considered to be the criteria of mastery learning. The experiment lasted for six months. The same units were taught to the students of the control group by the same teacher utilizing the same amount of time, by
following the traditional method of teaching. The experimental group took more time than the control group to complete the units, as they had to reach the mastery level of the content. The students of the control group spend their remaining time in self study, in the presence of the teacher. After completion of the experiment experimental and control groups were administered the figural TTCT from B. The manuscripts were scored as per instructions given in the manual and the data were analysed by employing 't' test. The findings of the study revealed that the students of experimental group had scored significantly higher mean score than that of the control group which ultimately may be attributed to the treatment i.e. mastery learning strategy.

Mathur (1979) has been experimenting in 20 schools by taking two apparently contradictory concepts, viz, mastery learning and creativity development on physics as subject.

Shah (1977) has taken up the effects of selected teaching strategies on development of creative thinking and achievement. But the investigator has not used the standardized instruments to measure creativity.
Bheemaiah (1978) prepared instructional materials for teachers, on skills of guiding discovery, for developing creative abilities in children, as a part of her M.Ed. programme.

3.1.3 MASTERY LEARNING AND SELF-CONCEPT

Block (1971) observed a relationship between students' academic performance and progress with his self-concept and mental health. He concluded that if a student can be provided with a history of successful and rewarding experiences in a given type of task, his confidence in his ability to perform similar and related tasks will increase his aspiration to learn and his actual performance will improve.

Guskey and Pigott (1988) on the basis of their analysis of the studies on academic self-concept conducted by Anderson, Scott and Hurlock (1976), Cabezon (1984), Tennenbaum (1982), Yudiran (1977) concluded that students who learnt through mastery learning procedures developed higher self-concept in comparison to students taught through other methods.

Hooda (1983) found that pupils taught through mastery learning strategy showed improvement in their self-concept but the improvement was not significant. But Yadav (1984) reported contrary findings in which he found that improvement in the self-concept of students instructed through mastery learning
strategy was significant. Vaidya (1989) also reported that application of mastery learning strategy contributes to the enhancement of self-concept by providing success experience to the learners. Sangwan (1992) and Renu (1997) also observed significant improvement in the self-concept of the students exposed through mastery learning strategy.

3.2.0 STUDY CONCERNING INQUIRY TRAINING MODEL

The research evidences for the effectiveness of Inquiry clearly indicate that Inquiry model can prove very effective in utilizing the potential of the learners to the maximum level. The findings of the studies conducted by Strike (1975) and Mayer (1975), Massialas B (1966), Schafer, R (1967) found that the school is a center of Inquiry. Ivany (1969) and Collins (1969) reported that inquiry training model works best when the confrontation are strong, arousing genuine puzzlement, Voss (1982) has found that elementary and Secondary students both can profit from this model. Sanchez's (1985), Doty (1985) and Katyal (1985) have found this model to be superior to traditional teaching. Dubey (1986) and Malhotra (1989) found that relative efficiency of Inquiry approach is better than traditional method. Thus it shows that pupils who
learn through inquiry training achieve higher than those who learn through conventional methods.

Popham (1966), Cruick Shand (1968), Keplar (1977), Gleissman and Pugh (1978), Mickelson studied the theoretical orientation of various models and showed that student teachers who taught with these models improved their knowledge about the models and skills of teaching Sanchez (1985) constructed a model of Biology lessons design based on synthesis of modern learning theory and some inquiry techniques. Cason (1985) developed a communication model to affect the critical thinking of students. Senapathi (1985) studied cognitive growth model. Sahni (1986) studied non-directive model. Gordon (1977), Poz (1983), Stello and Andrews (1986) studied synectics model, whereas, Tiwari (1986) and French (1986) are ones to study Jurisprudential inquiry model on college students.

Not much work has been reported in inquiry training model. The studies in this model of teaching have been reviewed by Strike (1975) and Mayer (1975). Massialas, B. (1966) studied inquiry training model in Social Sciences. Schafer, R. (1967) found that the school is a centre of inquiry. Ivany (1969) and Collins (1969) reported that inquiry training model works best when the confrontation are strong, arousing
genuine puzzlement; and when the materials are provided, the students use to explore, the topics under consideration are especially instrumental and the like. Schlenker (1976) after studying the model found that inquiry training model resulted in increased understanding of science, productivity in creative thinking and skills for obtaining and analysing information. He further reported that it was not more effective than conventional recitation methods in acquisition of information but it was as efficient as recitation or lectures accompanied by laboratory experiments. Elephant (1980), an intriguing student, successfully carried out the model with deaf children which suggests that method can be powerfully used with students who have severe sensory handicaps. Suchman (1981) studied the geological inquiry through this model.

Voss (1982) has found that elementary and secondary students both can profit from this model. Sanchez's (1985) investigation has attempted to bring a synthesis of some inquiry techniques, while, Doty (1985), Katyal (1985), etc. have found this model to be superior to traditional teaching. D'Lima and Sughnadi (1986) tried to identify teaching skills in relation to inquiry training model, while, Annatae (1986) has tried to develop college chemistry course based on inquiry training
Dubey (1986), Malhotra (1989) determined the relative efficacy of inquiry approach to be better than traditional methods. Leising (1986) found that intuitive type personality improved their logical reasoning and thinking through the use of the present model of teaching in intervention of science. Like the former models, the studies in this model too have used similar methods and samples from very small to moderate without randomisation. Parametric as well as non-parametric techniques have been used in these investigations using t-test, ANOVA, Chi-square, graphical methods and the like.

Sushma Swaraj (1987) found concept attainment and biological science inquiry model to be significantly superior to the conventional teaching in terms of class VIII pupils' achievement. The pattern of effectiveness observed by her was concept attainment model > biological science inquiry model > traditional methods on both achievement and attitude towards biological science.

at university level. Flory (1985) tried to determine enhanced mode of thinking of sixth grade students. Passi, Singh and Sansanwal (1986, 1987, 1988) tried to establish the effect of differential variation in components of models of teaching in terms of competence, understanding reaction and willingness to implement. The models included in the study were concept attainment model, inquiry training model, advance organiser model and Jurisprudential inquiry model. Two models were studied at a time. The training in models of teaching in the form of lecture/demonstrations/discussion and peer group practices plus feedback did enhance the understanding of theoretical aspects of the models and teacher/teacher-educators were willing to implement these models in their classrooms.

Sixteen sub-studies were also conducted by the participating teacher-educators in their institutions of which twelve related to the effectiveness of concept attainment model with variations in their peer practices and three to inquiry training model while one more related to family of information processing models.

Jain (1977) in his doctoral dissertation has stated that creativity components related to mental processes were
positively effective correlates of proficiency in teaching and teaching strategy involving innovations.