CHAPTER-II
REVIEW OF RELATED LITERATURE

2.0.0 INTRODUCTION

The review of related literature has a creative and analytical function. According to Good, Barr and Scates, review is essential for developing valid insights in the area of study and also for projecting tentative solution to the problem while W.R. Borg is of the opinion that related literature provides the infrastructure from which the study grows and a perspective against which it should be assessed. Bruce Tukman says that review of related literature is an essential device for developing an adequate research spectrum.

After having attempted to define the problem in the previous chapter, this chapter will be devoted to a brief and critical survey of researches available so far on mastery learning and gaming. It is hoped that the review of these studies will prove useful in identifying the important findings arrived at by the researchers. A knowledge of their accomplishments and limitations will provide a deeper insight into the nature of the problem and may guide the investigator to direct the research efforts to fill up the gaps and remove imbalances and inadequacies where-ever they are revealed by this analysis of the available researches. Thus, keeping in view the importance of review of related literature, this chapter has been devoted to the same.
Since the present study is concerned with two models namely Mastery Learning Model and gaming Model, the investigator reviewed the researches related to these models. Part I of this chapter deals with review of studies related to Mastery Learning Model and Part II deals with review of studies related to gaming.

PART-I

2.1.0 STUDIES RELATED TO MASTERY LEARNING STRATEGY

Carroll (1963) gave the ‘Model of School Learning’. According to him, there are five variables which influence learning in a school situation. Block (1971) classified five variables of Carroll’s model and two other areas. Same classification has been adopted by the investigator to review the studies related to Mastery Learning with the addition of an important area of pupil cognitive outcomes. These categories are as under:

i) Aptitude and rate of learning.

ii) Ability to understand instruction.

iii) Quality of instruction.

iv) Perseverance.

v) Time as variable in attaining mastery.

vi) Pupil Affective outcomes of Mastery Learning.

vii) Uses of mastery concepts and strategies.

viii) Pupil cognitive outcomes of Mastery Learning.
An important area need to be reviewed is pupil cognitive outcomes of mastery learning which has been given due importance in the present study.

2.1.1 APTITUDE AND RATE OF LEARNING

Researches related to aptitude and rate of learning as the major variable have been conducted by Gagne (1961), Yeager (1961), Carroll (1963, 1967), Sjogren (1967), Behr (1967), Glaser (1968), Atkinson (1968), Kim (1968, 1969), Cronback & Snow (1969), Block (1970), Dennis (1972), Anderson (1973), Arlin (1973), Steve (1984). The findings of these studies support that students differ in their rate of learning in a given subject or unit. Findings also indicate that when time allowed for learning was held relatively constant for all students, their performance on the final examination was more than ordinarily affected by differences in their aptitudes. Result of studies also suggest that learning rates and achievement levels were interchangeable in such types of learning situation. Ability to understand instruction affects learning rate and particular aptitudes are related to learning rate for each task.

Bloom (1971), who has summarised nearly forty studies including those made by Ausubel (1964), Biehler (1970), Kersh (1970), Kum (1969, 1970), has noted that these studies report significant effects on students’ cognitive and affective development and rate of learning. The conclusion drawn by Bloom was that a planned use of objectives, diagnostic problems and review prescriptions systematically raise the number of
students achieving mastery from 40 percent under control conditions to 80 percent or above under mastery conditions. Learner's interest in the subject and his aptitude towards the subject also increases greatly when taught by using mastery learning methods than under traditional approaches. According to Bloom, feedback/correction procedures may be able to offset the strong effects that I.Q. usually has on the achievement of students under typical classroom instruction. Similar findings characterise the results of almost fifty students summarised by Block (1974) in his book Schools, Society and Mastery Learning.

Dennis (1972) in his study concluded that mastery learning models can be used to reduce the correlation between aptitude and achievement.

2.1.2 ABILITY TO UNDERSTAND INSTRUCTION

Behr (1967) found several significant interactions between the instructional methods and mental ability factors. Leyton's (1983) study indicated that the achievement attained, attitudes acquired towards themselves as learners, including relations between prior and subsequent achievement, are strongly determined by the learning conditions provided. The average student in the mastery learning conditions group was above 95% of the students in the conventional group. This study also indicated that students' learning potential is most fully revealed under the best set of conditions such as enhanced initial cognitive entry behaviour plus mastery learning.
Berry (1985) found that among third graders in reading performance, tutored students scored higher than non-tutored.

2.1.3 QUALITY OF INSTRUCTION


Results of the studies indicate that the quality of instruction affects both student learning rate as well as achievement level. The qualities of cues, participation, reinforcement and the type of feedback available to both teacher and student are all predictive of student achievement. Research evidence suggests that effective feedback/corrective procedures can transform classroom instruction of any initial quality into instruction of optimal quality for each student.

Carroll (1967) found that there was no interaction between intelligence and quality of instruction, suggesting that poor quality of instruction affected high and low intelligence students equally.
Carriello (1980) found that the mechanism used to account for inserted questioning effects may be operative in mastery learning as well. Mastery learning may facilitate intentional learning at the expense of incidental learning. Broski (1981) inferred that mastery based strategies had a positive effect on student achievement in transposition and psychomotor conducting skills. The study also suggests that mastery learning is a potentially valuable tool for music learning in higher education because it enhances student learning through the individualization of teaching and learning.

Lemore (1981) reported that students exposed to mastery learning instructional methods scored significantly higher than students not exposed to mastery learning instructional method. Nicholson (1982) also found mastery learning instructional approach superior to conventional approach in teaching cultural concepts to rural disadvantaged children.

Kow (1984) found that ‘individualized learning package programme’ student learned more and there was significantly greater proportion of students who could earn grade ‘A’ by mastering the content than the students using conventional approach. Besides, all the students in the individualized programme passed as compared to only 60% of the students in the conventional classes.

Evans (1985) in his study on elementary remedial reading found that mastery learning was more effective than the eclectic diagnostic prescriptive approach.
Royal (1986) having compared personalized system of instruction (PSI) and conventional methods, found PSI superior to conventional method in areas of immediate and short term learning.

2.1.4 PERSEVERANCE

Limited research studies are available related to this variable. Seashore Bavelas (1942) and Bloom (1968) found that perseverance is not fixed. It can be increased by increasing the reward, i.e. providing external positive reinforcement and by evidence of learning success. It may also be influenced by the quality of instruction. Carroll and Spearitt (1967) found that there was an interaction between intelligence and the quality of instruction with respect to the students' willingness to persevere on a difficult post-experimental task. High quality of instruction increases the perseverance of students of high and low intelligence but it has little effect on the perseverance of average intelligence students.

Kulhavy (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 effect of feedback and suggested that research availability must be controlled if feedback is to be effective.
J.A. Kulik and Chen-Lin C. 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 educational purpose.

Robert L. Bangert-Drouns, et al. (1991) reviewed 58 effect sizes from 40 reports. They found that feedback effects varied with control for research availability, type of feedback, use of pre-tests, and type of instruction. This study suggests that elaborate feedback may be more important in the building of conceptual frameworks, drawing of inferences, or applying of rules in complex situations.

Frank M. 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.

2.1.5 TIME AS A VARIABLE

Sjogren (1967) empirically examined the Carroll’s Model and asserted that there was significant positive relationship between the ratio of time spent to the time needed and the learning measures the achievement tests and the aptitude scores. Wright (1967) investigated the relationship between subject mastery and time (grade level) and reported that time taken varied for different subject matters. Bloom (1968) concluded that student should be allowed the time he needed to learn a particular subject.

Glaser’s (1968) research results indicated wide individual differences in the number of units reached, and the number of mastered to the criterion level over time. Faster students mastered almost five times as many units as the slower students.

Yeagir (1969) found that there was a significant positive relationship between the student’s state of readiness to learn and the number of days he required to master a given unit. In particular, the students’ pretest scores of the number of skills to be mastered in the unit, and the student’s age were highly predictive of the time the student needed to learn. I.Q. had little predictive power, supporting earlier findings that it has little effect on progress in programme, where the student proceeds at his own rate and is capable of mastery.
Merrill et al's (1970) findings indicated that specific 'review' following difficulties made experimental student's learning increasingly efficient. Further the total time spent by the experimental group was slightly less with more material than the time spent by the control group.

The studies carried out by Mayo and Longo (1966), Kersh (1971), Pillet (1975), Jones et al (1975) in different subjects and in different grades was summarised by Bloom (1976). These studies were conducted on the learners of mastery groups 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. It was found that the learners tutored under mastery learning scored significantly higher than those in the control group.

Marshal Arlin (1984) attempted to assess both mastery proponents' and mastery critics' claim in the context of learning time differences. His study indicated 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.

Conclusions from Smith's (1981) study supported the notion that the mastery learning method clearly produces significantly higher gain in
achievement than traditional methods. Stock (1981) also reported that the mastery learning environment significantly reduced the time that a student needed to learn to 'A' level in the class.

Daniel L. Brace (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 of learning. Specifically, the study analysed student achievement, affect and learning time in two sixth-grade mathematics classrooms taught by the same teacher. The participants were one classroom mathematics teacher and 41 students from two sixth grade mathematics classes in a suburban middle level school. For an eight weeks 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:

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

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

iii) Differential time needs of students was not significantly change over successive units under mastery learning conditions.
iv) The promotional amount of remedial time used by qualifying students were not significantly change over successive units under mastery learning conditions, but remain stable.

2.1.6 PUPIL AFFECTIVE OUTCOMES OF MASTERY LEARNING

Affective outcomes are assessed in terms of changes in a student's perception or view of himself and the outer world, brought about by learning conditions and the evidences he gets of his adequacy or inadequacy in his school learning. Success or lack of success in school learning is a major factor in determining how the student feels about himself as a learner, about his school and school learning and his desire for further learning. Most of the researches conducted to examine the effects of mastery learning strategy have something to say about pupils' self-concept or attitude towards the subject etc., the studies reviewed here are Sears (1963), Torshen (1969), Kifer (1973), Burkman and Brezin (1981), Russock (1982), Pratt (1983), Soto (1983), Schielack (1983), Holden (1983), Kuhn (1985), Lovullo (1986), Anuforo (1987), Guskey and Pigott (1988), Kulik et al (1990), Studies by Indian researchers such as Hooda (1983), Yadav (1984), Koul (1986) and Vaidya (1989) have also been included in this review.

Most of the notable studies aimed at investigating students' self concept made during the sixties and early seventies by scholars such as Sears (1963), Torshen (1969) and Kifer (1973) have been discussed and analysed by Bloom (1976).
Bloom (1976) finds in the work of Sears (1963) a number of areas in which an individual may appraise himself. Some of them may be classified as academic self-concept, such as learning, school subjects, work habits, and relations with the teacher. There are others which may be classified as non-academic self-concept. They have to do with self-appraisals with regard to athletics, relations with boys and girls, relations with others, and appearance (Torshen, 1969). There is a low but positive relation between these two large categories of self-concept. Kifer (1973) noticed in his quasi-longitudinal study of successful and unsuccessful students that the general self-esteem of the successful students remained relatively high over the eight years of school, while the general self esteem of the unsuccessful students dropped significantly from grade 4 to grade 6 and was still low by the end of grade 8. It has been found that individuals who are low in academic self-concept may be high, average or low in non-academic self-concept. However, the role of academic self-concept is important in determining whether or not the individual will voluntarily engage in school-related learning when he is free to do.

Ernest Burkman and Michael Brezin (1981), while attempted to assess mastery learning strategy on achievement also focused on students' aptitude variables of academic ability, study orientation and locus of control. The results suggested that academic ability and study orientation were associated positively with achievement regardless of the difficulty of the content studied.
James Stuart Russock (1982) applied modified PSI treatment to experimental group. Results were compared to a teacher directed control group. Dependent variables included measures of self-concept of science ability, positive and negative attitude towards science, attitude towards science class, and understanding about science. Locus of control internal orientation was imposed as a second independent variable. Analysis of co-variance between instructional group yielded significant differences, favouring the experimental group, on understanding about science and retention of self-concept. Analysis of co-variance between locus of control group indicated significant differences in post-test measure of self-concept and negative attitude towards science favouring the positive internal group.

Lorraine Nichols Pratt (1983) studying the effects of the application of the concepts of sequencing, mastery and reinforcement found that it led to higher achievement which in turn resulted in their developing a more positive attitude towards English classes and towards school in general.

Fernando Leyton Soto (1983) also found that learning conditions strongly determine the achievement attained and attitudes acquired toward themselves as learners, including relations between prior and subsequent achievement.
The findings of Vincent Paul Schielack (1983) also indicate that post-course attitude towards mathematics can be more positive for PSI than for lecture treatment.

Nancy Christine Holden (1983) tried to examine the validity of the assumption that the more the students succeed in mastering their learning task, the more they wish to continue. She experimented with third-semester college level French class and found that mastery learning proved effective in helping students with different learning rates to master material and to feel positive towards learning French. The attitude of the learners towards grammar also improved significantly over the course of the semester.

But Carole Kuhn (1985) in his study on high school students enrolled in the second year of French observed that there was no significant difference between the experimental and control group towards learning French.

Carol Tocco 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 students' attitude toward school are a result of differences in schooling (i.e. mastery versus non-mastery approaches)? (ii) To what extent did a programme utilising 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.

Susan Akudo Anuforo (1987) studying the effects of mastery learning strategy on pupils' attitude towards the study of English language syntax found the attitude gain score mean of the experimental group significantly higher than that of control group.


Results from these studies, according to Guskey and Pigott, indicate that mastery learning procedures have an overall positive effect on affective outcomes though typically not as large an effect as what they have on cognitive outcomes. Results show that students who learned under
mastery learning generally liked the subject they were studying more, were confident of their abilities in that subject, felt the subject was more important, and accepted greater personal responsibility for their learning than students who learned under non-mastery conditions.

Kulik, et al. (1990) made a meta-analysis of 108 studies. 72 out of these were based on Keller's PSI approach and the remaining 36 studies were based on Bloom's mastery learning approach. The outcome variables measured in the studies included attitude towards instructions and attitude towards the subject matter being taught. Eighteen studies examined student ratings of the quality of the instructional method used in the course. Sixteen of the 18 studies found more positive attitude and two studies found more negative attitude in the mastery learning class.

Fourteen studies examined the effects of mastery programmes on student attitudes towards the subject matter that they were being taught. Twelve of these fourteen studies indicated that student attitudes were more positive in mastery classes than in conventional classes; two studies found negative effect.

Singh (1983) focussed on effects of mastery learning strategy on certain non-cognitive variables of high school students. The main purpose of the study was to compare the effects of programmed instruction, Bloom's mastery learning strategy and the conventional method of teaching on self-concept, achievement motivation and test anxiety of students after taking instruction in social studies. He found that: (i) Programmed
instruction, Bloom's mastery learning strategy and the conventional method of teaching did not significantly affect the self-concept of high school students (ii) There was significant increase in the achievement motivation of high school students after receiving instructions through Bloom's MLS in comparison with those students who were imparted instruction through programmed instruction. However, there was no significant difference in achievement motivation of the groups of students which took instruction through Bloom's MLS and the conventional method of teaching (iii) PI, Bloom's MLS and the conventional method of teaching did not significantly affect the test anxiety of high school students.

Hooda (1983) reported that 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.

Yadav (1984) also attempted to examine the effects of mastery learning strategy on students' attitude towards mathematics and their self-concept. After receiving instructions through mastery learning strategy, the experimental group students' attitude towards mathematics was found to be positively influenced. Improvement in self-concept of the experimental group was also found to be significantly higher than that of control group.

Koul (1986) while examining the effects of mastery learning strategy on achievement motivation and test anxiety of socially
disadvantaged group in Himachal Pradesh found 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. The result of the study also revealed that there was a decrease in magnitude of the test anxiety of student imparted instruction through mastery learning strategy.

Patadia (1987) in her study with fifth grade students found that the mastery learning strategy was effective in building the self-esteem of the pupils by removing the feeling of inferiority in them.

Aranha (1988) studied the effect of MLS on academic motivation and study habits of the V grade pupils. She found that there was significant development in academic motivation of the group but the development in the study habits was not significant.

Vaidya (1989) in her study revealed improvement in achievement, self-concept and attitude of students towards learning Hindi, of the experimental group.

Sangwan (1992) examined that effect of mastery learning strategy on pupils' achievement in science, self-concept, adjustment and classroom trust behaviour. The results of the study revealed that achievement in science, self-concept and classroom trust behaviour of the students improved significantly after taking instruction through mastery learning
strategy. It was also found that mean gain score of the experimental group after the experiment was significantly lower than that of control group on the test of adjustment.

2.1.7 USES OF MASTERY CONCEPTS AND STRATEGIES

Over the past twenty five years, considerable interest has grown in the concept of mastery learning. But the ideas of mastery learning are not altogether new. Infact, the fundamental of mastery learning were described in the early years of the twentieth century by Washburne (1922) and Morrison (1926), and can be traced to such early educators as Commenius 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 researches on quality of instruction and effective schools, which provide numerous examples of successfully using various elements considered basic to mastery learning strategy. As manipulation of the learning time allowed to each learner, the quality of instruction through various feedback learning corrective devices or use of alternative materials appropriate to the needs of the individual constitute important element of mastery learning strategy, considerable attention has been given to them by educators and researchers. A number of studies reported by Block (1971, 1974), Block and Burns (1976) and Bloom (1976) have brought out the effectiveness of mastery learning strategy at all levels of education and in such different subjects as Arithmetic,
Philosophy, Physics, Geography.


Block (1971), who has summarised nearly forty studies including those made by Ausubel (1964), Airasian (1967, 1969), Bloom (1968), Keller (1968), Biehler (1970),Kersh (1970), Kim (1969, 1970), has noted that these studies report significant effects on students' cognitive and affective development and rate of learning. Block concludes that a planned use of objectives, diagnostic problems and review prescriptions systematically raise the number of students achieving mastery from 40 per cent under control conditions to 80 percent, or above under mastery conditions. Mastery learning methods also contribute to increasing the learner's interest in and better aptitude for the subject learned than more traditional approaches. According to Block, feedback/ correction procedures may be able to offset the strong effects that IQ usually has on the achievement of students under typical classroom instruction. These studies also indicate that mastery learning strategy can compensate
learning deficiencies of culturally deprived children. Similar findings characterise the results of almost fifty students summarised by Block (1974) in his book *Schools, Society and Mastery Learning*.

Results of the studies conducted by Block and Burns (1976) show that students who learn in an environment that allows for testing, diagnosis, continued learning and retesting exhibit greater content learning than the students involved in a more traditional learning environment. Block and Burns (1976) reviewing literature on mastery learning found that in 97 comparisons of average achievement test scores, involving various types and number of students and various subject matter areas, mastery taught students scored higher than non-mastery taught students 89% of the time and significantly higher 61% of the time.

Bloom (1976) has provided a summary of results of studies carried out by Mayo and Longo (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 groups 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.

Jon J. Denton and Jo Ann G. 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 detail how to correct deficiencies appears to be most appropriate for less intense pacing, while less specific remediations are appropriate for time compressed programmes.

John W. Miller and Randy 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 retesting 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 trial students.

Yung Ming 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 drop-out rate were insignificant. However, the study gave some evidence that prior accounting knowledge, contrary to expectations, did correlate with achievement.

Mary Kerr 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.

Marshal 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.

Marie Grace Mashal (1986) in her study conducted on nursing programme concluded that all-mastery-group was found more positive about their learning experience than the some-mastery-group. The all-mastery-group earned higher grades.
Donald C. Royal (1986) compared personalized system of instruction (PSI) and conventional method. His study revealed that PSI was superior to conventional method in areas of immediate and short term learning.

Elaine Bernhard King (1987) came to the conclusion that research is still needed to find a more effective method of teaching. He compared a group-paced mastery learning model with an individually programmed mastery learning model in the teaching of reading to high school students. Neither model brought the hoped for growth, in most areas the results were almost indistinguishable from one treatment to the other.

Lawrence Leonard Callahan (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 basket ball, shooting skill and concomitant student state anxiety. The results indicated that the mastery learning students were somewhat higher in skill level and lower anxiety level than traditional pupils, but not at a statistically significant level.

Robert E. 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.

Chen-Lin C. Kulik, et al (1990), however, do not agree with R. Slavín. They described a variety of results from a variety of programmes. They covered 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 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 a 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 student attitudes toward course content and instruction but may increase student time on instructional tasks.

Similar are the findings of Thomas R. Guskey and Therese D. Pigott (1988) who made a meta-analysis of 46 studies on group-based applications of mastery learning strategies. Their study revealed that such
applications yield consistently positive student learning outcomes, as well as several teacher variables. Variation in the size of 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. Several factors were explored as possible explanations for this variation, including the subject area to which mastery learning was applied, the grade level of students involved, and the duration of the study.

There are also a number of studies which have attempted to test the effectiveness of frequent testing and feedback. Kulhavy (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 research availability must be controlled if feedback is to be effective.

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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 indicated that frequent testing is also an effective teaching strategy for more efficient learning. Mulik et al. (1986), cited by Frank M.Kika, et al. (1992), stressed 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.

Frank M. 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.

2.1.8 PUPIL COGNITIVE OUTCOMES OF MASTERY LEARNING

Cognitive outcomes of mastery learning are measured in terms of pre-determined specific objectives which deal with recall and recognition of knowledge and development of intellectual abilities and skills. A number of researches have been conducted abroad to investigate the effects of mastery learning strategy on students' cognitive outcomes. The researches reviewed for the present study include Block (1971), Fagan (1975), Myers (1975), Block and Burns (1976), Bloom (1976), Yildiran
Block's analysis (1971) of forty studies carried out under different school conditions led him to conclude that despite 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 learnings, mastery procedures appear to be able to almost eliminate the effects of individual differences on level of achievement.

James Stephen Fagan (1975) examined the relationship of mastery procedures and aptitude to the achievement and retention of
transportation environment concepts by seventh grade students. An eighty per cent criterion level was required for mastery on the formative tests. The investigator found that mastery procedures did not facilitate achievement or retention.

Robert Reese 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 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). They compared the experimental and control classes 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.

Guzver Yldiran (1977) conducted a study 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. The study further revealed that levels of learning produce effects which are associated with good learning and that its influence is greater than that of more stable characteristics like the rate of learning and aptitude or I.Q.

Jon. J. Denton and Jo Ann G. Seymour (1978) examined the influence of unit pacing and mastery learning strategy on the acquisition of higher order intellectual skill. The results of this investigation indicate 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.

Byong Sung Kim (1980) designed his study to investigate how teachers' instructional climate and instructional conditions interrelate to bring forth mastery implementation which in turn, is associated with student academic achievement. Teacher climate, in this study, is defined as a part of the school learning climate, and consists of teacher expectations, evaluations and academic norms of school. 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.

David Lee 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 students' perceived cognitive development both at the module and course level.

Ernest Burkman and Michael Brezin (1981) attempted to determine 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 most strongly associated with higher achievement for each dependent variable. Comparing high and low standards, high was better for easy content while low was better for hard content.

Marian Edith Chu Hallada (1982) applied mastery principles in an instructional design for effective learning in General College Chemistry. A field experimental research design was used for 50 students in a treatment group, identified by their relatively low cognitive pre-measures, and 300 students in a comparison group. An instructional design was developed for the treatment group, and the progress of both groups was followed during their first term in General College Chemistry. 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 than predicted from cognitive pre-measures, and both groups showed an overall high degree of student course satisfaction.

Edwin Thomas Brooks (1982) studied the effects of mastery instruction on the learning and retention of science process skills. He made comparison in student achievement and retention between mastery-instructed classes and non-mastery instructed control groups. The study indicated no significant difference in levels of achievement
between mastery and non-mastery groups, average or above-average students. It was further reported that while mastery instruction may not be significantly better than non-mastery instruction in effecting achievement gains when equal amount of time is spent in both modes of instruction, the mastery learning strategy can sometimes produce a more permanent mastery of sequentially organised materials (high process skills) than an equivalent time non-mastery instructional design.

Gary Steven 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-week 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 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.

Vincent Paul Schielack (1982) attempted to assess the relative merits 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 suggested that achievement in mathematics can be expected to be higher for PSI than for lecture treatments.

Curtis Reed (1983) examined 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, parents' educational level, previous experience, and gender were also tested to determine if they could account for a significant level of variance in student cognitive achievement in high school basic drafting. The study revealed no significant difference in the scores between the two groups.

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

Fernando Leyton Soto (1983) worked to assess the extend 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 Charlotte R. 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.

Dinesh Mohan Srivastava (1983) found that instruction in mathematical modelling using mastery learning strategy results in greater acquisition and retention of modelling skills than instruction in mathematics modelling using a non-mastery approach. 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.

Nancy Christine Holden (1983) tested the effectiveness of mastery learning in the foreign language classroom. The study compared two classes taught by the same instructor, one with a mastery learning treatment and one without. Pre and Post-test measures revealed that on
diagnostic tests of grammar skills and vocabulary knowledge mastery-taught students had significantly higher scores than non-mastery taught students, regardless of the instructor, and despite small sample sizes. Mastery learning proved effective in helping students with different learning rates to master material and to feel positive towards learning French.

Carol J. Kuhn's (1985) 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.

Donald Royal (1986) conducted his research to develop a PSI, to test its effectiveness in teaching the elements of art, as compared to conventional methods of instruction, to compare retention levels, and to examine perceptual gain. PSI compared to conventional methods in areas of immediate learning and short-term retention was found to be superior. No difference in perceptual gain was noticed in either group.

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.

Susan Bumann 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 in a college algebra class taught by modified mastery learning techniques.

Valeen Wallace Sullivan (1987) compared outcomes of mastery math and traditional math among junior high school students enrolled in general, remedial and resource mathematics classes. The research questions focussed on two major areas, achievement gains and implementation issues such as acceptance by students and teachers, problems encountered, and costs involved. He found that test scores varied significantly according to their instructional method used. Full year gain scores revealed that the original mastery math group achieved significantly higher gains than the traditional group of all areas.

Kristine Louise 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.

Susan Akudo Anuforo (1987) investigated the effects of mastery learning techniques on students' achievement in the study of English language syntax and recommended the use of mastery learning technique as a better method of teaching English language syntax.

Ronald William Anderson (1988) attempted to examine the effects of group-based mastery learning and enhanced cognitive entry behaviours on algebra achievement. The study focussed on two experimental groups and two control groups taught by different teachers. The experimental groups were taught for eighteen weeks under mastery learning conditions. The control group received traditional instruction. 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. On the standardized post-test, the afternoon experiment group out performed its control group. However, the morning control group performed better than its corresponding experimental group.

Edith Myrtle Jantjes (1988) found the when the conditions of learning are appropriately improved to meet the cognitive and affective
needs of most students, their levels of achievement and affect are significantly enhanced, and their initial cognitive differences are greatly decreased over time.

Dale Arthur Olson (1988) analysed the effects of mastery learning and wait time on student achievement in seventh and eighth grade mathematics. There were three independent variables which were studied: mastery learning, wait time, and gender. The results for grade seventh were that mastery learning, wait time, and gender had significant effects on student achievement as measured by the CRT with mastery learning, wait time, and females having 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 effect for the CRT post-test. Wait time was a negative and significant main effect for the CRT post-test.

Mohamed Ibrahim Salim (1988) studied the effects of mastery learning strategy on the chemistry achievement of secondary school students as related to their gender and aptitude at a school in Sabha (Libya). The investigator found that the mastery learning students had significant achievement gains in Chemistry. Although, females and males did significantly better under mastery learning, the instructional strategy
appeared to reduce gender differences. The study further revealed that although, all aptitude students benefitted from mastery learning, high and average aptitude students benefitted more than low aptitude students.

Margret Mansfield 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-2 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 result of this study support Bloom’s theory pertaining to mastery learning and enhanced initial cognitive entry behaviours with regard to achievement.

In India studies to investigate the effect of mastery learning strategy on cognitive outcome of the pupils started in the eighties. The studies conducted by Mathur (1983), Hooda (1983), Yadav (1984), Chand (1984), Patadia (1987), Vaidya (1989) and Koul and Chand (1989) can be cited in this context.
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 the IGSI taught students was 70 percent or above for going on to the next unit. Result showed that 75 per cent 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) studied the effect of mastery learning strategy on pupils' achievement in mathematics. The sample consisted of pupils studying in two sections 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 experimental 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.

Hooda and Jarial (1983) carried out a study aimed at finding out 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 than those in the
control group on all the dimensions of verbal and non-verbal creativity. This shows that teaching through mastery learning strategy helps in improving the different dimensions of verbal and non-verbal creativity.

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 per cent 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) studied 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 randomized matched subjects design was used in this study. A sample of about 160 students were selected from the Government Higher Secondary School, Galore and three equivalent groups were formed. One of the groups was taught through conventional method of teaching and the second was taught by PSI method. The third group followed Bloom's mastery learning strategy. The study evinced that PSI and Bloom's MLS have equal effects 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) worked with fifth grade students with the objective of developing a strategy for mastery learning in geometry and to validate the effectiveness of 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) Textbooks and Workbooks, (9) Small group study sessions (10) Mathematical games, (11) Review and Practices, (12) Assignments, (13) Feedback Sessions, (14) Formative and summative tests. Sample consisted for 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
Vaidya (1989) found that the mastery learning strategy raises the achievement of the learners irrespective of the entry equipment, aptitude and intelligence of the pupils. The study indicated that MLS can be used to reduce the number of under-achievers, dropouts and failures, as it ensures almost equal attainment on the part of learners irrespective of their entry behaviour and intelligence.

Koul and Chand (1989) compared the effects of PSI and conventional method of teaching on the retention of material in science. Their study revealed 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 to be valid in case of immediate, two weeks and six weeks retention.

Willial Paul Maurer (1991) studied the effectiveness of a mastery-learning strategy in enhancing student cognitive achievement, problem solving skills and retention of these concepts in an introductory chemistry programme. The investigator found that those students that received the mastery learning strategy had a significant better cognitive achievement than those students that did not receive the treatment. However, the mastery learning strategy did not significantly improve the cognitive retention of the treatment group.
Laila Fawazy Ghobrial (1992) studied the effects of mastery learning strategies on community college mathematics students' achievement and attitude. The two mastery learning strategies were interactive video mathematics (IVM) and individualised instruction (IND). The investigator found that there was significant difference that suggested that mastery learning strategies have a positive educational influence on students' achievement in mathematics.

Stephen Charles (1992) studied the effects of group-based mastery learning on first grade reading 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 three criterion referenced summative tests than the central students.

Suzanne Stetson Kulas (1992) studied the achievement and effective 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 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 standarized measure, average and slow learners also
gained less than their counterparts in the control group. No significant difference favouring the experimental group were found on any measure and this lack of significant effect 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 into the effect of mastery learning strategy in teaching science. The sample consisted of two sections of Class VI of Jat High School, Rohtak. One section was assigned to the experimental group and other to the control group. 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.

William Michael (1993) studied 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 pre-test 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.

Dahiya (1995) investigated into the effect of mastery learning strategy in teaching of mathematics. The sample consisted of 70 pupils studying in the seventh class of two different secondary schools of Nangloi City in Delhi. 35 pupils from each school were selected at random as the sample for the study. The age of pupils range from 11 years to 13 years. It was found 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. It was also found 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) investigated into 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 of the study revealed that mastery learning strategy and concept attainment model both help in raising the achievement of pupils and also help in improving the self-concept and classroom trust behaviour of the pupils. It was also reported that concept attainment model is better approach than mastery
learning strategy in improving the achievement of students in science, whereas both these models were equally affected in case of self-concept and classroom trust behaviour.

**PART-II**

**2.2.0 GAMING**

The present study concerns with gaming model also. Therefore, this section of the chapter deals with studies on Gaming Model (GM). Games have been played for amusement for thousands of years, and simulation as an equally long history. The application of simulation and gaming techniques to education and training is, however, a comparatively recent development. The first field in which such applications took place was military training. The use of simulation and gaming in military training began at the end of eighteenth century. In business management training simulation and gaming was introduced as a means of developing decision making skills in the mid of 1950s. It was not early 1960s, however, that the use of such techniques spread to secondary and territory education with the initial developments, taking place in teacher training and in the social science. This part II deals with review of gaming studies conducted in India. The effectiveness of gaming has been studied by Sushila (1982), Sharma (1986), Grover (1987), Hooda (1988), Kumar (1989), Kaur (1992) and Kumar (1996).
Sushila (1982) found that pupils trained in classroom questioning through gaming increased the incidence of pupil questioning considerably at all levels of learning.

Sharma (1986) compared the achievement of pupils in chemistry by teaching two groups of 9th class using conventional method in one group and gaming in the other. It was found that student taught chemistry through gaming exercises achieved significantly higher as compared to the students taught chemistry through conventional method.

Grover (1987) tested the effectiveness of gaming in the subject of physics with pupils of 10th Class and observed that it resulted in significantly higher achievement of pupils taught physics through gaming as compare to conventional method.

Hooda (1988) studied the effect of gaming on achievement of pupils of VIII class in the grammar and she reported that students taught Hindi grammar through gaming showed significant improvement in achievement as compared to those taught Hindi Grammar through conventional method.

Kumar (1989) found that Xth class pupils taught mathematics through gaming showed significantly higher achievement than pupil taught through conventional method.

The study conducted by Kaur (1992) on the effectiveness of training using games on the class room questioning behaviour of the
students reported that it is possible to train pupil in classroom questioning behaviour using games. Firstly, it revealed that content free training in classroom questioning using games helps in increasing the incidence of questions asked by the pupils in the real classroom instruction. Secondly, through systematic feedback pupils can be helped to improve the structural characteristics and the levels of questions. Thirdly, the competence to ask questions in the classroom acquired by the pupils in the content free gaming exercises in transferred to classroom instructional transactions as indicated by the post-training measures on classroom questions obtained in actual teaching situations. Lastly, the delivery behaviours need to be studied with control of examination potential in the experimental and control groups.

Kumar (1996) studied the role of quiz gaming in teaching of science at elementary level. He reported that students definitely gain significantly higher when taught science by quiz gaming as compared to lecture method in terms of achievement.

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 evidence of the
effectiveness of these approaches in raising the achievement level of the learners. The claims of the advocates of mastery learning strategy that 90-95% students can master 90-95% of the content if they follow education through mastery learning procedures seem to stand vindicated 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 things 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 indicates 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 and gaming can go a long way in helping to tackle the problems such as under achievement, stagnation and drop-outs. It also emerges from this brief survey that the number and range of studies conducted to examine the effectiveness of mastery learning strategy and gaming in Indian situations are limited, leaving much scope for research.