CHAPTER II

REVIEW OF RELATED LITERATURE
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In the previous chapter the investigator discussed about the introduction, need and importance of the study, statement of the problem, objectives of the study, statement of hypotheses, definitions of technical terms and scope of the study. In the present chapter the researcher reviewing the research studies already done by the researchers.

2.1 Introduction

The review of related literature is an important aspect in any research. Knowledge acquired through generation is well displayed in books and they are arranged in libraries. Each new generation of human being make use of accumulated knowledge as a foundation for building up further knowledge. Hence the study of literature is necessary in any field of inquiry.

The literatures provide the researcher the means of getting to the frontiers in his/her particular field of knowledge. A careful review of the research journals, books, dissertations, theses and other sources of information on the problem to be investigated is one of the important steps in the planning of any research study.

2.2 Reviews Related To Mathematics

1) PRAKASH K & PREMALATHA SHARMA (2010): conducted a study on “Influence of Gender and Area on MLL Attainment in Mathematics among V Standard Students” This study was aimed at assessing the influence of gender and area on MLL attainment in
mathematics among fifth standard students of Shimoga district. A total of 1457 students of 166 government primary schools from 7 taluks of Shimoga were constituted the sample of the study, of which 704 were boys and remaining 753 were girls. They were selected from both urban and rural areas of Shimoga district. MLL based test developed by Kashinath (2005) was adopted and used for assessing selected MLL competencies, which had 7 competencies. The test was administered on the students selected from 7 taluks of Shimoga district. Independent samples t test was applied to find out the significance of difference between gender and areas. Results revealed that girls excelled boys only in one competency- fundamental operation. Area wise comparisons indicated that in competencies – number, decimals, addition and subtraction with mixed operations and in total competency scores, rural children were better than urban children.

2) THIMOTHI SAMUEL RAJU YALLA P AYODHYA (2010): conducted a study on “Gender Differences in Mathematical Problem – solving.” Objectives of the study were; 1. To know the effectiveness of the Conventional method in developing problem solving skill among boys and girls; 2. To examine the difference in the problem solving skills of Male and Female students when exposed to Polya’s Heuristic Method; 3. To know the difference in the problem solving skills of Male and Female students when exposed to the conventional and Polya’s Heuristic method; 4. To examine the difference in the problem solving skills of Male and Female students belonging to the three ability groups; 5. To know the relative effectiveness of the Conventional and Plyya’s method in
developing problem solving skills among the Male and Female students; 6. To know the difference between Male and Female students in implementing the four step process to solve the problems. Findings of the study were; 1. The problem solving skills was better in the girls than in the boys in a conventional classroom; 2. The Polya's Method would develop the problem solving skills equally in the boys as well as in girls; 3. The boys and girls belonged to the three ability groups equally benefited from the Polya's Method of teaching in developing problem solving skills; 4. The Polya's Method was more effective, as a method of teaching to develop problem solving skills in boys than the conventional method; 5. The Polya's method was more effective than the Conventional Method to develop problem solving skills among the girl students; 6. The Polya's method was more effective than the Conventional Method to develop problem solving skills of the three ability groups of the boys and girls; 7. The boys and girls were equally benefited by the Polya's method in understanding the problem; 8. The girls were more benefited than the boys in devising a plan when they were exposed to the Polya's method; 9. The boys and girls were equally benefited by the Polya's method in devising a plan to solve a problem; 10. The boys and girls were equally benefited by the Polya's method in looking back.

3) SANJEEV KUMAR JHA & TOMAR D P (2010): conducted a study on “Mathematical Phobia of Government and Private school students in relation to certain Demographical variables.” Objectives of the study were; 1. To study the difference between the Mean scores of Mathematical Phobia among Government and Private
school students at secondary level in relation to the Management of the school; 2. To study the difference between the Mean scores of Mathematical Phobia among Government and Private school students at secondary level in relation to their Age; 3. To study the difference between the Mean scores of Mathematical Phobia among Government and Private school students at secondary level in relation to their Sex; 4. To study the difference between the Mean scores of Mathematical Phobia among Government and Private school students at secondary level in relation to their Socio Economic Status. Findings of the study were; 1. There was a significant difference between the Mean scores of Mathematical Phobia of Government and Private school students in relation to the management at the secondary level. The Mean score shows that the Government school students have higher Mathematical Phobia than their private counterparts at secondary level; 2. There was a difference between the Mean scores of Mathematical Phobia among Government and Private school students at secondary level in relation to their Age group at secondary level. The Mean score of Mathematical Phobia test was highest in the age group of age more than 14 years (12.8). It showed that the students of age more than 14 have highest Mathematical Phobia as compared to students of age group below 14 years at secondary level. Also it cannot be said that the Mathematical Phobia increased with the age, since the students of age group up to 13-year students have high Mean score (11.94) than the students of age group of 14 years; 3. There was a difference between the Mean scores of Mathematical Phobia among Government and Private school students at secondary level in relation to their Sex at secondary level. The Mean score of
Mathematical Phobia test of the boys is greater than girls. So the boys have more Mathematical Phobia than girls. it may be because the girls are harder working than the boys; 4. There exists a difference between the Mean scores of Mathematical Phobia among Government and Private school students at secondary level in relation to their socio economic status at secondary level. The mean score of Mathematical Phobia test is highest in the lowest economics status. It may be justified as the students with high economic status have more facilities compared to the low economic status group. The students from higher economic group study in good schools, still if they have problems their parents can arrange tuition classes for them. Also the students from higher economic families have educated parents. They can solve their problems and give more attention than the other families.

4) DONNIPAD MANJUNATH (2009): conducted a study on “Use of Mathematics Laboratory for Teaching Mathematics”. Objectives of the study were; 1. To study various methods of teaching Mathematics in regular classes; 2. To study teachers’ opinions about Mathematics Laboratory; 3. To develop a strategy for use in a Mathematics Laboratory set-up. Finding of the study was; The difference between the mean scores of Experimental group and Control group on posttest was quite significant. Hence the strategy evolved to teach Mathematics in a Mathematics Laboratory was more effective than the traditional methods of teaching.

5) KHAJAPEAR. M (2001): presented a paper on “Bridging the gap between research and class room practices in mathematics education at the school stage”. More often than not, research in
mathematics education remains isolated in classroom practice in our country. Mathematics at the school level was taught in a mechanical and stereotyped way where strategies of teaching were product-oriented rather than process-oriented and where students are hardly involved in the teaching-learning process actively. The curriculum load was heavy. Abstractions are introduced at the early stages and with the logic of the disciplined predominating in the place of psychology of learning; it has assumed the status of an esoteric discipline. The principles and concepts were left mystified leading to the backwardness and phobia of the students regarding the subject. A majority of the students fail in mathematics as a result. This research takes into consideration the research findings of five manipulability variables- need to reorient teachers, need to reorganize curriculum, need to adopt appropriate instructional strategies, need to foster students aptitude and attitudes and need to increase parental concern for their wards progress in the subject to support its arguments in respect of bridging the gap between research and classroom practices in mathematics teaching.

6) CHITRIV U G (1983); conducted a study on “Evaluating differential effectiveness of Ausubel and Bruner strategies for acquisition of concepts in Mathematics”. Objectives of the study were; 1. To ascertain the comparative effectiveness of the Ausubel strategy with the traditional one of the various criteria of concept acquisition in Mathematics; 2. To ascertain the comparative effectiveness of the Bruner strategy with the traditional one on the various criteria of concept acquisition in Mathematics; 3. To
ascertain the relative effectiveness of the Ausubel and Bruner strategies on the various criteria of concept acquisition in Mathematics; 4.To ascertain the effectiveness of the Ausubel strategy in the acquisition of concepts in Mathematics separately for the students of different conceptual style preferences; 5.To ascertain the effectiveness of the Bruner strategy in the acquisition of concepts in Mathematics separately for the students of different conceptual style preferences; 6.To ascertain the relative effectiveness of the Ausubel and Bruner concepts in Mathematics separately for the students of different conceptual style preferences. Findings of the study were; 1. The Ausubel strategy was superior to the traditional strategy for teaching mathematical concepts to XI grade students, so far as knowledge transfer and heuristic transfer of the concepts were concerned; 2. The Bruner strategy was superior to the traditional strategy for teaching mathematical concepts to XI grade students, so far as knowledge, heuristic transfer, short term retention and long term retention of the concepts were concerned; 3. Ausubel and Bruner strategies were equally effective for teaching mathematical concepts to XI grade students so far as students ability to acquire of knowledge of the concepts was concerned; 4. The Ausubel strategy was superior to the Bruner strategy for teaching mathematical concepts to XI grade students so far as enhancing concept transfer was concerned; 5. The Bruner strategy was superior to the Ausubel strategy for teaching mathematical concepts to XI grade students so far as students abilities to transfer heuristics discover new relationships and to retain knowledge of the concepts learnt for short as well as long periods of time were concern; 6. Conceptual
style preferences of the students seemed to have a differential effects on their acquisition of mathematical concepts, when taught by the Ausubel strategy. This strategy appeared to be more suitable for teaching mathematical concepts of categorical style preference of the students did not seem to have a different concept on their acquisition of mathematical concepts, when taught by the Bruners strategy. This strategy appeared to be suitable for teaching mathematical concepts to XI grade students of all conceptual style preferences.

7) **Vyas C S (1983):** conducted a study on “Development of Symbol Picture Logic Programme and to Study its Effect on Mathematics Achievement – A System Approach”. Objectives of the study were; 1. To develop a symbol picture logic programme (SPLP) on the basis of the fundamentals of symbolic logic; 2. To study the effectiveness of the SPLP on the achievement in mathematics; 3. To identify the effect of the SPLP in the context of variables like intelligence and syllogistic reasoning ability; 4. To find the effectiveness of the SPLP in the context of other variables like parent education, sex and the choice of mathematics course at the S.S.C.level. Findings of the study were; 1. The students of the experimental group who were given a treatment of the SPLP showed better achievement in mathematics than the control group students; 2. The students with high intelligence benefited more by the SPLP by better achievement in mathematics than those who possessed low intelligence; 3. The student possessing high reasoning ability benefited more by the SPLP by better achievement in mathematics than those who possessed low reasoning ability; 4. There was no interaction
between the programme (treatment) and intelligence; 5. There was no interaction between the programme and syllogistic reasoning ability; 6. There was no interaction effect of intelligence and syllogistic reasoning ability of the students; 7. There was no interaction among program, intelligence and syllogistic reasoning ability. This showed that the achievement in mathematics was independent of these three variable; 8. The students of the control group possessing low general ability and low syllogistic reasoning were inferior to the student of the rest of the group; 9. The student of the experimental group possessing high intelligence and high reasoning did better in achievement in mathematics than the students of the control group possessing low intelligence and low reasoning ability; 10. There was no significant mean difference in achievement in mathematic of students whose parents education was high and those whose parents education was low; 11. Their was no interaction effect between the programme and parents education; 12. The students using higher mathematics course did better in mathematics achievement after taking the SPLP than the students who chose commercial arithmetic; 13. There was no interaction between the programme and the choice of course; 14. There was no significant difference between the means of achievement in mathematics of boys and girls taking the SPLP, and also there was no significant difference between the means of achievement in mathematics of boys and girls who did not take the SPLP.
2.3 Reviews Related To Creativity & Mathematical Creativity

1) RENUKA SHARMA (2009): conducted a study on “Emotional Intelligence and Creativity of school students”. Objective of the study was; To examine the relative effects of three types of school environment on the levels of emotional intelligence and creative thinking. Findings of the study were; 1.Gurukul students scored significantly high on two measures of emotional intelligence i.e. Self awareness and Managing Emotions than their counterpart Govt. school students. Hence Gurukul students tend to be more capable of self awareness and management of their own emotions while interacting with other than Govt. school students. In case of four measures of creativity, Gurukul students scored significantly high only on elaboration than their counterpart Govt. school students. On remaining three measures of creativity i.e. fluency, flexibility and originality of two groups did not differ significantly. Hence Gurukul students tend to have more elaborative thoughts than their counterpart Govt. school students; 2. The Public school students have scored significantly high on three measures of emotional intelligence than the students of Gurukuls and on four measures of emotional intelligence as compared with Govt. school students. Overall Public school students tend to be high on emotional competencies as compared to the students of Gurukuls, and Govt. schools. It was suggests that public schools provided more stimulating and prompting environment for the cultivation of emotional competencies and skills than Gurukuls and Govt, schools. Comparison of Gurukul students with those of Govt.
schools in terms of their performance on five measures of emotional intelligence suggests that Gurukuls tend to provide slightly more stimulating environment for the cultivation of emotional skills among their students than Govt. schools; 3. Overall comparison of students of three types of schools in terms of their performance on verbal measures of creative thinking suggests that Public school students have scored significantly high measures of creativity i.e. fluency, flexibility, originality and elaboration than the students of Gurukuls, and Govt. schools. It was suggested that Public schools tend to provide more stimulating and prompting environment for the cultivation and enhancement of divergent thinking capacities among their students than Gurukuls, and Govt. schools. Govt. schools do not tend to provide conducive environment for the cultivation of creative thoughts among their students.

2) ANNIE K JACOB (2007): conducted a study on “Relationship between Creativity and Self- concept”. Objectives of the study were; 1. To measure the creativity (verbal, nonverbal and total) among overachievers and underachievers of IX standard pupils; 2. To compare the creativity (verbal, nonverbal and total) among overachievers and underachievers of IX standard pupils; 3. To study the relationship between creativity (verbal, nonverbal and total) and the psychosocial factors namely anxiety, values, self-concept, extroversion and introversion among overachievers and underachievers of IX standard pupils. Findings of the study were; 1. Comparison of verbal creativity scores of under, normal and overachievers showed that there is significant difference among
under, normal and overachievers in respect of mean verbal creativity scores and that the three groups do not differ significantly in comparison of their mean nonverbal creativity scores and creativity (total) scores; 2. The co-efficient of correlation obtained between verbal creativity and self-concept, nonverbal creativity and self-concept, and creativity (total) and self-concept shows that there is significant positive relationship between creativity and self-concept.

3) KARTIKESHWAR BEHERA & NILADRI PRADHAN (2007): conducted a study on “Exploring the Creative potentialities of children with learning Disabilities”. Objectives of the study were; 1. To identify the creative talent inherent in the children with L.D; 2. To compare the performance of L.D children with normal children’s performance in creative activation. Findings of the study were; 1. The L.D children shows better performance than the normal children in the creative activity conducted for both the groups. At the pretest stage it was marked that the normal children were found better than the L.D children in almost all the activities. As an effect of intervention was extended to the L.D children their performance was marked better than the normal children; 2. L.D children are in no way inferior to the normal children of in performing creative activities. Right type of instruction and support can help them to eliminate their learning disabilities.

4) ROY M (2005): conducted a study on “Effect of Creativity Appreciation Training Programme (CATP) on the Teachers Attitudes Towards Creative Teaching and Learning”. Objectives of
the study were; 1.To study the attitudes of High and Higher Secondary school teachers and compare the attitudes of male and female teachers towards creative teaching and learning; 2.To develop creativity Appreciation Training Programme (CAYP) for high and higher secondary school teachers; 3.To study the effect of CATP on the attitudes of high and higher secondary school teachers both male and female and from Government and Private schools towards creative teaching and learning; 4.To find out the opinion of high and higher secondary school teachers on CAYP. Findings of the study were; 1.Teachers of High and Higher secondary schools have poor perception about creativity and hence an unfavorable attitude towards creative teaching and learning; 2.In CATP, the High and Higher Secondary school teachers demonstrated a remarkable positive shift in their attitudes towards creative teaching and learning; 3.The teachers participating in the study received the Creativity Appreciation Training Programme (CATP) well and appreciated the programme.

5) Patel R K (2002): conducted a study on “A study of Scientific Creativity of undergraduate science students of Allahabad University and Affiliated degree colleges”. Objectives of the study were; 1.To find out whether students of University teaching departments differ from students of affiliated degree colleges with respect to their scientific creativity; 2.To find out whether boys differ from girls studying in same university teaching department with respect to scientific creativity; 3. To find out whether boys of university teaching departments differ from affiliated degree colleges with respect to scientific creativity; 4. To develop a system
for scoring responses on various tests of scientific creativity for originality. Findings of the study were; 1. There was no significant difference among students of University teaching departments and affiliated degree colleges with respect to their overall scientific creativity and different aspects of scientific creativity, i.e., fluency, flexibility, originality and inquisitiveness; 2. There was no significant difference in overall scientific creativity as well as fluency, flexibility, originality and inquisitiveness aspect of scientific creativity among boys and girls; 3. There was no significant difference in overall scientific creativity and originality and inquisitiveness aspect of scientific creativity among boys and girls of degree colleges, respectively; 4. Girls excelled boys in fluency and flexibility aspect of scientific creativity.

6) PREMALATA MOHAPATRA (2000): conducted a study on “Developing Creative Expression in Elementary Grade through Enrichment Programmes”. Objectives of the study were; 1. To provide an enrichment programme through i). Stimulating imaginative thinking and fantasy in children, ii). Removing the blocks to creativity, iii). Providing experiences through activities and exercises to stretch their minds; 2. To study the effect of enrichment programme; 3. To compare the effect in relation to sex variation. Findings of the study were; 1. The null hypothesis that there will be no effect of enrichment programme in the creative expression of students was rejected i.e It is inferred that the treatment had a positive effect; 2. The null hypothesis that there will be no difference in the mean gained score in creative expression of boys and girls was also rejected i.e the result shows
that girls have developed better composition writing compared to the boys.

7) REDDY, SUDHAKARA Y (1990): conducted a study on “An investigation into the creativity of adolescent boys and girls”. Objectives of the study were; 1. To find out whether boys and girls differ in their creativity; 2. To find out whether urban and rural children differ in their creativity; 3. To find out whether creativity is affected by differences in length of schooling; 4. To find out whether high and low creative differ in their personality characteristics, intelligence, SES, certain family variables, and personal characteristics and habits of life. Findings of the study were; 1. In case of verbal tests, urban children were found to be more creative than rural children; 2. There was a significant difference between the creativity of classes VIII, IX and X children. Each group differed from the other; 3. Though boys scored better than girls, the difference between means was not significant. Similar results were obtained for all the three components of creativity, viz., fluency, flexibility and originality and composite creativity; 4. In the case of non-verbal tests, boys scored significantly better than girls; 5. There was a significant difference between the creativity of classes VIII, IX and X children. Each group differed from the other. Similar results were obtained for all the components of creativity and composite creativity; 6. Rural children tended to score better than urban children on all the components. The difference between means was significant in the case of flexibility, originality and composite creativity but not in the case of fluency; 7. When creativity as measured by both types
of tests at together, was analysed, it was found that (a) There was a significant increase in the creativity of children from classes VIII to IX and IX to X and this was true for all the components of creativity. (b) Boys scored better than girls but the difference between means was significant only in the case of fluency. (c) Similarly, urban children scored better than rural children, but the difference between means was, however, significant in the case of fluency only; 8. When the analysis was carried out separately for different subgroups (boys-girls, urban-rural children, and children of classes VIII, IX and X) slight differences in the pattern cited above were seen; 9. There was significant difference between (a) The mental ability, and (b) SES of high creative and low creative in favour of the former group. This was true for all the subgroups of children; 10. Compared to low creative a large percentage of high creative (a) The tended to do things in an unconventional way; (b) read story books, magazines, etc. more frequently; (c) had a better general state of health; (d) tended to come from nuclear families, and (e) perceived a close affinity between the members of the family; 11. High and low creative did not differ on (a) the number of friend they had, (b) the frequency with which they got silly ideas, (c) the liberty given by parents in doing things, (d) the frequency with which they were punished by their parents for their mistakes, and (e) order of birth; 12. Multiple regression analysis showed that about 37% of the variance in creativity was predicted by the different independent variables included in the study.
8) **MOHAMMAD MIYAN (1982):** conducted a study on “A Study of Examine the Effectiveness of Methods of Teaching Mathematics in Developing Mathematical Creativity”. Objectives of the study were; 1. To find out the comparative effectiveness of three methods of teaching and learning for developing mathematical creativity in high school students; 2. To examine whether the methods of teaching had any effect on the development of convergent and divergent thinking components of mathematical creativity; 3. To assess the effect of methods of teaching on low, medium and high creative students in mathematics. Findings of the study were; 1. None of the three methods was significantly different in developing mathematical creativity; 2. None of the methods of teaching was markedly better than the others in developing fluency and flexibility; 3. The guided discovery method was most effective in enhancing originality as compared with tell and do and the pure discovery methods; 4. None of the methods was significantly different in developing divergent thinking and convergent thinking abilities; 5. There was no differential effect of the three methods of teaching on any one of the three levels (low, medium and high) of creative performers in mathematics.

9) **JARIAL G S (1981):** conducted a study on “Instructional Materials for Developing Creativity in students”. Objectives of the study were; 1. To prepare verbal and non verbal instructional materials; 2. To assess the effectiveness the verbal and non verbal instructional materials in the development of creativity of the students; 3. To compare the gains of mail and female students in creativity after treating them with verbal and non verbal
instructional materials; 4. To compare the gains of students of high and low SES in creativity after treating them with verbal and nonverbal instructional materials; 5. To compare the gains of initially high and low creative students in creativity in creativity after treating them with verbal and nonverbal instructional materials. Findings of study were; 1. The posttest creativity mean scores of students of verbal and nonverbal experimental groups were significantly higher than those of the students of the verbal and nonverbal control groups; 2. The posttest mean scores of male and female students of verbal experimental group were not significantly different in any of the four aspects of verbal creativity. The posttest mean scores of male and female students of nonverbal experimental group were not significantly different in four of the five aspects of the nonverbal creativity, namely fluency, flexibility, originality, and total creativity, whereas in elaboration aspect of nonverbal creativity, female students of the experimental group scored significantly higher than male students of the experimental group; 3. The mean posttest scores of high and low SES students of verbal and nonverbal experiments groups were not significantly different in any of the aspects of verbal and nonverbal creativity; 4. There was no significant difference in the posttest verbal creativity scores of initially high and initially low creative students of verbal experimental group. The initially high and initially low creative students of the nonverbal experimental group did not differ significantly in four of the five aspects of nonverbal creativity, namely fluency, flexibility, originality, and total creativity, at the posttest level, whereas with respect to elaboration aspect of nonverbal creativity, the initially low creative
students of nonverbal experimental group were significantly higher than initially high creative students of the nonverbal experimental group.

2.4 Reviews Related To Guided Discovery Method

1) B.Y. Khasnis & Manjunath. Aithal (2011); “Guided Discovery Method A Remedial Measure In Mathematics”, Objectives of the study were; 1) To construct lesson plan using Guided discovery method in Mathematics. 2) To study the relative effectiveness of Traditional method and Guided discovery method in Mathematics at IXth STD. The findings of the study were; 1. There is a significant difference in the performance of students in mathematics, in the posttest scores of traditional method and guided discovery method. This shows that gain parentage for total scores of Guided discovery method is higher than Traditional method. The posttest performance indicates the students learn better through Guided discovery method.

2) MARCIO BRANDAO: conducted a study on “Guided Discovery Tutoring and Schoenberg’s Harmony Teaching Method: an Investigation”. Objective of the study was; This paper describes a computer-based learning environment presenting the pedagogy and part of the curriculum of Schoenberg’s harmonic teaching method. The pedagogical constraints, which guided the design and construction of the environment, were presented and compared with the constraints found in traditional harmony teaching. Findings of the study were; from studies involving the prototype learning environment were presented a formative evaluation was
carried out with music experts with the aim of assessing its interactive music notation interface and to inform changes and improvements to be made to the prototype and a summative evaluation was conducted with music lectures to assess not only the degree of faithfulness of the environment to the method, but also the educational benefits that such an environment can potentially bring to harmony teaching. The results of the studies suggest that materials of the method can be delivered, and can be made accessible to the user, by a computer-based environment embodying a computer model of Schoenberg's method of teaching harmony.

3) SHIVAKUMAR P & SUMATHI S (2005): conducted a study on “Efficacy of Guided discovery strategy of Teaching Biology science at higher secondary level”. Objectives of the study were; 1. To find out whether the guided discovery strategy of teaching is an effective strategy; 2. To find out whether there is significant difference between the scores of the pretest of control group and experimental group students; 3. To find out whether there is significant difference between the scores of the pretest and posttest scores of control group students; 4. To find out whether there is significant difference between the scores of the pretest and posttest scores of experimental group students; 5. To find out whether there is significant difference between the scores of the pretest and posttest scores of control and experimental group students. Findings of the study were; 1. There was no significant difference in the pre-test scores of the control group of homogeneous; 2. There exists no significant difference between the mean scores of the pre and post
tests of the control students when through traditional method; 3. There exists significant difference between the pre-test and post-test scores of the experimental group students who were taught through Guided Discovery strategy of teaching. It indicates the efficacy of Guided Discovery strategy of teaching; 4. There exists significant difference between the post-test mean scores of the control group and the experimental group. The performance of the experimental group in the post-test is higher than that of the control group. This indicates the efficiency of the Guided Discovery strategy of teaching, which is superior than the traditional method.

4) **AJITHA NAYAR K (2004):** conducted a study on “Effectiveness of Discovery Learning Method with Respect to Achievement in Biology”. Objectives of the study were; 1. To study the effectiveness of Discovery learning method with respect to achievement in immediate posttest achievement Delayed memory achievement and Extent of Forgetting; 2. To compare the immediate posttest achievement scores of sub samples based on sex, locale and management of school. Findings of the study were; 1. There was significant difference between experimental and control groups with respect to immediate posttest achievement and delayed memory test. It can be concluded that teaching through Discovery learning enhances the immediate posttest achievement. This gain in achievement score is also reflected in the delayed memory test (retention test); 2. This implies that discovery learning facilitates effective learning as content learnt can be recalled more easily and effectively; 3. This result is supported by the extent of forgetting scores (difference between immediate post achievement and
delayed memory achievement scores) which reveal a significantly higher mean score for the control group. This implies that the extent of forgetting was higher for the control group; 4. There was no significant difference between boys and girls with respect to the immediate posttest and delayed memory achievement scores. However the retention power of girls was found to be better than boys when taught using discovery learning; 5. Students of rural and urban schools did not exhibit any significant difference with respect to immediate posttest achievement, delayed memory achievement and extent of forgetting. It can be concluded that the achievement in Biology was not influenced by the locale of the school when taught through Discovery learning method; 6. Students of private schools were found to have better retention than students of government schools when taught using Discovery learning method.

5) RAJCOOMAR S (1999): conducted a study on “An Investigation into the Efficacy of Guided Learning as compared with Traditional Method of Teaching Chemistry in Mauritian Secondary School”. Objectives of the study were; 1. To find the effectiveness of guided learning on achievement in chemistry and attitude towards science; 2. To find out the relative effectiveness of teaching through guided learning as against traditional methods regarding both achievement in chemistry and attitude towards science. Findings of the study were; 1. There was significant difference in the mean pre and posttest scores of achievement in chemistry and also attitude scores of experimental group in the case of both boys and girls; 2. There was no significant difference in the case of the control
group. The guided learning was more effective than the traditional method,

6) **SMITH, K. (1996):** conducted a study on “Guided Discovery, Visualization and Technology Applied to the New Curriculum for Secondary Mathematics”. Linear programming has recently been integrated into the high school mathematics curriculum. Graphical problem solving offers methods for teaching systems of constraints and objective, which emphasize visualization and student discovery. Activities, which highlight major concepts of linear programming are presented. These activities demonstrated how technology allows students to solve linear programming problems using exploration prior to learning algorithmic methods. They have been used with pre-service teachers, offering them experience with the new curriculum and use of technology.

7) **RAO A V, RAGAVENDRA (1986):** conducted a study on “An Investigation into the Relative Effectiveness of Guided Discovery and Expository Approaches of Teaching Mathematics”. Objectives of the study were; 1.To study the relative effectiveness of guided discovery and expository approaches of teaching mathematical concepts; 2.To study the relative effectiveness of guided discovery and expository approaches of teaching problem solving; 3.To study the interaction of intelligence and achievements in mathematics vis-à-vis guided discovery and expository approaches; 4.To study the relative effectiveness of guided discovery and expository approaches indifferent types of pupils, namely boys, girls and rural pupils. Findings of the study were; 1.There was no significant difference in achievement in mathematics when taught by the
guided discovery and expository approaches; 2. There was no significant difference in achievement in mathematical concepts when taught by the guided discovery and expository approaches; 3. There was no significant difference in problem solving when taught by guided discovery and expository approaches, except in the case of girls where a significant difference was found; 4. There was no significant difference in variance in achievement when taught by the guided discovery and expository approaches; 5. Intelligence had no say in achievement when taught by the guided discovery and expository approaches, except in the case of urban boys.

8) BHALWANKAR A G (1985): conducted a study on “A Study of Effects of Expository and Guided Discovery Methods of Teaching Mathematics on the Achievements of Students of Different Levels of Intelligence”. Objectives of the research were; 1. To study the differential effect of guided discovery and expository methods of teaching mathematics on the achievements of students; 2. To compare the effects of guided discovery and expository methods of teaching mathematics on the achievements of students of different levels of intelligence measured in terms of knowledge, comprehension and application objectives; 3. To study the differential effects of guided discovery and expository methods of teaching mathematics on the retention of the students; 4. To compare the effects of guided discovery and expository methods of teaching mathematics on the retention measured in terms of knowledge, comprehension and application objectives with respect to students of different levels of intelligence; 5. To study and compare interaction pattern associated with guided discovery and
expository methods of teaching mathematics. Findings of the study were; 1. Guided discovery and expository methods were equally effective on knowledge and comprehension objectives with respect to both immediate posttest as well as retention test; 2. The expository method was more effective than the guided discovery method on the criterion of scores on application objective with respect to students of high intelligence; 3. The guided discovery method was more effective than the expository method on the criterion of percentage of retention scores on the application objective in the case of students of low intelligence; 4. The guided discovery method was more effective than the expository method on the criterion of percentage of retention scores with respect to total achievement of the students of middle intelligence; 5. The guided discovery method was associated with an indirect pattern, whereas the expository method was associated with a direct pattern; 6. Teacher’s indirect behaviour decreased with decrease in level of intelligence; 7. The expository method was significantly more effectiveness than the guided discovery method on the criterion of scores on the application objective test items in the case of students of high intelligence; 8. The main educational implication of this study is that one cannot be right in the use of teaching methods. All teaching methods are effective in certain situations and not so effective in other situations. Content and objectives determine the methods to be used.

9) YADAV R S (1982) : conducted a study on “An Experimental Study of Effectiveness of Lecture and Guided Discovery Methods in Developing a Hierarchy of Learning in Cognitive Domain”.
Objectives of the study were; 1. To find out the comparative effectiveness between the lecture method (LM) and the guided discovery method (GDM) at different intellectual levels; 2. To identify the effectiveness of GDM over LM in terms of proposed hierarchical order; 3. To assess the feasibility of hierarchy of learning objectives with their related behavioural processes.

Finding of the study were; 1. There was significant difference between the mean achievement scores obtained in the posttest by the subjects of groups A and B; 2. No significant difference was observed in the mean achievement scores of the superior, the high average, the average, the low average and the borderline defective subjects of group A on pretest and posttest; 3. Significant differences were found in the mean scores of the superior, the high average, the average, the low average and the borderline defective subjects of group B on pretest and posttest respectively; 4. The subjects of group B gained significantly better the concept of knowledge on posttest than did the subjects on pretest; 5. A significant difference was found in the mean achievement scores obtained for the objective understanding on pre and posttests, respectively in favour of posttest in group B; 6. Similarly, significant difference in the mean scores obtained on pretest and posttest by the subjects of group B were identified for application, discovery and creativity components. No such difference was revealed on the variable evaluation; 7. Likewise, there were significant differences between the mean scores obtained on posttest by the subjects of group A and B respectively, on knowledge, understanding, evaluation and creativity; 8. There was significant difference between the mean achievement scores
obtained for cumulatively defined learning objectives within the hierarchy of learning in group A on posttest; 9. There were significant differences between the mean scores obtained for cumulatively treated learning objectives—knowledge and application, knowledge and discovery, knowledge and evaluation and knowledge and creativity, respectively, on posttest in group A; 10. Analysis of variance indicated a highly significant difference among cumulatively treated learning objectives on posttest in group B; 11. The values of correlation coefficients among different learning objectives (treated independently) were found to be highly significant on pretest and posttest in group A and group B respectively; 12. Knowledge was identified as the most significant factor among all the objectives within the proposed hierarchy of learning; 13. As a result of factor analysis, it was observed that knowledge, understanding, application, discovery, evaluation and creativity took out 87.06, 4.99, 2.95, 2.24 and 1.19 percent of the common factor variance on pretest in group A; 14. It was further observed that the objectives knowledge, application, discovery, evaluation and creativity appeared within the percentage contribution of 79.62, 7.59, 6.05, 2.96, 2.28 and 1.5 respectively, on posttest in group A; 15. The percentage contribution made by knowledge, understanding, application, discovery, evaluation in group B in pretest was observed to be 90.9, 2.34, 2.45, 1.79 and 1.16 respectively; 16. Different learning objectives—knowledge, understanding, application, discovery, evaluation and creativity took out 84.58, 5.82, 4.97, 2.99, 1.27 and 0.45 percent of the common factor variance in group B on the posttest.
2.5 Reviews Related To Inquiry Training Model

1) HOODA, JAI PRAKASH AND SUSHMA RANI (2010): conducted a study on "A comparative study to find out the effectiveness of Science Inquiry Model and Advanced Organizer Model in attaining mastery in Biology". In their study, pretest, experimental treatment and posttest design was employed. The experimental group 1 was taught biology through Science Inquiry Model. Experimental group 2 was taught biology through Advance Organizer Model and the control group was taught biology through Conventional method. The design comprised three stages. The first stage involved pre testing of all the students of three groups on achievement in Biology, Intelligence and Socio-Economic status. The second stage involved treatment of twenty weeks. The experimental treatment consisted of teaching of four units of Biology through Science Inquiry Model to experimental group 1, through Advance Organizer Model to experimental group 2 and through conventional method to control group. In third stage, the students were post tested on achievement in Biology. Findings of the study were; 1 the students who were taught Biology through Science Inquiry Model and Advance Organizer model have shown significant improvement in the achievement in Biology than the students who were taught through Advance Organizer Model has shown significantly gain in achievement than the group of students taught Biology through Science Inquiry Model.

2) BRAJA KISHORE JENA & BIJAYA KUMAR MOHANTY (2010): conducted a study on “A Study of Effectiveness of Social Inquiry Model in Teaching History for the Development of Values of
Secondary School Students”. Objective of the study was To study the effectiveness of Social Inquiry Model in the development of values of secondary school students. Findings of the study were; 1. Social inquiry Model was a significant effect on the development of personal values of the students. The reason for value development is that assumptions like creative reconstruction of society, genuine inquiry and logical thinking and reflective classroom followed in Social Inquiry Model helps the student to increase in values; 2. Social inquiry Model and Programmed instruction helped in the development of personal values of students. So it was recommended that teachers may use Social inquiry Model in teaching about values.

3) VEERPAL SINGH (2008): conducted a study on “Effectiveness of Jurisprudential Inquiry model of Teaching on verbal Fluency of Ninth Graders”.

Objective of the study was; To find out the effect of Jurisprudential Inquiry Model (JIM) of teaching on verbal fluency (word ideational, expressional and associational) of students belonging to different intelligence and socio-economic status (SES) groups. Findings of the study were; 1. The analysis of the data showed that Jurisprudential inquiry model group students for verbal fluency (total scores) as well as for its four areas viz. word fluency, ideational fluency, expressional fluency and associational fluency; 2. JIM was found effective in improving the word fluency of low intelligent and expressional fluency of high intelligent students.

4) ERIC J PYLE (2008): conducted a study on “A model of Inquiry for teaching Earth Science”. Objectives of the study were; Models
of Inquiry science teaching attempt to engage students in active processes of science knowledge, construction and emulating the process of science itself. This model of Inquiry science teaching that more accurately reflects the nature of the earth sciences than do Generic or Physical science – based on models do. Findings of the study were; these mechanisms include descriptions of materials, space and time, observations and modeling, inspirations and historical representations, earth science is not a narrow set of ideas but a synthesis of many concepts, traditions and discipline in science.

5) **ASHOK K KALIA (2005):** conducted a study on “Effectiveness of Mastery Learning Strategy and Inquiry Training Model on Pupil’s Achievement in Science”. Objective of the study was; To compare the effect of Mastery Learning strategies and Inquiry Training Model of Teaching on Achievement in Science. Findings of the study were; 1. Inquiry training model of teaching and traditional method of teaching are equally effective in raising the achievement of students in science; 2. There was no significant difference in the mean gain level of achievement between E2 and control groups.

6) **KASINATH H M (2000):** conducted a study on “Effectiveness of Inquiry Method of Teaching Science in Fostering Science Process Skills, Creativity and Curiosity”. Hypotheses of the study were; 1. Experimental and Control groups do not differ significantly in terms of science process skills, creativity (fluency, flexibility and originality) and curiosity before applying the ITM treatment; 2.ITM method of teaching science is more effective than CM in fostering science process skills, creativity (fluency, flexibility and originality)
and curiosity; 3. ITM method of teaching science is more effective than CM for students at different levels in developing science process skills, creativity (fluency, flexibility and originality) and curiosity; 4. There is interaction between treatments and levels in developing science process skills, creativity (fluency, flexibility and originality) and curiosity; 5. The experimental group sustains science process skills, creativity (fluency, flexibility and originality) and curiosity. Findings of the study were; 1. Experimental and Control groups were alike with regard to the dependent variables, i.e., science process skills, creativity – fluency, flexibility, originality and curiosity; 2. The significant interaction between the treatments and levels of intelligence in fostering science process skills suggested that differentiating variance was contributed by both, thereby subduing the exclusive effect of each of them separately; 3. ITM method of teaching was more effective than CM in fostering fluency. Similarly, levels of intelligence contributed differentially to its development; 4. Neither the methods nor the differential levels of intelligence helped in fostering flexibility; 5. ITM was more effective in fostering originality than CM. However, levels of intelligence did not contribute differentially to its fostering; 5. ITM was more effective in fostering curiosity than CM. However, levels of intelligence did not contribute differentially to its fostering; 6. The gains occurred in the dependent variables-science process skills, creativity (except flexibility) and curiosity through ITM were sustained by the students.

7) SIVAKUMAR P & PREMA P (1997): conducted a study on “Effectiveness of Suchman’s Inquiry Training Model in Learning
Biology. General objective of the study was; To find out the effectiveness of Suchman’s Inquiry Training Model in learning biology at IX standard level. Specific objectives of the study were; 1.To develop packages based on Suchman’s Inquiry Training Model for the topics Genetics, Ecology and Evolution; 2.To apply these packages in the teaching of biology a IX standard level; 3.To test the effectiveness of this model by conducting an experimental study; 4.To find out the comparative effectiveness of teaching strategy based on Suchman’s inquiry training model over the conventional teaching methods. Findings of the study were; 1.Suchman’s Inquiry Training Model significantly improves the achievement of the learner in biology. The statistical analysis of posttest performance of experimental and control group confirmed this first hypothesis. The obtained t-value was significant at 0.01 level ; 2.Suchman’s Inquiry Training Model is more effective than teaching based on the conventional methods in improving the achievement of the learners biology. It has been confirmed by the statistical analysis of pretest and posttest performance of the experimental and control group. The t-value of the pretest and posttest of experimental group was 18.00 and for the control group it was 14.15. Even though there was significant difference between both the groups in their posttest achievement, t-value for the control group was less than the experimental group; 3. Moreover, the percentage of gained mean score for experimental group was 97.23 and for control group it was 59.73. These findings have again confirmed that Suchman’s Inquiry Training Model is more effective than the conventional method in improving the achievement of the learners in biology; 4.The investigation
revealed that the ideas or concepts should not be forced on the student's mind; concept must be developed through a natural way of scientific inquiry. The instructional techniques should allow the student to develop his own thinking. Once such normal way of thinking was stimulated, knowledge develops in a right way. The teacher should not spoil the curiosity by forcing information. More over the students must know that all knowledge is tentative.

8) BERTRAM C BRUCE & JUDITH DAVIDSON (1996): conducted a study on “An Inquiry Model for Literacy Across the Curriculum”. After two decades of intense research on reading a number of teachers and researchers are beginning to ask whether a narrow focus on reading distorts our view of learning and whether a curriculum centered on reading constraints what can be done in the classroom. Because of these concerns, many have turned to literacy across the curriculum approaches. This report explores three models for the relation of literacy to larger curricular concerns: a skills Model, an Instrumental Model, and an Inquiry Model. It explores in some depth the Inquiry Model's conception of the role of reading and writing within learning. A possible realization of this model is suggested through a detailed look out at one college class session.

9) JOSHI S C (1994): conducted a study on “A Comparative study of the effects of teaching methods on the Development of Mathematical Creativity”, Objectives of the study were; 1.To find out comparative effectiveness of Guided Discovery Method (GDM), Inquiry Training Model of Teaching (ITMT) and Traditional Method (TM) of teaching and teaching and learning for developing
mathematical creativity among students; 2. To examine the effects of three teaching methods on development of divergent thinking components of mathematical creativity among students; 3. To assess the effects of three methods of teaching on the development of mathematical creativity among high, average and low mathematical creativity. Findings of the study were; 1. The effect of GDM on dimensions fluency, flexibility, originality, creative product and mathematical creativity as a whole was found significant; 2. The effect of ITMT on dimensions fluency, flexibility, creative product and mathematical creativity as a whole was found significant; 3. The GDM of teaching was found to be better than ITMT in enhancing originality in mathematics; 4. The effects of both GDM and ITMT on flexibility dimension of mathematical creativity among high creative was not found significant; 5. GDM was found to be significantly better than ITMT in fostering mathematical creativity as a whole among high creative; 5. The effects of both GDM and ITMT on originality dimension of mathematical creativity among average creative was not found significant; 6. The GDM was found to be significantly better than ITMT in developing fluency dimension among average creative; 7. The effect of GDM and ITMT were found significantly better on fluency, flexibility creative production and mathematical creativity as a whole among low creative but not on originality dimension.

10) **PANDEY S N (1986):** conducted a study on “Effectiveness of Advanced Organizer and Inquiry Training Models for teaching social studies to class VIII students”. Objectives of the study were; 1. To compare the effect of the Advanced Organizer Model, Inquiry
Training Model and conventional teaching in terms of pupils achievement in social studies; 2. To compare the effect of the Advanced Organizer Model, Inquiry Training Model and conventional teaching in terms of pupils attitude towards social studies; 3. To study the pupils reactions towards the Advanced Organizer Model and Inquiry Training Model. Findings of the study were; 1. The treatments had different effects on the pupils achievement; 2. The difference in means of gain scores in achievement due to advance organizer and conventional teaching was significant at the 0.05 level; 3. Difference due to Inquiry teaching model and conventional teaching was significant at the 0.01 level and the difference due to Advanced organizer model and Inquiry Training Model was not significant; 4. There was no significant difference between the Advance Organizer Model and the Inquiry Training Model, Advance Organizer Model and conventional teaching, and Inquiry Training Model and conventional teaching in terms of pupils attitude towards social studies; 5. Pupils reacted favourable towards the Inquiry Training Model and Advanced Organizer Model.

11) PASSI B K, SINGH L C and SANSANWAL D N (1985): conducted a study on “Models of Teaching- Developing Training Strategy”. Objectives of the study were; 1. To study the effectiveness of training in the Concept Attainment Model (CAM) in terms of A. Understanding of, and B. Reaction towards the model; 2. To study the effectiveness of training in the Inquiry Training Model (ITM) in terms of A. Understanding of, and B. Reaction towards the model; 3. To study the resultant willingness of Teacher
Educators to implement the models in Teacher Education Programmes; 4. To develop a strategy of training in Models of Teaching. Findings of the study were; 1. Training in CAM did bring significant favourable change in Teacher Educators Reactions towards CAM; 2. The level of understanding of CAM did not influence Teacher Educators Reactions towards CAM; 3. Training in CAM in the form of Lecture, Demonstration, Discussion and Peer practice plus feedback did enhance the Understanding of Teacher Educators theoretic aspects of CAM.; 4. Training in ITM in the form of Lecture, Demonstration, Discussion and Peer practice plus feedback did enhance the Understanding of Teacher Educators theoretic aspects of ITM; 5. Training in ITM did bring about favourable reactions of Teacher educators towards ITM; 6. The understanding of the ITM did not influence teacher educators reactions towards ITM; 7. The teacher educators were willing to implement to Models of teaching in the teacher education programme if a support system was available; 8. The training strategy comprising theoretical discussion, demonstration, and peer practice plus feedback was found effective in terms of developing understanding, favourable reactions and willingness to implement Models of teaching in teacher training programme.

12) AL-KHAYYAT & ABDUL JAREEN A (1980): conducted a study on “An experimental study comparing the effects of the inquiry method and the traditional method for teaching social studies in two secondary school boys”. The main purpose of this study was to compare the effectiveness of Inquiry method and traditional
method of teaching history on the achievement, attitude and critical thinking ability of the students. Findings of the study indicated that the inquiry second year students in the two schools performed significantly better than the traditional second year students in the same schools on the achievement test and Watson Glaser Critical Thinking Appraisal. There was no significant difference in the attitude of the students in both the schools.

2.6 Reviews Related to the Different Models of Teaching

1) MEGHA M UPLANE, SANJEEV A SONAWANE & PADMINE M S (2011): conducted a study on “CAI: An Effective Instructional Method for Secondary School Low Achievers”. Objectives of the study were; 1. To identify low achievers in Physics. 2. To develop textbook-based computer multimedia software package. and 3. To test the effectiveness of the developed software package for enhancing the academic achievement of low achievers in Physics. Findings of the study was; The performance of students in posttest and retention test for questions on ‘Physics content’ was better than in pretest. It was due to better representation of the subject matter through multimedia effect of TBCMSP or it could also be because through C.A.I, the learners were lean at their pace and cater to their individual shortcomings in learning and enable the enhancement of the academic achievement in Physics.

2) RAGES JOHN (2011): conducted a study on “Dealing with Heterogeneity in Classes: Differentiated Multi-Phased Performance Model”. Objectives of the study were; 1. Giving opportunities for all the students belonging to one class but having different skills and different traits; 2. Facilitating the learning of all the students in the
class according to their skills, tastes, pace and social behaviour; 3. Encouraging and motivating all the students to come up with their skills and their creative potentials; 4. Enhancing the self esteem of the students by having essence of achievement; 5. Supporting socially and intellectually strong students to take initiative and present their ideas and creative skills; 6. Making socially and intellectually strong students feel their potential acknowledged and appreciated; 7. Assisting socially and intellectually strong students to develop healthy leadership skills; 8. Enabling socially and intellectually strong students to improve cognitive skills by sharing and generating knowledge; 9. Providing intellectually and socially weak students enough time for thinking and preparation without feeling pressure; 10. Permitting intellectually and socially weak students to observe and understand from the model performance by the gifted students; 11. Stimulating intellectually and socially weak students to perform with improving abilities and with wider range of interests; 12. Engaging intellectually and socially weak students in cooperation activities with more skilled students in a spirit of collaboration and teamwork; 13. Helping intellectually and socially weak students to feel a sense of belongingness in a team where they enjoy reassurance, trust and guidance. Findings of the study were; Differentiated Multi-phased Performance Model meets the needs of diverse learners while maintaining high standards and high expectations for all learners. This model was sensitive to students' feelings and ways of learning, gives more freedom but was firm with regard to performance. Learning goals and objectives are achieved through a variety of ways by different students, but all of them enjoy the same sense of achievement. This model was
suitable for any type of school, applicable in the prevailing teaching situation, without adding extra burden to the teachers and to the students. At the same time, it was flexible enough to meet the usual problems such as heavy syllabus, limited time, overcrowded classes, student's inhibition, disinterest etc...Originally, it was used in language class, but subject teachers also can adopt this method. The students learn to act and think freely and differently, and, as a result, new ideas and styles were generated. The presentations and the evaluation of the first phase will stimulate the creative thinking and the pupils will come up with novelties and varieties in the next phase. The first phase performances will be an example and model for the remaining students who were comparatively weak. They are encouraged to explore topics in a risk free learning environment. They got more listening, thinking and preparing time before trying their chances in the next phase. The weak students are not simply imitating performances, instead, their creativity is fired up and more ideas are generated and it will have a brainstorming effect on them. As the presentation in the successive phases was different or improved from the earlier ones, the last performers were not feeling themselves backward. In fact, the last performances by the weaker students will have high quality, having incorporated the suggestions and corrections made in the evaluation sessions. The performance and evaluation in different phases provide for ongoing, embedded, authentic and encouraging assessment of students skills, interests and learning style. The teachers can provide support from the context. The learner gets a variety of verbal and academic backup, from both the teacher and more proficient peers.
3) **PANDYA S R (2010):** conducted a study on “A study of the effect of co-operative learning model on the academic achievement in mathematics among students with different learning styles” Objectives of the study were; 1. To develop lesson plans on selected topics in the subject of Mathematics of standard VIII based on (a) co-operative learning method and (b) the traditional lecture method; 2. To compare the pretest scores of academic achievement in mathematics of experimental and control groups; 3. To compare the posttest scores of academic achievement in mathematics of experimental and control groups; 4. To ascertain the interactive effect of cooperative learning model and the following learning styles of students on academic achievement of students in mathematics (i) Independent v/s Dependent learning styles (ii) Avoidant v/s Participant learning styles (iii) Competitive v/s Collaborative learning styles; 5. To compute the effect size of the treatment on the academic achievement in mathematics. Findings of the study were; 1. There was a significant effect of the co-operative learning model on academic achievement of students. The magnitude of the effect of the treatment on academic achievement is maximum; 2. Co-operative learning model was found to be more effective for students with predominantly dependent, participant and collaborative learning styles as compared to the students with predominantly independent, avoidant the competitive learning styles respectively.

4) **ARUNA P K & SMITHA E T (2009):** conducted a study on “Effectiveness of Concept Attainment Model of Teaching on Achievement in Biology”. Objectives of the study were; 1. To
compare the Mean pretest score of experimental and control groups; 2. To compare the Mean posttest score of experimental and control groups; 3. To study the effectiveness of Concept Attainment Model on the Achievement in Biology of standard VIII pupils. Findings of the study were; 1. The study reveals that the CAM of teaching was effective for the proper understanding and clarification of concepts. Even though the investigation was carried out on a small sample, the findings throw light on the current educational practices of secondary classes; 2. By adopting the Brunerian model of teaching in the classroom, the teacher would develop an easy method of attaining scientific concepts, which was the basic to content mastery. Concepts, which seem to be not so difficult apparently, may not be that easy in reality, therefore learning experiences have to be selected in such a way as to reinforce and develop the deeper meanings of the ideas to be learned; 3. Commitment to use the Concept Attainment Model requires teachers to understand the theory and nature of concepts; 4. The CAM offers teachers a method for teaching thinking across the curriculum using the subject matter of the disciplines, which they teach; 5. It was models, which helps when broaden their own holistic understanding of their disciplines as ways of thinking about the world, and helps them consider which concepts in the discipline students most need to understand in order to use the knowledge and skills the discipline encompasses; 6. The model strengthens teachers own subject -area knowledge and critical thinking skills by engaging them in opportunities to create realistic exemplars that reflect the concept and in doing so, helps them understand the thinking process students need to use as in order
to derive the concept; 7. It provides teachers with opportunities to help students apply the concepts and critical thinking skills they learn in the classroom and beyond.

5) Srinivasan P. and Mthumanickam R (2009): conducted a study on “Computer Assisted Instruction and Lecture Method: A comparative study Experiments in Education”. A Computer Assisted Instructional programme was the lesson on learning in educational psychology for trainees of diploma in teacher education was developed. It has been put in the linear style of programmed instruction. It was tested in three categories such as individual try out, small group try out and field-testing. After testing it had 197 frames. The frames were presented was visual basic version 6 with the help of a computer programmer. The entire programme was also set in Tamil. Since students may or may not know Tamil type writing, the full programme itself was Mouse Driven. A comparative study of CAIP was made with Lecture method of teaching with a sample of 50 was made. Control group pretest – posttest experimental design was followed. A criterion – referenced test prepared by the researchers and administered on the subjects for finding the effectiveness of CAIP. It was found that the CAIP was more effective than lecture method. CAIP was suitable for drill and practice. CAIP was best suitable for open and distance learning and it reduces the workload on teachers.

6) Gara Latchanna & Asrat Dagnew (2009): conducted a study on “Attitude of Teachers towards the use of Active Learning Methods”. Objective of the study was; To study attitude of English language teachers towards the use of active learning methods in
teaching communicative English. Findings of the study were; The English teachers showed a positive attitude towards the utilization of active learning methods. They were of the opinion that utilizing active learning methods was crucial as it makes students participate in discussion, integrating their learning experiences, and raising their interest of learning English. Besides, teachers underlined the paramount significance of active learning as it helps them improve their English teaching methods. Though teachers showed positive attitude towards the utilization of active learning methods, there were a number of factors hindering them from utilizing the approach properly. These included lack of enough training and experience, inadequate budget meant for the purchase of instructional materials and the shortage of enough seats for the students.

7) RAFEEDALI E (2009): conducted a study on “Computer – Based Technology and its Pedagogical Utility”. Objectives of the study were; 1.To identify the basic computer knowledge among the higher secondary school teachers; 2.To find out the purposes of using computer resources among the higher secondary school teachers; 3. To find out the extent of use of computer resources in the teaching – learning process among the higher secondary school teachers. Findings of the study were; 1.Most of the higher secondary school teachers had basic computer knowledge; 2.The concept of smart classroom was unfamiliar to most of the higher secondary school teachers; 3. Only 12.67% of higher secondary school teachers were able to handle LCD; 4. Most of the higher secondary school teachers were using computers for educational
purposes; 5. Computer was a very helpful device for evaluation but only a small percentage of higher secondary school teachers are using computers for evaluation; 6. Among the higher secondary school teachers female teachers were used computer more for educational purposes than male teachers; 7. Higher secondary school teachers were not applying the Informational Technology resources in the classroom interaction, only 13% of higher secondary school teachers were used Power Point presentation in the classroom; 8. Only 11.33% of higher secondary school teachers were used LCD; 9. Even though higher secondary school teachers were not using Power Point presentation and LCD in the classroom they assign web-based assignment to their students.

8) SHREYASHI PALTASINGH (2008): conducted a study on “Impact Of Synectics Model Of Teaching In Life Science To Develop Creativity Among Pupils”. Hypotheses of the study were; H1: There is significant difference between effects of Synectics model and traditional method of teaching life science in development of creative thinking ability of students; H2: The Gain score in creativity of the experimental taught Life Science by Synectics model was significantly higher than the control group taught by traditional method; H3: The training in creativity by teaching through synectics model produce significantly higher achievement in science; H4: The experimental group taught through synectics model obtains significantly higher post test scholastic achievement score than the control group. Findings of the study were; 1. There was a significant difference between effects of Synectics model and traditional method of teaching life science in development of
creative thinking ability of students; 2. The Gain score in creativity of the experimental group taught life science by Synectics model was significantly higher than the control group taught by traditional method; 3. The training in creativity by teaching through Synectics model produce significantly higher achievement in science; 4. The experimental group taught through Synectics model obtained significantly higher post test scholastic achievement score than the control group.

9) **THANGARAJATHI S, ADLIN VIOLA (2007):** conducted a study on “Cooperative learning Approach in Learning Mathematics”. Objectives of the study were; 1. To find out the effectiveness of the cooperative learning approach over conventional method in learning mathematics at high school level; 2. To compare the achievement of the high, average and low achievers when taught through conventional method; 3. To compare the achievement of the high, average and low achievers when taught through cooperative learning method; 4. To find out and compare the achievement of conventional method group and cooperative learning method group with respect to sex, locality of the houses, tuition undergone, and type of tuition. Findings of the study were; 1. There was an extremely significant difference between the pretest and posttest scores of experimental method group with respect to sex, locality of the house, tuition undergone and type of tuition. But there is little significant difference between the pretest and posttest scores of control group with respect to sex, locality of the house, tuition undergone and type of tuition. Hence the hypothesis is accepted; 2. The cooperative learning approach was found to be more
effective than the conventional method. The conventional method can make improvement in the achievement of the pupil to a certain extent. But when compared with the cooperative learning approach the conventional method is not as much effective.

10) GNANADEVAN R (2006): conducted a study on “A study of problem solving ability of higher secondary students, Research and Reflections on Education”. Objectives of the study was; An attempt was made to find out the problem solving ability of higher secondary students in relation to their gender, type of school, locality of the school and nature of family. Findings of the study were; The problem solving ability of higher secondary students was low. Higher secondary students differ significantly in their problem solving ability with respect to gender and locality of the school and do not differ significantly with respect to type of school and nature of family.

11) JOHN LOUIS MANOHARAN R (2006): conducted a study on “Fostering Creativity through Problem solving in Mathematics”. This article clarifies the concept of creativity in mathematics. A viewpoint has been suggested that it was possible for mathematics teachers to promote creativity while teaching mathematics. Guilford and Torrance tests of creative thinking highlight fluency, flexibility, originality and elaboration as creative abilities. These abilities can be developed through problem solving in mathematics. Describing the scope of creativity and appropriate problematic situations for the development of creativity in mathematics through problem solving, this article also highlights the role of divergent production tasks in mathematics in fostering
creativity in students. While teaching mathematics in the class, teachers should provide divergent production tasks in mathematics, so that students can think of different ways of solving a divergent production task. In such a situation students can be flexible, fluent, appropriate and original in their thinking. Hence problem solving is a framework of pattern within which creativity takes place.

12) SWARUPA RANI T (2006): conducted a study on “Effectiveness of the Synthetic and Polya’s Heuristic Approaches on the Acquisition of Problem solving skills in Mathematics”. Research questions; 1. What was the effectiveness of synthetic method in developing problem solving ability in the students of mathematics? 2. What was the effectiveness of poy’s method in developing problem solving ability in students of mathematics? 3. What was the relative advantage of one over the other in achieving the generalizable problem solving ability of the experimental research process? Findings of the study were; 1. The synthetic group did not make any improvement from its initial position after the one-month traditional teaching of the context matter; 2. The Polya’s group made spectacular gains after being taught using the new heuristic approach; 3. A significant difference could be seen between the synthetic method group and Polya’s method on posttest scores; 4. A study of the gain scores differed significantly between synthetic and Poly’s method group; 5. The experimental students taught by Poly’s method are functioning well in the four problem solving stages; 6. The synthetic method students fared very dismally in these phases and stages except on the
understanding of the problem stage; 7. The teachers who participated in the experiment have proved their competence to implement different methods and produce significant results in a Poly's; 8. The high ability group did not get influenced by any method differentially; 9. The other two lower levels of students' abilities are beneficially affected by the experiment method in Poly's method.

13) ADITI SHARAN & SATGURU SHARAN (2006): conducted a study on “Vitalizing the Project Method – Use of Online Techniques”. Project method of teaching was a democratic and scientific way of teaching. The present growth of information technology has entirely changed the teaching – learning process. In this paper, the authors was tried to justify how online techniques have revolutionized the teaching – learning process adopted in the project method of teaching. By using different online techniques project method could be made of motivating, effective and challenging. Here they presented a comparative picture by taking a practical example of planning and executing a project 'know your city- Udaipur' through traditional as well as online technique. This paper will be useful to our teachers as a guideline for using various online techniques and make their project lively and scientifically.

14) RAJINDERAPAL KAUR SIDHU & PARMINDER SINGH (2005): conducted a study on “Comparative study of Concept Attainment Model, Advance organizer Model and Conventional Method in teaching of Physics in relation to Intelligence and Achievement Motivation of ninth class students”. Objectives of the study were;
1. To study the effect of Bruner’s concept attainment model on scholastic achievement as compared to conventional method of teaching in Physics in relation to intelligence and achievement motivation; 2. To study the effect of Ausubel’s advanced organiser model on scholastic achievement as compared to conventional method of teaching in Physics in relation to intelligence and achievement motivation; 3. To study the relative effectiveness of Bruner’s concept attainment model and Ausubel’s advance organizer model on scholastic achievement in Physics in relation to intelligence and achievement motivation. Findings of the study were: 1. The three groups did not differ significantly from each other in their age and matched on the basis of age; 2. The difference in mean marks between the groups was not found significant. This suggests that the students under investigation were not different on the basis of marks secured in Science in class 8th examination; 3. The students of all three groups were not different from each other on the basis of socio economics status. All the three groups were found to be homogeneous with regard to their initial behaviour i.e Knowledge of Physics; 4. There existed a significant difference with respect to learning of concepts in Physics among subjects taught through three different techniques. Significant F-ratio was followed by t-test. So t-test was applied to test the significance of difference between means of gain scores of subjects on criterion test in Physics, taking two treatments at the same time; 5. A statistically significant difference was found between high and low intelligence groups for learning of concepts in physics (F=14.66) where high intelligence group is better in concept learning than low intelligence group; 6. No statistically
significant difference was found between the subjects belonging to high and low level of achievement motivation for learning of concepts in Physics (F=1.51). The result did not show any independent effect of achievement motivation on the gain scores of subjects for learning of concepts in Physics; 7. The teaching techniques, intelligence and achievement motivation were not found to have any statistically significant effect on scholastic achievement of students for learning of concepts in Physics (F=0.32). This result indicated that interaction effect between teaching techniques, intelligence and achievement motivation on scholastic achievement in learning of concepts in Physics does not exist at all.

15) PAL R (2000): conducted a study on “An Experimental study to assess the Impact of Information Processing Model on the Achievement of objectives of science teaching at secondary level”. Objectives of the study was; To find the relative effectiveness of teaching through information processing models and traditional (lecture) method on the development of knowledge and understanding of the concepts, principals and processes, ability to think logically, creativity, rational outlook, objectivity, spirit of inquiry, decision making ability, courage to question, ability to draw conclusions and aesthetic sensibility. Findings of the study was; Information processing models were more effective than traditional method in developing understanding of facts, concepts and principles related to science, reasoning ability, creativity, rational outlook, objectivity, spirit of inquiry, decision making
ability, courage to question, ability to draw conclusions and aesthetic sense among the students.

16) RAJINDER PAL KAUR SIDHU (1997): conducted a study on “Transforming the learning process through teaching Models”. Objectives of the study were; This investigation was conducted to evaluate teaching effectiveness of two models of teaching, so that more result oriented strategies could be followed for teaching of concepts. The study was undertaken with the objective to determine teaching effectiveness in the area of teaching of concepts in Economics of Bruner's Concept Attainment Model, Ausubel’s Advance Organizer Model and conventional method of teaching in relation to academic achievement, intelligence and socio-economic status (SES). Findings of the Study; 1. There was no significant difference in the efficacy of Bruner's Concept equal to 40.254 was significant at 0.01 level. This shows that the terminal behaviour of the three groups differed significantly. Thus Bruner's Concept Attainment Model, Ausubel's Advance Organizer Model and conventional method of teaching differ in their instructional efficacies; 2. There exists a significant difference in achievement of concepts in economics of class XI students; 3. There was no significant independent effect of academic achievement on the gain scores of subjects on criterion test for the attainment of concepts in Economics of class XI students are accepted in view of non-significant F-ratio.

17) SMITH, PEGGIE A. (1996): conducted a study on “Problem Solving Through Writing in Entry Level College Algebra”. The purpose of this study was to create an undergraduate, college-level
course in teaching problem-solving through writing, to provide mathematic pre-service secondary school teachers with the knowledge and strategies that will better prepare them to respond appropriately to the challenges of the contemporary mathematics classroom at the high school level. Mathematics education in the United States was week in preparing teachers to teach problem solving. Consequently students in other countries. Writing was a viable method for teaching the mathematical skill of problem solving. Using writing to teach other subjects was called “writing to Learn”. Writing to learn sets the stage for “Language Across the Curriculum” as a source of innovative techniques in teaching mathematics in conjunction with other disciplines. Many teachers are aware of writing as a catalyst for learning; however they lack the staff development training needed to successfully implement the process at the high school level. Teacher training is necessary for the implementation of writing to learn in the mathematics classroom. An undergraduate-level course in problem solving through writing was developed, which was responsive to the recommendations of the National Council of Teacher of Mathematics (NCTM, 1991) standards for Teaching Mathematics and the Mathematical Association of America’s report (Leitzel, 1991) which includes recommendations for the mathematical preparation of teachers of Mathematics classroom through the use of writing strategies. The lessons centered on method objectives and content.
STIX, ANDI N. (1992): conducted a study on “The Development and Field Testing of Multi-Model Method for Teaching Mathematical Concepts To Pre-service Teachers By Utilizing Pictorial Journal writing”. Objectives of this study was to design a training program that made mathematics exciting, enjoyable, and clearly understandable so that pre-service teachers could communicate positive feelings about mathematics to their students. Building on extensive research regarding the different which people process spatial and numeric information and the relationship between visual spatial thinking and mathematics, a multi-modal Approach in teaching and writing across the curriculum was created that uses pictures, numbers, and words to facilitate comprehension and retention of basic mathematical concepts. The dissertation consists of two main parts. The first part is a teacher’s guide called “Pic-Jour Math” which incorporate pictorial journal writing into its multi-model presentation of the essential numerical equations thought at the elementary and middle level. The second part consists of a study of pre-service teachers to test the impact of using pictures in the journal writing processes. The study compared the attitudes of teachers-in-training who used journal forms that included pictures, words and numbers versus those that used journal forms with words and numbers alone. The effect of using pictorial diagrams of math anxiety, perceived ability to teach mathematics, level of self-confidence in mathematics, ability to have a clear sense of task, to write a focused introduction, create a smooth transition of thought between steps, offer evidence to support every major point, generate a clear logical order, sue a proper choice of words,
express oneself succinctly, avoid repetition, convey ideas comfortably, coordinated the modes, and clarify ideas through the writing process was assessed. Results of the study indicated marked changes in attitudes when pictorial note taking was incorporated in the journal writing process. With all forms of journal writing, math anxiety decreased and self-confidence and perceived ability to teach in math increased. With the added dimension of pictures, teachers-in-training believed that they were able to express themselves more easily, were better able to execute their task, and were more meta cognitively aware.

19) CHITKARA M (1985): conducted a study on “To study the Effectiveness of different strategies of teaching on achievement in mathematics in relation to intelligence, sex and personality”. Objectives of the study were; 1. Whether achievement in Mathematics was affected by different strategies of teaching; 2. Whether different strategies had differential effects on achievement of male and female students; 3. Whether levels of intelligence interacted with strategies in terms of achievement; 4. Whether personality acted as a potential factor in selection of teaching strategies. Findings of the study were; 1. All the three strategies, namely i. Lecture discussions, ii. Inductive drill, and iii. Auto instruction group discussion were found to be equally effective in terms of achievement in Mathematics disregarding levels of intelligence, sex and personality type; 2. Boys and Girls of superior ability did not show any significant difference between their mean scores on achievement in Mathematics; 3. Girls of average ability scored significantly higher in Mathematics than
Boys of average ability; 4. Lecture discussion strategy found favour with average ability students as they scored significantly higher than above average and below average groups; 5. Strategy ii and strategy iii, namely inductive drill and auto instruction group discussion was more suited to the students having above average intelligence than average and below average in intelligence; 6. The strategy of lecture discussion was found to be equal effective with above average and below average ability (intelligence) introverts as well as extroverts; 7. Extroverts of high ability, average ability and below average ability scored equally well taught through strategy I; 8. Under the strategy of inductive drill, average ability extroverts scored significantly higher than average ability introverts; 9. Under the strategy of auto instruction group discussion high ability and low ability introverts. But extroverts of average ability differed significantly in their achievement from average ability introverts; 10. Out of the three strategies, strategy was more suited for below average ability extroverts and strategy iii was most suited for high ability introverts for achievement in mathematics.

20) Rao T G (1983): conducted a study on “A Comparative study of Programmed Learning and Conventional Learning Methods in the instruction of Mathematics – a psychological approach”. Objectives of the study were: 1. To find out the efficiency of the Programmed learning method over the conventional learning method in the instruction of Mathematics in school education; 2. To determine the variation in learning gains in the pupils in the rural urban dimension; 3. To determine whether there was any difference in learning due to sex variation of the pupils; 4. To investigate into
the variations in achievement gains of the pupils in Mathematics owing to variation in their general mental ability level under Programmed learning instruction; 5.To find out the differential learning gains in the pupils owing to school climate, with special reference to private and government management of institutions. Findings of the study were; 1.The mean performance scores of the Programmed learning group and Conventional group on the achievement test was less than the normative means of the tests; 2.The mean performance scores of all the programmed learning groups were higher than those of the corresponding conventional learning groups; 3.The performance of urban subjects was superior to the performance of the rural subjects under the Programmed learning method, irrespective of grade; 4.The difference between the mean performance scores of the Programmed learning and Conventional learning groups was the highest in the case of urban subjects of grade 10, in grades 5 and 10, girls scored higher than boys; 5.There existed no sex difference in the learning gains of the Programmed learning groups separated on the basis of sex; 6.The mean performance scores of groups of subjects of high, average and low level of general mental ability were in the order of their categorization; 7.The significant differences were very high in the case of mean performance scores of the Programmed learning and Conventional learning groups of subjects in the category of high level of general mental ability; 8.Subjects of grade 10 gained more by the Programmed learning method than subjects of grade 5; 9.The increase in mean performance score of subjects of private schools was more by the programmed leaning method of instruction as compared to that of
The difference between mean performance scores of the programmed learning and conventional groups was the highest in the case of the subjects of grade 5 of private schools; 11. The learning gains in mathematics were maximized by the programmed learning method in the case of subjects of urban private schools; 12. The girls of the private schools, irrespective of their stage of instruction, scored higher than the boys by the programmed learning method of instruction in mathematics, through these differences were not found to be significant; 13. Subjects of high general mental ability of private schools were the highest beneficiaries of the programmed learning method of instruction in mathematics.

21) SHARMA M M (1981): conducted a study on “A Comparative Study of Teaching Mathematics by the Method of Programmed Instruction and Conventional Classroom method”. Objectives of the study were; 1. To compare the outcomes of learning mathematics through programmed instruction and conventional methods of teaching; 2. To find out whether intelligence, introversion-extroversion, rigidity-flexibility, study habits and previous achievement of students were differentially related to their achievement and retention when they learn mathematics through the aforesaid two methods. Findings of the study were; 1. Programmed instruction was more effective method than conventional teaching not only in relation to achievement but also in relation to retention; 2. The personality dimension introversion-extroversion has highly significant effect on achievement and some effect on achievement or retention through the two methods of
teaching employed. However, introverts with poor study habits achieved better than extroverts with poor study habits when taught through the programmed instruction; 3. Intelligence had a significant effect on achievement and no significant effect on retention of achievement. It did not show any differential effect on achievement and its retention through the two methods of teaching employed; 4. Good study habits had significant effect on retention of achievement but no significant effect on immediate achievement; 5. The flexible achieved higher through the programmed instruction and rigids achieved higher through the conventional method of teaching; 6. Students with high previous achievement achieved and retained higher than those who had poor previous achievement. Students with low previous achievement achieved better through the programmed instruction than those with through the conventional method.

2.7 Analysis of the Reviews Related Literature

A. Positive Opinioned Studies


B. Negative Opinioned Studies;
Thimothi Samuel Raju Yallap Ayodhya, Vyas C S, Swarupa Rani T, Rao A V, Ragavendra, Mohammad Miyan and Vyas C S.

C. Neutral Opinioned Studies;
Thimothi Samuel Raju Yallap Ayodhya, Annie K Jacob, Ashok K Kalia, Jarial G S, and Chitriv U.

By observing the above reviews, the researcher is in highly curious to know the actual effect of the Guided discovery method and Inquiry training models in the selected sampling area. This became the geneses of the Research and the importance of the Related Literature.