Chapter - III

REVIEW OF THE RELATED STUDIES
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3.1 INTRODUCTION

Theoretical aspects of the study were presented in the first chapter. This chapter deals with the review of previous researches in the areas related to that of the present study. The review of the literature is an important part of scientific approach and it is carried out in all areas of scientific research including educational field. Due to scientific approach, the researcher enables to precise procedure to scan the studies, finds the gaps in previous research, helps to select suitable instrument and develop the whole design of the problem at hand. For better understanding of the problem and to provide an opportunity to plan the intended study more precisely and meaningfully the review of literature plays an important role. Without the review of past studies in relation of the problem one cannot complete a research successfully.

Synoptic overviews of the research in the area of models of teaching indicate clearly that there were few research studies which have been experienced into its depth. No doubt, it is difficult to classify the diverse kind of researches in this field, but still a number of researches pertaining to this field have been reviewed and their review along with trend observed is being presented in this chapter. To understand the present problem, which is aimed at investigating individual effectiveness and relative effectiveness of information processing models of teaching, it is also necessary to take the review of the effectiveness of different models at various levels of teaching and hence the related studies have been reviewed in light of that in this chapter.
In order to study the researches conducted in this field the total work available from various sources i.e. books, journals, thesis, internet etc. in respect of various research studies made on the models of teaching have been categories as:

- Studies involving a single model of teaching
- Studies involving two or more models of teaching

3.2 STUDIES INVOLVING A SINGLE MODEL OF TEACHING

Under this category the following research studies have been listed which involves the study related to single model of the teaching.

Saretzky (1975) studied the Facilitative effect of Advance Organizers on Learning with Readers of Differing Reading Ability Levels for Topically Different Prose Passages. He investigated the effect of the use of an Advance Organizer on learning, with learners at different reading ability levels for topically different prose passages. The sample consisted of 288 eighth graders. A $3 \times 3 \times 2$ mixed effect design, Analysis of Variance and a Reading Comprehension test, were utilized. The findings showed that there was no significant difference for use or non-use of advance-organizers. Main effects for reading ability level and for different prose passages were found significant. No interaction effects were significant.

Pandey (1981) studied the teaching style and Concept Attainment in Science. The purpose of his study was to evolved teaching styles on the basis of verbal interaction taking place in the classroom, determine the effect of teaching style on science concept attainment at various levels; to identify the teaching behaviours commonly exhibited by science teachers and determined the effect of individual teaching behaviour on concept attainment at various levels. Sample of 24 postgraduate trained male science teachers having at least five years of teaching experience in secondary and higher secondary schools and 300 secondary schools students studying in class XI from five schools was selected for the study. The tools used for the data collection were the Concept Attainment Test and Instrument for
analyzing verbal teaching behaviour developed by him, Group Test of General Mental Ability. Calculation of percentages, Different Interaction Analysis Ratios, Analysis of Variance and t-test were used to analyze the data.

In this study he found that in science teachers all teaching behaviours were not frequently observed. Extended lecturing was negatively related with different levels of concept attainment and the segment of formal level, excepting for segment of problems and definitions with which it was positively correlated. The teacher's questioning had significant positive effect on both the levels, formal of concept attainment and classificatory. Teaching styles had varying effects on both the levels of concept attainment as well as total concept attainment. Empathic and democratic teaching styles were on par as regards their effect on concept attainment even though the empathic style was slightly superior to the democratic style. Oratorial and traditional styles were inferior to empathic and democratic teaching styles.

Lee (1983) carried out a Study of the effect of students Conceptual Level and Presentation Forms on Concept Attainment. He investigated the interactive effects of the personal traits of conceptual development and the different presentation forms of concept attainment. Sample of 511 male and female 10th grade students was considered for the study. A 2 x 2 Factorial Design was utilized. The findings showed that there was a statistically significant performance difference between instructions based on the definitions and examples and based on the examples only form.

Mahajan (1983) studied the differential effects of Ausubelian Advance Organizers on the learning of students characterized, as formal operational and concrete operational in the Piagetian Paradigm. The purpose of his study was to see whether the effect of Ausubelian Advance Organizers on the learning of formal operational students was any different from their effect on concrete operational students. The sample consisted of 305 physics-students. A 2 x 2 Factorial Design and Analysis of Covariance were used for analysis of the data. It was found that there was a significant interaction between the cognitive level and the absence or presence
of organizers, at least as far as the immediate post-test was concerned. For the two delayed post-test, there was no significant interaction as far as the composite scores or scores on the recall portion of the test were concerned.

Livingston (1984) studied the effect of Advance Organizer and Direct Instruction pre instructional passages on learning and retention for eighth grade students. He investigated the effects of Advance Organizer and Direct Instruction passages for high and low ability eighth grade students in the learning and retention of meaningful verbal material. The sample of 210 eight-grade students was taken for the study. A criterion test, Retention test, A 2 x 2 x 3 repeated measures ANOVA Pearson Product Moment Correlation, Multiple Regression Analysis were used for analysis of the data. The findings showed that there was no statistical difference between the treatment means high ability subjects in the Advance Organizer group achieved significantly higher scores than low ability students in this group on all three occasions.

Antimadas (1986) carried out the study on Effectiveness of Training Strategy in Concept Attainment Model and Personality of Pre-service teacher training. In which he developed the model competor of pre-service teacher trainees by adopting Concept Attainment Model with three different training strategies. He studied the effectiveness of three different training strategies for Concept Attainment Model in terms of model competency of pre-service teacher trainees at the end of coaching stage. The sample consisted of 55 B.Ed. students of Education Department. For collection of the data he used Teaching Analysis Guide. Factorial Analysis of Variance with unequal cell size and one way Analysis of Variance were used for analysis of the data.

He found that the three different training strategies were equally effective in terms of model competency of teacher trainees at the end of training and coaching stage. Some of the personality factors did not influence the model competency of teacher trainees at the end of coaching stage. There was no significant
affect of interaction between some Treatment and Personality factors on model competency of teacher trainees at the end of training and coaching stage.

Bihari (1986) studied the effectiveness of Training Strategy in Learning Concept Attainment Model at B. Ed. Level in terms of teaching competency of student-teachers, understanding of the model, coaching through the model, reaction towards the model and willingness to implement the model. Sample selected was of 55 student-teachers studying in B.Ed. Tools used for the data collection was Theory check up and modified Theory check up, Teaching Analysis Guide, Reaction Scale and Willingness Scale. Analysis of Variance, Analysis of Covariance and t-test were used for analyzing the data. In the study he found that the three training strategies namely peer feedback and practice in quardo, peer feedback and practice in pairs and demonstration followed by practice in quardo were equally effective for developing teaching competence.

Bodolus (1986) studied the use of examined the use of a Concept Mapping Strategy to facilitate meaningful learning for Ninth Grade Students in Science. In which he examined the use of concept mapping, after Novak, as a strategy to facilitate meaningful learning based on a theoretical structure. The sample of 429 students of ninth grade science was considered for the study. Pre-test/Post-test true Experimental design was used. It was found that the experimental and traditional groups did significantly better on the context Post-test than the control group while the experimental group using the mapping process did only slightly better than the traditional group.

Das (1986) studied the effectiveness of Concept Attainment Model in terms of teaching competencies of preservice student teachers. The aim of his study was to study the effectiveness of Concept Attainment Model in terms of understanding the model, training the model, reaction towards the model at various stages of training; coaching the model and the effectiveness of Concept Attainment Model in relation to previous achievement. Sample consisted of 16 student-teachers studying in B.Ed. Reaction Scale, TAG by Bruice Joyce was used for data collection.
He concluded that Concept Attainment Model is effective in developing the teaching competencies of pre-service student-teachers. Training given to student teachers in theoretical aspects of Concept Attainment Model. Training in Concept Attainment Model had effected the teaching behaviour of student-teachers of the coaching stage. There was significant relation of the student-teachers towards the Concept Attainment Model at post theory demonstration and post practice stage. There was effective transfer of training and Concept Attainment Model had affected the teaching behaviour of student-teachers of coaching stage. There was no significant relationship between previous academic achievement of student-teachers and their performance on Concept Attainment Model theory and coaching stage but it seemed that previous academic achievement was related with training of Concept Attainment Model.

McDonald (1986) studied the locus of control and Concept Attainment strategies. He investigated the relationship between locus of control and Concept Attainment strategies. The sample consisted of public middle school children. The Chi-square statistical test and Two Way ANOVA procedure were used for analysis. He found that there were statistically significant differences between locus of control, strategy utilization and number of traits to solution. There was no statistical support for a significant interaction between locus of control and utilized strategy on the number of trials solution.

Panda (1986) studied the comparative study of the effect of Advance Organizer and Set Induction on learning. He determined the effect of AO and set induction on learning from text material of ninth grade pupils; the effect of AO and Traditional Method of teaching on the achievement of ninth grade pupils; and the influence interaction between methods of instruction sex and criterion test. The sample consisted of 60 students. General Mental Ability Test by Jalota, Criterion test prepared by investigator were used for data collection and $3 \times 2 \times 2$ factorial design was employed for analysis. He found that the difference between the mean achievement of pupils studying through AO, set induction and TM were significant.
Sharma (1986) studied the effectiveness of Concept Attainment Model and their reactions in terms of achievement of students on attainment test based on the concepts taught in Chemistry and the effectiveness of Concept Attainment Model in terms of reactions of students towards the new method of teaching. Sample of 67 students of class IX was taken for the study. For data collection Achievement Test for Chemistry concepts, Reaction Scale was used. Chi-square test and t-test were used for analysis of the data. He found that the mean performance of the experimental and control groups on achievement test is not significantly different from each other. Students of experimental group have responded favourably towards majority of the statements.

Gangrade (1987) studied the Comparison of Combination of Concept Attainment Model and Lecture Method with Traditional Method for teaching science to class VII and VIII students. He compared the achievement of science of class VIII students taught through combination of Concept Attainment Model and Lecture Method (LM) with those taught through Traditional Method (TM) by taking separately intelligence, attitude towards science and previous year achievement in science as covariates; the achievement in science of class VIII students taught through combination of Concept Attainment Model and Lecture Method with those taught through Traditional Method by taking separately intelligence, Attitude Towards Science and previous year achievement in science as covariate; studied the contribution of intelligence, attitude towards science, achievement value-anxiety and previous year achievement in science to achievement in science of class VII students taught through combination of Concept Attainment Model and Lecture Method, and the contribution of intelligence, attitude towards science, achievement-value-anxiety, and previous year achievement in science to achievement in science of class VIII students taught through combination of Concept Attainment Model and Lecture Method. The sample consisted of 104 VIIth and VIIIth class students of science. Intelligence test by Prayag Mehta, Science Attitude Scale by Avinash Grewal, Achievement-value-Anxiety Inventory by Prayag Mehta, criterion test previous year
achievement in science were used. For analyzing the data analysis of covariance, regression equation and multiple correlation coefficient were used.

He found that the combination of CAM with LM was significantly superior to Traditional Method in teaching Chemistry to class VII students when, the groups were matched in respect of intelligence, attitude towards science and previous year achievement in science. The combination of CAM with LM was significantly superior to Traditional Method in teaching Physics to class VIII students when the groups were matched in respect of intelligence, attitude towards science and previous year achievement in science. For predicting the achievement in science of class VII students taught Chemistry through combination of CAM with LM regression equation was established. The intelligence was found to be contributing to the extent of 53 percent to the achievement in science. For predicting the achievement in science of class VIII students taught Physics through combination of CAM with LM regression equation was established. The total contribution of intelligence, attitude towards science, achievement-value-anxiety and previous year achievement in science was 74 percent. Out of which intelligence contributed to the extent of 42 percent and attitude towards science to the extent of 25.8 percent.

Rajoria (1987) studied the comparison of Advance Organizer Model with Traditional Method for teaching science to class VIII students with different residential background. She studied the effect of method of teaching, residential background and their interaction on achievement in science of Class VIII students by taking separately intelligence and previous year achievement in science; the contribution of intelligence, attitude towards science, Achievement value-Anxiety and previous year achievement in science to achievement in science of Class VIII students of different residential background taught through Advance Organizer Model and the Traditional Method.

The sample consisted of 114 students of class VIII. Intelligence test, Science Attitude Scale by Avinash Grewal, Achievement value-Anxiety-inventory and Criterion test constructed by herself were used for data collection. 2 x 2 Factorial
Design Analysis of covariance, 2 x 2 x 2 Factorial Design Analysis of Variance with unequal all size, Regression equation and Multiple correlation Coefficient were used for analysis. She found that the Advance Organizer Model was significantly superior to TM in terms of achievement in science of class VIII students when the groups were matched separately in respect of intelligence and previous year achievement in science. Advance Organizer Model was effective and suitable for teaching science to class VIII students belonging to rural as well as urban area. The total contribution of intelligence, attitude towards science, Achievement value-Anxiety and previous year achievement in science to the achievement in science for rural students was 87 percent. Whereas for urban students it was 44 percent. For predicting the performance in science of students taught through Advance Organizer Model belonging to urban and rural areas, the regression equation was established separately for students having rural or urban background.

Satapathy (1987) studied the relative effectiveness of Wholist, Partist and Partist-first Demonstration Approaches in Training Student-Teachers in Advance Organizer Model. He compared the relative effectiveness of wholist, partist and partist-first demonstration approaches in terms of theoretical understanding of the model, competency in model, reaction towards the model and willingness for implementation of the model by taking abstract reasoning as covariate, the change in competency in the model from simulated condition to real condition of student-teachers trained through wholist approach, partist approach and partist-first demonstration approach separately; the change in reaction towards the model from simulated condition to real condition of student-teachers trained through wholist approach, partist approach and partist first demonstration approach separately; the change in willingness for implementation of model from simulated condition to real condition of student-teachers trained through, wholist approach, partist approach and partist-first demonstration approach separately and the competency in the model attained by student-teachers trained through different training approaches by taking theoretical understanding of covariate.
The sample comprised of 36 B.Ed. student-teachers studying in the Department of Education. Abstract Reasoning Test, Indore Theory Check-up, Teaching Analysis Guide, General Reaction Scale and Willingness Scale for Implementation were used for the data collection. For analyzing then data Correlated t-test and Analysis of Covariance were used. He found that the partist and partist-first demonstration approaches were significantly more effective than wholist approach in terms of theoretical understanding of the model when abstract reasoning was taken as covariate whereas partist approach and partist first demonstration approach were equally effective in terms of theoretical understanding of the model when abstract reasoning was considered as covariate. The wholist, partist and partist-first demonstration approaches were equally effective in terms of competency in model of student-teachers both in simulated and real conditions when abstract reasoning was considered as covariate.

The wholist, partist and partist-first demonstration approaches were equally effective in terms of reaction towards the model as expressed by student-teachers in simulated condition when abstract reasoning was considered as covariate. The wholist and partist approaches were equally effective in terms of reaction towards the model while the partist-first demonstration approach was significantly more effective than both wholist and partist approaches in terms of reaction towards the model in real condition when abstract reasoning was considered as covariate. The wholist approach was significantly effective than partist approach in terms of willingness for implementation of the model while the wholist and partist-first demonstration approaches were equally effective in terms of willingness for implementation of the model. But the partist-first demonstration approach was significantly effective than partist approach in terms of willingness for implementation of the model when abstract reasoning was taken as covariate. The wholist, partist and partist-first demonstration approaches were equally effective in terms of willingness for implementation of model in real condition when abstract reasoning was taken as covariate. There was a significant positive change in competency in model of student-teachers trained through wholist-approach and those
trained through partist-first demonstration approach while there was no significant change in competency in the model of student-teachers trained through partist approach from simulated condition to real condition. There was no significant change in reaction towards the model of student-teachers trained through that list approach partist approach and partist-first demonstration approach from simulated to real conditions. The practice conditions significantly influenced on the willingness for implementation of model as expressed by student-teachers. The practice in real conditions influenced willingness for implementation higher than the practice in simulated conditions. The wholist approach and partist approach and the wholist approach and partist-first demonstration approach were to be equally effective in terms of willingness for implementation of model while the partist-first demonstration approach was significantly more effective than partist approach in terms of willingness for implementation of model of student-teachers. The interaction between practice condition and training approach significantly influenced on the willingness for implementation of model of student-teachers. Partist-first demonstration approach was the best approach of training in simulated and real condition as compared to wholist and partist approaches in terms of willingness for implementation of model. In real condition; both wholist and partist approaches produced same impact on willingness for implementation of the model. There was a positive significant change in willingness for implementation of model of student-teachers from simulated to real conditions trained through wholist approach while there was no significant change in willingness for implementation of model of student teachers trained through partist-first demonstration approach from simulated condition to real conditions. The wholist, partist and partist-first demonstration approaches were equally effective in terms of competency in model of student-teachers both in simulated and real conditions when theoretical understanding was considered as covariate.

Agarwal and Misra (1988) studied the effectiveness of Reception Concept Attainment Model of teaching for enhancing attainment of science concepts. In this study he addresses the problem of achievement of science concepts and the students of Class VII, by using the Modified Reception Concept Attainment Model of
Teaching as an effective alternative. The main objective of conducting the study was to investigate the effectiveness of the Modified Reception Concept Attainment Model of Teaching for enhancing the attainment of science concepts.

Random sampling method was adopted to select a sample of 18 students studying in Class VII. The two groups, the experimental group and the control group were formed. The randomized control group pre-test and post-test design, U-test were used as the tools for collection of the data with the findings that the Modified Reception Concept Attainment Model of Teaching was decidedly effective in increasing the knowledge and understanding of science concepts of Class VII students and it helped in students' concept attainment.

Kaushik (1988) planned a study of the long-term effect of Advance Organizers upon achievement in biology in relation to reading ability, intelligence and scientific attitude for his doctoral. The purpose of his study was to investigate the long-term effect of written advance organizers upon the achievement of ninth graders in biology and effect of advance organizers on students of different reading abilities intelligence and scientific attitude. To study the interaction of the study conditions and retentions and the study conditions, levels of reading ability, intelligence, scientific attitude and retention. To study the relative effectiveness of study conditions on immediate ability, intelligence and scientific attitudes as co-variates, and to study the relationship of reading ability, intelligence and scientific attitude with mean achievement scores on immediate and delayed tests, respectively, of other groups, viz. Advance Organizer Model, General Introduction and Traditional Method.

The sample of the study was sixty Class IX students of Kendriya Vidyalaya divided into three groups and each group consisted of 20 students selected randomly. The two experimental groups were the Advance Organizer group and the General Introduction group and the control group was the Traditional Method group and the factorial design of "3 x 3 x 2 was used in this study. The tools used for collection of the data included three standardized tests, viz. Silent Reading Comprehension Test, Verbal Intelligence Test, and Scientific Attitude Test. Thirteen lessons
from the Class IX biology textbook were chosen for study. For each lesson, one Advance Organizer, one general introduction and one retention test were prepared. The experiment continued for 13 days. The retention tests were administered to measure the achievement of students. Different statistical techniques like 't' test, one-way ANOVA, three-way ANOVA, ANCOVA and correlation matrix were used for analysis of data.

He found that the organisation of learning material, employing the principles of progressive differentiation and integrative reconciliation, enhanced as much learning and retention as the Advance Organizers and Advance Organizer's facilitated immediate and delayed learning in Biology. A general introduction or an overview, generally preceding the learning material in the lectures, lessons or textbooks, was of little value as compared to the Advance Organizers. Pupils with high intelligence, reading comprehension and scientific attitude derived the greatest advantage from the presentation of an advance organizer, which profited general learners. The achievement of the learners in Biology was found to be highly positively correlated with their intelligence, reading comprehension and scientific attitude.

Chaudhary (1989) studied the teaching of concepts through the Concept Attainment Model and facts through traditional teaching-competency in teaching skills of pre-service teachers. In his study he addresses the rigidity and lack of variety of the present pre-service teacher training programmes based on microteaching and the Herbatian steps. He investigated that whether student-teachers trained to teach concepts in science through Bruner's Concept Attainment Model would indirectly learn the teaching skills and be equally competent in using such skills to teach facts through traditional teaching. The study was conducted to find out if student-teachers had indirectly learned the teaching skills during college-based peer practice and school-based practice teaching, and to find out if there was any difference in their competency in the various teaching skills during teaching of concepts through the Concept Attainment Model and the teaching of fads through traditional teaching.
The sample of 10 female student teachers of College of Education and Research, with science as one of the methods was taken for the study, which was trained in Concept Attainment Model. For data collection, the Process Appraisal Scale of Teacher Effectiveness and Bruner's Concept Attainment Model were used and the collected data were treated using mean, SD and 't' test.

In this study he found that there was no significant difference in the competency of student-teachers in stating the aim. However, few students showed improvement while teaching during traditional teaching, even though these skills were taught directly. He also observed that two student-teachers had performed better in the skill of questioning and three student teachers performed better in the skill of explaining; one had performed better in the skill of reacting; one had performed better in the skill of stimulus variation; and the students had improved in the skill of evaluation and two student-teachers had improved in the skill of classroom management, and one had better content mastery.

Mujumdar (1989) attempt to develop a cybernetic model of teaching learning process with the objective to find synchronization between input and output such that input changes are needed to achieve the target output. In his study he selected a sample of one hundred and twenty-five students from Class IX and 100 students from class X of a higher secondary school located in a rural area. The learning achievement of the annual examination of Class X and the test examination of Class X in mathematics, physical science and life science were used as the tools of the study. The data were analyzed by using the statistical methods like Mean, SD and 't' tests.

He found that the principle of cybernetics, applied in the teaching-learning for achieving output by students, was described with the following components- input, teaching, performance, evaluation, error-finding and correction. Students made substantial progress in the initial stage when the proposed model taught them.
Martis (1990) studied the developing Making-the-Strange-Familiar competencies through the Synectics Model of teaching in graduate student-teachers and the study of their reactions and the reactions of pupils for his doctoral study. The purpose of his study was to find out the effectiveness of training in the Synectics Model of teaching in developing the theoretical understanding of the model, ‘Making-the-Strange-Familiar’ competencies, favourable reactions towards the model and the general and scientific creativity of graduate student-teachers. To find out the effectiveness of Making-the-Strange-Familiar on general and scientific creativity of high school pupils, the reactions of high school pupils towards Making-the-Strange-Familiar and to suggest measures for incorporating the application of the findings of the study in the form of implementation of Making-the-Strange-Familiar in school education.

The pre-test and post-test parallel-groups design with the experimental and control groups sample belonged to the biology group B. Ed. students, with 12 trainees in the experimental and 12 trainees in the control group. For another objective, a similar design was developed at high school students’ level, with 70 students in the control group and 70 in the experimental group. The tools used for collection of the data were theory check up synectics model of teaching, teaching analysis guide, reaction scale for graduate student-teachers, Raven’s progressive matrices, Torrance test of creative thinking, verbal test of scientific creativity, lesson plan guides and worksheets, verbal test of scientific creativity and reaction scale for high school pupils. The control group graduate teachers delivered the same lessons using the traditional method in the control group classes. Measures of central tendency, percentage, ANOVA and ANCOVA were used to treat the data.

He found that the training in MSF, comprising theory, discusses demonstration and practice, developed making the Strange Familiar competencies generated favourable reactions in student-teachers towards the model and developed the verbal fluency and verbal originality of trainees, non-verbal fluency, flexibility and originality, scientific fluency, flexibility and originality among experimental-group teachers-trainees. These achievements of the trainee given to the teacher-
Trainees in MSF were observed in the development of general and scientific creativity in school students taught by the traditional method. Such achievements were not found among the other high school students where as these achievements were not observed significantly among the control group teacher-trainees. The training in MSF, using lecture and discussion, significantly improved the theoretical understanding of the model, the high school students developed favourable reactions towards the model and the MSF needs to be slightly modified to suit the classroom situations.

Vaidya (1990) carried out a doctoral study on the effect of mastery learning strategy on pupils' achievement, their self-concept and attitude towards Hindi to study the effect of mastery learning and Concept Attainment Model on the learning of Hindi (as a subject) in relation to the traditional method of teaching.

The sample of the study was chosen from Class VI students of higher secondary school and the experimental-control group pre-test-post-test design was used. In all 44 students were selected on the basis of IQ and SES and three groups were given respectively, the treatments of Mastery Learning strategy, Concept Attainment Model and Traditional Method. For collection of data Culture Fair Intelligence Test, SES Scale, Self Concept Test, one Achievement Test and one Attainment Scale prepared by him were used as a tool. All the three groups were taught for 30 minutes for 33 days. For analysis of the data Correlated 't'-test and one-way ANOVA were used.

In his study he investigated that the mastery learning strategy was more effective facilitating learning and raising the achievement of the learners than either the Concept Attainment Model or the traditional method. The Concept Attainment Model group's achievement was significantly higher than that of traditional method group and it was found more effective than the traditional method in developing a positive attitude in students towards the Hindi subject. The mastery learning strategy was more potent in bringing about improvement in the self concept of the pupils than either the Concept Attainment Model or the traditional method and
it was also more beneficial to the pupils in changing their attitudes favourably towards the Hindi subject than either the Concept Attainment Model or the traditional method of instructions. There was no significant difference in the Self Concept scores of students taught through the Concept Attainment Model and the traditional method.

Bawa (1991) conducted research on conceptual learning and research possibilities: Bruner's view. The study centers round concept learning, which is the most important part of academic discipline. Concepts acquired with understanding serve as tools not only for acquisition of new concepts but also for solving problems. Research studies in the area have an obvious bearing on teacher education. Main objectives of his study were to examine critically the concept of conceptual learning, to explain what conceptual learning is, to describe Bruner's ideas on the nature and acquisition of concepts and strategies that can be used in concept attainment, and to describe the Concept Attainment Model based on Bruner's ideas and review the researches conducted during the last six years.

In the study he reviewed all possible sources in the library from among the documented studies. For analysis qualitative methods were used by him. One common characteristic feature running across all the definitions given was that there was an abstraction process in which similarities in objects were stressed and differences in them were ignored. In his study he found that the Concept Attainment Model was more effective than the conventional method for the teaching of concepts, especially at the knowledge and understanding levels, for retention of concepts and for bringing about attitudinal changes.

Gupta (1991) studied the effectiveness of the Advance Organizer Model of Ausubel in developing the teaching competence of student-teachers and their attitude towards teaching as an experiment for his doctoral study and he has assessed the effectiveness of Ausubel's model in developing teaching competence.

The main purpose of his study was to compare the effectiveness of teaching through the Advance Organizer Model of Ausubel and the conventional
method in the simulated condition in development of the teaching competence of student-teachers. To compare the effectiveness of teaching through Advance Organizer Model of Ausubel and the conventional method in real classroom conditions in development of the teaching competence of student-teachers were compared for the effectiveness and to compare the effect of teaching through Advance Organizer Model and the conventional method on the attitude of student-teachers towards teaching.

The sample of the study comprised 100 B.Ed. students of the 1985-86 session, who had offered Hindi as one of the teaching subjects by using the purposive sample procedure. Teacher Attitude Inventory, Teaching Competency Scale of NCERT and Model Assessment Guide were used for collection of the data. The data was analyzed by using Mean, SD and 't'-test. In his study he founds that there existed a significant difference in the teaching competence between the experimental and the control groups of student-teachers. The effect of training on the Advance Organizer Model approach on the experimental group was visible as they had high teaching competence in the simulated condition. It was indicated that the experimental group was better after using the Advance Organizer Model of Ausubel so far as teaching competence was concerned in the real classroom situation. He also observed that there existed a significant difference in the attitude of the experimental and control groups of student-teachers. There was the effect of the Advance Organizer Model approach on the attitude of the experimental group of student-teachers.

Manocha (1991) carried out a doctoral study of development of textual material in Biology for Class IX using Bruner's Concept Attainment Model teaching. The main purpose of his study was to develop textual material on Biology concepts for Class IX on Bruner's Concept Attainment Model of teaching and to determine the comparative effectiveness of the developed textual material in terms of Reception vs. Traditional, Selection vs. Traditional and Reception vs. Selection strategies.

The sample of the study consisted of class IX students of a higher secondary school and the pre-test - post-test control experimental group-design was
used. The number of samples in the Experimental Group I and Group II and the Control Group were 36, 36 and 32, respectively. The tools developed by the researcher Achievement Test, Student Willingness Reaction Scale and Willingness Scale for Teachers and Reaction Scale of Concept Attainment Model for Trainee Teachers were used for data collection. The statistical methods used for the analysis of the data were Mean, SD, t'-tests, and ANCOVA.

In his study, he found that the reception strategy of Concept Attainment Model was significantly superior to the conventional group when matched on the pre test achievement scores. The Concept Attainment Model was found to be significantly superior to the conventional method in teaching Biology to Class IX students when compared to the pre-test achievement scores. The selection strategy was superior to the conventional group when matched on the pretest achievement scores and there was no significant difference between selection and reception strategies with respect to achievement scores. He also observed that the pupils' reactions to reception and selection strategies were highly favorable and the teachers' reactions to and willingness for the Concept Attainment Model were highly favourable.

Pal and Misra (1991) studied the effect of jurisprudential strategy of teaching on the development of social consciousness and ability to solve value conflicts to study the effectiveness of these two strategies, i.e. Jurisprudential Inquiry Teaching and Individualized Jurisprudential Inquiry, and the predictors of gains in social consciousness and value-conflict solution ability.

The objectives of his study were to study the effectiveness of Jurisprudential Inquiry Teaching and Individualised Jurisprudential Inquiry for developing social consciousness and for developing value conflict solution ability. To find out whether Jurisprudential Inquiry Teaching is more effective than Individualised Jurisprudential Inquiry for developing social consciousness and developing value conflict solution ability, to find out whether social coincidence gain scores and value-conflict solution ability gain scores are related to deprivation,
intelligence, personality traits and pre-test social consciousness scores, and to find out the extent to which present social consciousness, intelligence, deprivation, and personality traits contribute to the development of social consciousness and value-conflict solution ability among students exposed to Jurisprudential Inquiry Teaching and Individualised Jurisprudential Inquiry.

A purposive sample of 153 girls was selected from students studying in Class IX of two schools. The tools included social consciousness test and the value conflict solution ability test developed by himself, Cattell’s cultural fair intelligence test, personality questionnaire, D-scale and Pre-test-post-test experimental control group design were used for the collection of data. Mean, S.D., ‘t’ test, Analysis of Variance and product-moment correlation were computed for the analysis of the data.

He found that Jurisprudential Inquiry Teaching was effective for developing overall VCSA and overall social consciousness it was more effective than Individualized Jurisprudential Inquiry for developing students' overall VCSA as well as its four dimensions and also for developing social consciousness as well as its three dimensions. Exposure to Jurisprudential Inquiry Teaching brought about improvement in students' ability to identify value conflicts, and in their social reasoning. He also experienced that development of VCSA among students exposed to Individualized Jurisprudential Inquiry was negatively related to adaptability and relatively related to prescribed VCSA and exposed to Jurisprudential Inquiry Teaching was positively related to crookedness and negatively related to pre-test. Development of social consciousness among students exposed to Jurisprudential Inquiry Teaching was positively related to tolerance and negatively related to initiative and pre-test DSC status when students were exposed to Individualized Jurisprudential Inquiry. Gains in the capacity to guess problem were negatively related to deprivation and pre-test guess problem status and positively related to intelligence. Development of social consciousness among students exposed to Individualized Jurisprudential Inquiry could be predicted from initiative and pre-test status on social consciousness and a training strategy consisted of seven phases was developed which could be used for training teachers to use a teaching strategy.
Pandey (1991) studied the instructional and nurturant effects of the Jurisprudential Inquiry Model of Teaching for his doctoral study he undertaken the study to validate the Jurisprudential Inquiry Model of Teaching in terms of its effectiveness to produce expected instructional and nurturant effects in producing expected instructional and nurturant effects.

He conducted pilot study on 20 randomly selected students of Class IX and the pre-test control group design was used with the main experiments on a sample of 84 students of Class IX. The pre-test-post-test single-group design was used. For the collection of the data researcher constructed the measures of dependent variables, viz. Social Value, Jurisprudential Inquiry Ability and Socio-economic Status, Socioeconomic Index and Raven's Standard Progressive Matrices were used as tools. Mean, SD, ‘t’-test and ANCOVA on 3x2 factorial design were used to analyse data.

He found that Jurisprudential Inquiry Model of Teaching was effective for the development of social values, viz. justice, liberty, equality, fraternity, seclusion, and tolerance; jurisprudential inquiry abilities and sociometric status. The sociometric status of accepted pupils did not suffer and deterioration as a result of exposure to Jurisprudential Inquiry Model of Teaching sessions and development of values of equality and secularism was affected favourably intelligence. Interaction SES and intelligence affected the development of the value of justice and the effect of intelligence was favourable to the development of jurisprudential inquiry ability (overall) and nine component abilities- ability to solve definitional questions, ability to identify value-conflicts, ability to take a position, ability to justify one's position, ability to assume arguments of others, ability to predict consequence, ability to suggest analogies, ability to assess one's value over another value and ability to qualify one's position. The development of two abilities, i.e. ability to take position and ability to justify one's position were favourable by the high SES level and interaction effect was found to be significant in the development of students' ability to justify his/her position.

Khan, Siddiqui (1992) studied the effectiveness of Concept Attainment
strategies: A review of research in which the study reviews the researches in the area of Concept Attainment at different levels. His study was related to review the research studies conducted in India and abroad in the area of Concept Attainment, its strategies and factors affecting it. The author reviewed the studies conducted earlier in India and abroad on Concept Attainment strategies at different levels. After classifying them into two broad categories, i.e. selection strategies and reception strategies, the author also touched upon their effectiveness for learning.

He found that all concepts possessed at least four components: attributes, examples, definitions and hierarchical relations. The factors that affected the selection strategies and reception strategies to attain concepts were definition of task; nature of the instances encountered; nature of validation; anticipating consequences of categorizing and nature of imposed restrictions. He also observed that the concept attainment strategies were more effective over the traditional approach in teaching, personality factors were no significant effect on the concept attainment process and disjunctive concepts were significantly more difficult than the attainment of conjunctive concepts. Concept Attainment strategies were responsive to the needs of the disadvantaged learners in problem solving situations and attainment of concepts.

Aloni (1993) carried out an experimental study of effectiveness of Inquiry Training Model for developing Scientific Attitude among school children. The aims of her study were to ascertain the extent to which Traditional Methods of teaching develop Scientific Attitude among school children and to determine the effectiveness of Inquiry Training Model for developing various dimensions of Scientific Attitude among school children. To determine the extent to which Inquiry Training Model is capable of developing Scientific Attitude among school children.

A sample of 300 students was chosen for the study from IX class student from three schools. The students were taught through the Inquiry Training Model and Traditional Method of Teaching and Scientific Attitude Scale developed by herself were administered on the sample with pre-test-post-test scores for
collection of the data. For analysis of the data various statistical techniques like mean, S.D. and one tailed test of significance were used. In her study she found that the Traditional Method of Teaching were not much effective in developing Scientific Attitude and intellectual honesty among school children. The Inquiry Training Model was effective in developing various dimensions of Scientific Attitude and it was observed that all the dimensions were not developed equally. It was concluded that empiricism, openness and curiosity were the dimensions of Scientific Attitude, which were developed to a small extent. Inquiry Training Model was superior to Traditional Method of Teaching for developing Scientific Attitude among the children.

Pandey and Purohit (1993) carried out his study through the research paper on Advance Organizer Model: Does it facilitate learning outcomes? The aim was to investigate the efficacy of Advance Organizer Model in comparison to Traditional Teaching Method for learning outcomes in educational psychology of B.Ed. students. Sample of 52 B. Ed. girls students were considered for the study. For data collection the investigator a Criterion Test which was administered on the students. The data was analyzed using one-way analysis of Covariance. They found that the Advance Organizer Model was superior than Traditional teaching Method for achievement, knowledge achievement and facilitating of educational psychology to B. Ed. students.

Sivakumar and Prema (1997) studied the effectiveness of Suchman's Inquiry Training Model in learning Biology. The objectives of the study were to develop packages based on Suchman’s Inquiry Training Model for the topics Genetic, Ecology and Evolution, to apply these packages in the teaching of Biology on IX standard level, to test the effectiveness of this model by conducting an experimental study and to find out the comparative effectiveness of teaching strategy based on Suchman’s Inquiry Training Model over the conventional teaching method.

The sample consisted of 200 students and I.Q. test developed by Dr. Ahuja was administered to the students for selecting a homogeneous group.
Experimental group and the control group were given Suchman's Inquiry Training Model and conventional method of instruction respectively. For the collection of data pre-test-post test scores were used through the stimulated questioning strategy towards the goal. Mean, S.D. and t-test were used for the analysis of the data.

They found that Suchman's Inquiry Training Model significantly improves the achievement of the learner in Biology and found more effective than teaching based on the conventional method.

3.3 STUDIES INVOLVING A TWO OR MORE MODELS OF TEACHING

Under this category the following research studies have been listed which involves the study related to two or more models of teaching.

Chitrive (1983) carried out the study on evaluating differential effectiveness of Ausubel and Bruner strategies for acquisition of concept in Mathematics for Ph. D. The purpose of his study was to ascertain comparative effectiveness of Ausubel strategy with traditional strategy and Bruner strategy with traditional strategy on the various criteria of concept acquisition in Mathematics, to ascertain relative effectiveness of Ausubel and Bruner strategies on the various criteria of concept acquisition in Mathematics. To ascertain individual and relative effectiveness of Ausubel strategy and Bruner strategy in the acquisition of concept in Mathematics separately for the students of different conceptual style preferences.

Sample consisted of 127 eleventh grade students of science stream. Raven's standard Progressive Matrices, Cognitive Style Test, Previous Knowledge Test, Concept Knowledge Test Concept Transfer Test, Heuristic Transfer Test, Concept Retention Test-I, Concept Retention Test-II, Observer's Rating Scale, Observer Raters, pre and post-testing were used for data collection and Analysis of Covariance was used for analysis of the data. He found that Ausubel strategy was superior to traditional strategy for teaching mathematical concepts to Xth grade students, so far as knowledge transfer and heuristic transfer of the concepts were
concerned. Ausubel strategy was superior to traditional strategy for teaching mathematical concepts to Xth grade students, so far as knowledge, heuristic transfer, short-term retention, and long-term retention of the concept are concerned. Ausubel and Bruner strategies were equally effective for teaching mathematical concepts to Xth grade students so far as student ability to acquire knowledge to the concept was concerned. Ausubel strategy was superior to traditional strategy for teaching mathematical concepts to Xth grade students so far as enhancing concept transfer was concerned. Bruner strategy was superior to Ausubel strategy for teaching mathematical concepts to Xth grade students so far as students abilities to transfer, heuristics discover new relationship and to retain knowledge of the concept learnt for short as well as long period of time were concerned.

Passi, Singh and Sansanwal (1985) studied the Effectiveness of Strategy of Training in Models of Teaching in terms of understanding, Reactions and willingness of Teacher Educators. They used Concept Attainment Model and Inquiry Training Model in terms of understanding of, and reaction towards to model and the resultant willingness of teacher educators to implement the models in teacher education programme. For collection of the data he developed and finalised the measurement tools namely, theory check up and reaction scale separately for Concept Attainment Model and Inquiry Training Model and a Scale measuring willingness to implement the models and developed a strategy of training in Models of Teaching. They used theory check up and reaction scale for Concept Attainment Model and Inquiry Training Model. For analyzing the data the tools used were the mean, SD, Frequency Distribution, Coefficient of Variation, Rank Correlation, t-test, Coefficient of Correlation, Percentage and Chi-square test.

They found that training in Concept Attainment Model in the form of lecture, demonstration, discussion and peer practice feedback did enhance the understanding and favourable change of teacher-educators theoretical aspect of Concept Attainment Model. The level of understanding of Concept Attainment Model did not influence teacher-educators reactions towards Concept Attainment Model; Training in Inquiry Training Model in the form of lecture, demonstration,
discussion and peer practice feedback did change the understanding and favourable reactions of teacher educators' theoretical aspects of Inquiry Training Model. The understanding of Inquiry Training Model did not influence teacher-educators reactions towards Inquiry Training Model also the teacher educators were willing to implement models of teaching in teacher education programme if the support system is available.

Budhisagar (1986) studied Development and Comparison on Instructional Material developed by using Advance Organizer Model and Operant Conditioning Model for Teaching. She studied the effect of treatment, intelligence, attitude towards coaching profession and their interactions on overall achievement of students; the effect of treatment, intelligence, creativity and their interaction on overall achievement of students; the effect of treatment, personality, creativity and their interaction on overall achievement of students; the effect of treatment, attitude towards teaching profession, personality and their interaction on overall achievement of students; the effect of treatment, attitude towards teaching profession, creativity and their interaction on overall achievement of students; the change in reaction of students towards instructional material and the students reaction towards instructional materials with respect to their level of intelligence, creativity, personality and attitude towards teaching profession.

The sample consisted of 139 student-teachers in the Department of Education. The tools used for data collection were Standardized tests, Achievement test developed by herself, Culture Fair (or Free) Intelligence Test, Non Language Test of Verbal Intelligence, Allahabad Intelligence Test, Verbal Intelligence Test, A Group Intelligence Test, Progressive Matrices and Advance Progressive Matrices, Attitude Towards Teaching Professional Scale, Non Verbal Test of Creative thinking, Verbal Test of Creative Thinking, Tests of Creativity, Torrance Tests of Creative Thinking, Extroversion-Introversion and Personality Inventory. Mean, Standard Deviation, Percentiles, Analysis of Covariance, 3 x 2 x 2 Factorial Analysis of Variance with unequal cell size; and Chi-square were for analyzing the data.
She found that the instructional material based on operant conditioning model is PLM and that based on Advance Organizer Model, were effective in terms of achievement of students on different criterion tests and reaction of students. The instructional material based on operant conditioning model as well as Advance Organizer Model was significant superior to the Traditional Method and the instructional material based on Operate Conditioning Model and that based on Advance Organizer Model were equally effective when students' mean achievement scores were adjusted with respect to intelligence. On the other hand, when the overall mean achievement scores of students were not adjusted with respect to intelligence then instructional material based on Advance Organizer Model was found to be significantly superior to instructional material based on Operate Conditioning Model. But instructional material based on Advance Organizer Model as well as Operate Conditioning Model were significantly superior to the Traditional Method. Intelligence was found to be effective significantly the overall, achievement of students.

Dulton (1986) studied the Taught Process of teachers when practicing two models of teaching. The objectives of his study were to learn about teachers thinking processes as they attempted to implement in their classrooms two recently acquired models of teaching (Concept Attainment and Synectics) and to investigate the relationship of those processes to their success in transferring the new models of teaching into their active teaching repertoire.

The sample consisted of ten teachers with no previous experience with either the Concept Attainment teaching strategy or the synectics strategy, two teachers with three years of experience in using both strategies. A Semi structured Simulated Recall Interview and Transcripts of the Simulated Recall Interview were used. He found that teachers using these two strategies report nearly twice as many thoughts related to both goals/objectives and instructional procedures.

Passi, Singh and Sansanwal (1986) carried out the study on Implementing Training Strategies and studying effectiveness of different variations in
components of Training Strategy for Concept Attainment Model, Inquiry Training Model in terms of understanding, competence, reactions and willingness of student-teachers. They compared the understanding of student-teachers belonging to standard Model Treatment Group (E1), group having variation in PPF (E2), group doing PPF in Pairs (E3), the competency, in the beginning of PPF of student-teachers belonging to E1, E2 and E3 groups; the competency at the end of PPF of student-teachers belonging to E1, E2 and E3 groups; the reactions towards Concept Attainment Model of student-teachers (as trainee learner) belonging to E1, E2 and E3 groups; understanding of student-teachers belonging to standard Model Treatment Group (E1) with the group having variation in PPF (E2); the competency in the beginning of PPF of student teachers belonging to E1 and E2 groups; the competency at the end of PPF of student-teachers belonging to E1 and E2 groups; and the reactions towards Inquiry Training Model of student-teachers (as trainee-learner) belonging to E1 and E2 groups.

Sample of 321 student-teachers for Concept Attainment Model and 72 for Inquiry Training Model were taken. Theory check up (Broice), Theory check up (Indore); Reaction Scale’ for Concept Attainment Model (RS1 for Trainee learner). Teaching Analysis Guide and Pre- and post-test parallel group design were utilized for collection of the data. They found that (i) Mean achievement scores on Theory check up (Indore) of E1, E2 and E3 groups differed significantly when scores on Theory check up (Broice) were used as covariate student-teachers belonging to E2 groups had significantly higher understanding of theoretical aspect of Concept Attainment Model as compared to student-teachers of E1 and E3 groups. E1 and E3 groups understood the theoretical aspects of Concept Attainment Model to the same extent. (ii) Mean TAG scores of E1, E2, and E3 groups differed significantly by adjusting Theory Check up (Indore) scores as covariate. The student-teachers of E2 group attained significantly higher competency in the beginning of PPF. E1 and E3 groups had equal level of understanding of the theoretical aspect for Concept Attainment Model. In decreasing order of competency, the groups are E2, E1 and E3 (iii) Groups had differential competency at the end of PPF. Mean competency score
of E2 group was significantly higher than that of E2 and E3 groups, so student teachers of E2 group attained higher competency at the end of PPF in comparison to El and E2 groups. El and E3 groups attained competency to the same extent at the end of PPF. El group attained higher competency as compared to E3 group in the beginning of PPF. (iv) El, E2 and E3 groups had differential reactions at the end of theoretical presentations and in the beginning of PPF. Mean reaction score of E3 group is significantly lower than that of El and E2 groups. The reactions of all the three groups were favourable as evident from the mean reaction scores. Reactions of El and E2 groups were same. (v) The mean achievement scores of El and E2 groups did not differ significantly. (vi) Student-teachers of El and E2 groups attained competency in Inquiry Training Model to the same degree after viewing demonstrations and having understood the theory. (vii) The mean adjusted competency scores of HI group were significantly higher than that of E2 group. The treatment given to El group was superior to the treatment given to E2 group in terms of competency attained at the end of PPF. (viii) The mean scores of reaction towards Inquiry Training Model El and E2 groups did not differ significantly. Student teachers of both El and E2 groups had equally favourable reactions towards Inquiry Training Model.

Sushma (1987) studied the effectiveness of Concept Attainment Model and Biological Science Inquiry Model for teaching biological sciences to VIII class students. She studied the effect of these models on pupils achievement, the effectiveness of Concept Attainment Model, Biological Science Inquiry Model and Traditional Method to teaching on pupil achievement, the effect of Concept Attainment Model based teaching on pupils attitude towards Biological Science, the effect of Biological Science Inquiry Model based teaching on pupils attitude towards Biological Science and the difference in change in attitude towards Biological Science when taught through different models of teaching (Concept Attainment Model and Biological Science Inquiry Model).

The sample consisted of 102 girls of class VIII. Samanya Mansik Yogyata Parikshan, Socio-Economic Status Index Scale, Uplabdhi Parikshan, Jeev
Vigyan Ke Prati Chhatra Abhivriti Mapan Suchi were used for data collection. Analysis of Variance, F-Ratio and t-test were utilized for analysis. He found that Concept Attainment Model was effective for teaching Biological Sciences to VIII-class students Biological Science Inquiry Model was effective for teaching biological sciences to VIII-class students. The three different teaching strategies had different effects on pupil achievement in biological science Concept Attainment Model was more effective than Biological Science Inquiry Model when students achievement in Biological Science was taken.

Bhaveja (1989) carried out an experimental study of information-processing models of teaching in schools of India for his Ph. D., which was an investigation into the effectiveness of the information-processing models of teaching designed to teach concepts inductively, taking concept-attainment, retention and development of inductive mental processes as the measures of effectiveness. The purpose of his study was to analyze the thinking strategies or concept-building strategies used by learners of the group exposed to the model, based programme of teaching in terms of Bruner’s ideal thinking strategies, to identify the most effective strategies of thinking from among the strategies used by the subjects, to identify the instructional conditions which favour selection of the most effective thinking strategies and to determine the role of this model in developing inductive thinking in terms of the ability to form conceptual systems, abstractions or generalizations from discrete bits of information.

The purposive sampling method was used for selecting a sample in which 99 students (29 girls and 70 boys) were distributed among the experimental and control groups. They were further divided into two groups. Raven’s Progressive Matrices (Advanced) a Criterion Test developed by himself and an Interview Schedule and developed in the affective domain were used as the tools for data collection. Mean, SD. t-test and chi-square were used to analyze the data.

He investigated that subjects which were exposed to the teaching programme based on information-processing models of teaching, viz. Concept-
Attainment And Inductive Thinking, demonstrated significantly higher mean values on concept-attainment, as compared to the mean values achieved by the subjects who were exposed to the traditional teaching programme. On comparing the mean scores of experimental and control groups, obtained on delayed post-tests, it was found that subjects who were exposed to model based teaching programme achieved a significantly higher mean value than the subjects who were exposed to the traditional teaching programme. Subjects who underwent the model-based teaching programme formed a significantly greater number of complex categories (conceptual system) as compared to the subjects of the control group who experienced the traditional teaching programme. It was found that in the final inductive-thinking lesson significantly greater numbers of higher-order generalisations were made (Interrelating the concepts formed and extrapolating (going appreciably beyond what is given)). This suggests that the inductive-thinking model was effective for teaching inductive mental process requiring extrapolation, i.e. proceeding from specific data to generalization and the mean values obtained on the number of categories formed and the number of abstract concepts formed in the final inductive-thinking lesson were significantly higher than those formed in the initial lessons.

Singh (1990) studied the effectiveness of Inquiry Training Model and Concept Attainment Model over traditional teaching methods for teaching physical science for his doctoral study. In this study he investigates the comparative effect of the two models of teaching compared to the traditional method in terms of gain in achievement scores and change in attitude of the pupils towards physical sciences to study and compare the effectiveness of Inquiry Training Model, the Concept Attainment Model and the Traditional Method of teaching on pupils’ achievement, and to study the relationship of intelligence with achievement, and attitude with achievement.

The method of cluster two-stage random sampling was used to form the three groups of 120 students selected from three colleges. These Class IX student-groups were matched on intelligence and socio-economic status scores. Non-randomised control-groups pre-test-post-test quasi-experimental design was used.
The tools used for data collection included Mental Ability Test, SES Scale, Achievement Test and Attitude Scale developed by him. Mean, SD, 't' tests, ANOVA and product-moment correlation were used to analyse the data.

He found that two groups taught through Inquiry Training Model or Concept Attainment Model scores more in post-test achievement than the pre-test scores, but Traditional Method of teaching was not effective, which resulted into the achievement gain scores of both the Inquiry Training Model and Concept Attainment Model groups were higher than the Traditional Method of teaching group. But there was no significant difference between gain scores of achievement when taught through Inquiry Training Model and Concept Attainment Model.

He also observed that there was a significant difference between pre-test and post-test scores of attitude when taught through Inquiry Training Model and Concept Attainment Model, but not in the case of Traditional Method of teaching and both Inquiry Training Model and Concept Attainment Model were equally effective in inculcating a more favourable attitude towards physical sciences than Traditional Method of teaching. There appeared significant relationship between intelligence and academic achievement and between attitudes towards physical sciences with achievement in these.

Sood (1990) carried out the study for his doctoral on comparison of Advance Organiser and Reception Strategies for acquisition of language concepts in relation to cognitive style, intelligence and creativity. The purpose of his study was to study whether Strategies of Concept Attainment and Advance Organiser Model affect acquisition of concepts, whether there is any interaction between strategies of teaching concepts and intelligence level of learner, whether there is any interaction between strategies of teaching and cognitive style and whether there is any interaction between strategies of teaching concepts and the creative level of the learner. He also tries to study whether acquisition of concept by the learner and his creativity are independent of each other and whether students possessing different cognitive styles and intelligence levels differ in acquiring concepts.
The sample consisted of 288 students of Class IX belonging to five schools randomly selected and divided into two groups. Group I were taught through Concept Attainment Model, and Group II taught through Advance Organizer Model. The tools used for data collection were included Group Test of General Mental Ability, Torrance's Test of Creativity, Group Figure Embedded Test and a test to measure the Achievement of Concepts developed by him. The collected data was analyzed using descriptive statistics such as Mean, Median, Standard Deviation, Skewness and Kurtosis. To test hypotheses, the Analysis of Variance (2x2x2x2) measure and 't'ratios to test the significance between means were employed.

In his study he found that the Concept Attainment Strategy was found to be a more effective method of teaching Hindi concepts as compared to the Advance Organizer Strategies, intelligence creative levels and cognitive style were reduced factors so far as learning of concepts in their language was concerned and highly creativity field-independent students scored high comparison to high-creative as well as the creative field-dependent students.

He also found that the dependent low-creative students achievement significantly higher than field-independent high-creative students, there was no significant interaction between teaching model, cognitive style and intelligence levels; teaching high levels of intelligence and levels of creative teaching model, cognitive style and high creativity and cognitive style, levels of intelligence and level of creativity and the interactions having the variables of teaching model and intelligence level were found to be insignificant. The students taught with Concept Attainment Model retained much score in comparison to those taught with Advance Organizer Model. The field-independent students retained more than the field-dependent students. High intelligence students retained more than low intelligence students and creativity acted as an independent factor towards retention of scores.

Jaimini (1991) carried out the doctoral study on the effect of teachings strategies on conceptual-learning efficiency and retention in relation to divergent thinking in which he investigates the effect of two major teaching strategies and their
interaction with creativity on learning outcomes in terms of learning efficiency and retention.

The purpose of his study was to study the relative effectiveness of teaching through the Advance Organizer Model, Concept Attainment Model and Conventional Model on conceptual learning efficiency, retention of concepts. To compare the performance of the pupils on conceptual learning, and retention of concepts in relation to their divergent thinking.

The purposive sampling method was used to select three sections of Class IX Secondary School, the quasi experimental, non-equivalent control-group design was used. He used pre-test and post-test design with two experimental groups in two strategies, i.e. Advance Organizer Model and Concept Attainment Model, and one control group. The tools used for data collection were included Standard Progressive Matrices, Test of Creative Thinking and Criterion Tests developed by him. For analysis of the data ANCOVA was used.

He found that Advance Organizer Model and Concept Attainment Model were equally effective in concept learning and both of these models were more effective than the conventional method in fostering conceptual learning efficiency in terms of comprehension and application. Interaction of teaching strategies and divergent thinking was significant in the concept-learning of pupils, the concept retention of the pupils was not significantly influenced by their divergent thinking ability rather, teaching strategy significantly influenced it and Advance Organizer Model was more effective than Concept Attainment Model in the retention of concepts by the pupils of high as well as low divergent thinking.

Kaur (1991) studied the effectiveness of the Bruner and the Ausubel models for teaching of concepts in economics to high & low achieving students across creativity level for his doctorate. The purpose of his study was to determine the teaching effectiveness of Bruner's Concept Attainment Model, Ausubel's Advance Organizer Model and conventional teaching in the teaching of concepts in economics
in relation to the various levels of academic achievement and creativity of student. To compare the teaching effectiveness of Bruner's Concept Attainment Model and Ausubel's Advance Organizer Model, Bruner's Concept Attainment Model and the conventional method of teaching. To compare Ausubel's Advance Organizer Model and the conventional method of teaching and to have these three comparisons in relative in different levels of academic achievement and creativity.

The sample comprised female senior secondary students of Class XI, who were selected through the convenient-purposive sampling technique. The three groups, two experimental and one control, were matched with respect to age, intelligence, socio-economic status, and pre-test criterion scores and the pre-test-post-test control-group quasi-experimental design was used. For collection of the data the tools used included the Criterion Test, three Lesson Plans, Torrance Test of Creativity –Verbal test and Tandon's Group Test of creativity, Mental Ability, Social Class Scale. One-way and three-way (3x2x2) for ANCOVA and 't'-test was used to analyze the data.

He found that the results of one-way ANCOVA revealed a statistically significant difference between students who had been taught through Bruner's Concept Attainment Model, Ausubel's Advance Organizer Model and traditional teaching with respect to the scores in attainment of concepts in economics; also Ausubel's Advance Organizer Model was more effective than conventional teaching; further Ausubel's Advance Organizer Model was more effective than conventional teaching' whereas no statistically significant difference was found in effectiveness of the two experimental groups. While applying three-way ANOVA (3x2x2) to the scores in concept learning in economics having 120 students, a statistically significant difference was found between the three teaching approaches where Ausubel's Advance Organizer Model was found to be more effective than Bruner's Model; Bruner's Model was more effective than the conventional method and Ausubel's Model was more effective than the conventional method. He also found that neither academic achievement nor creativity affected the gain scores of subjects pertaining to the attainment concepts in economics, the interactions between teaching approaches
and academic achievement, between teaching approaches and creativity, and between academic achievement and creativity were not significant where as the interaction between teaching approaches, intelligence and creativity was not significant.

Passi, Singh and Sansanwal (1991) conducted an independent study on models of teaching a report of the three-phase study of Concept Attainment Model and Inquiry Training Model. In this study he addresses the problems utilities of two different models, viz. the Concept Attainment Model and the Inquiry Training Model, to provide training to teacher educators in different models of teaching, to test the efficacy of the training strategy adapted for training in models of teaching, to study the extent to which models of teaching can be incorporated as an integral part of teacher training programmes in India and also to see the feasibility of the application of the models in the Indian classrooms.

He took a sample of three types containing 45 teacher-educators from institutions located in 11 States, 393 student-teachers from 16 collaborating secondary teachers from training institutions and more than 2500 pupils belonging to different schools of various states in the country as phase I for Workshop-based study on Development of Training Strategy related to Concept Attainment Model/Inquiry Training Model, Phase II for college-based study related to Concept Attainment Model/Inquiry Training Model and Phase III for school-based study related to Concept Attainment Model/Inquiry Training Model. Each of the three phases was taught through the two models of teaching, namely, the Concept Attainment Model and the Inquiry Training Model. The training strategy at Phases I and Phase II contained theory of the models and testing the understanding of the theory, demonstration of the model and Teaching Analysis Guide based observation, the explanation of Lesson Plan Guide, LPF and worksheet formation of Lesson Plan Guide, LPF and worksheet, and Peer Practice Feedback quadro and in pair. Where as the treatment in Phase III contained employed coaching conducted through Peer-Pair Practice Feedback in actual classroom teaching. The dependent variables related to understanding of the theory of the model tested through theory check-up, reaction towards the model tested through a locally developed Reaction Scale, willingness to
development the model assessed through a locally designed willingness scale and testing acceptance to use the specific models assessed in the help of a Teaching Analysis Guide. The data at each phase was collected and analyzed by employing content analysis and appropriate statistical techniques. In general, chi-square, F-test, and 't'-test were employed for the analysis of the data.

Findings of the study were categorized as phase wise:

Phase One - Training on Concept Attainment Model/Inquiry Training Model in the form of lecture, demonstration, discussion and peer-practice feedback did enhance the understanding of teacher-educators about the theoretical aspects of to Concept Attainment Model/Inquiry Training Model. The training in to Concept Attainment Model/Inquiry Training Model did bring about significant favourable change in teacher-educators reactions towards to Concept Attainment Model/Inquiry Training Model and the understanding of to Concept Attainment Model/Inquiry Training Model did not influence teacher-educators reactions towards to Concept Attainment Model/Inquiry Training Model. The teacher-educators were willing to implement the models of teaching in the teacher education programme if the support system was available. The training strategy, comprising of theoretical discussion, demonstration and peer-practice feedback in quadro, were found effective in terms of developing understanding, favourable reactions and willingness to implement the models of teaching.

Phase Two- The student-teachers belonging to E1, E2 and E3 groups had differential understanding of the theoretical aspects of Concept Attainment Model. More specifically, the student-teachers belonging to E2 group had significantly higher understanding of the theoretical aspects of Concept Attainment Model than student-teachers of E1 and E3 groups. On the other hand student-teachers of E1 and E3 groups had understood the theoretical aspects of Concept Attainment Model to the same extent where as the student-teachers of E1 as well as E2 groups understood the theoretical aspects of Inquiry Training Model to the same extent.
The student-teachers belonging to E1, E2 and E3 groups had differential model competency in Concept Attainment Model. More specifically, E2 group was significantly higher in competency than E1 and E3 groups in the beginning of PPF. E1 group was significantly higher in competency than E3 group and the student-teachers of E1 and E2 groups attained competency in Inquiry Training Model to the same degree in the beginning of PPF-viewing after demonstrations and having understood the theory.

The student-teachers belonging to E1, E2 and E3 groups had differential competency in Concept Attainment Model at the end of the PPF. More specifically, E2 attained higher competency in comparison to E1 and E3 groups. On the other hand, E1 and E3 group attained competency to the same extent at the end of PPF and the student-teachers of E1 groups attained significantly higher competency in Inquiry Training Model at the end of PPF as compared to student-teachers of E2 group.

The student-teachers belonging to E1, E2 and E3 groups had differential reaction towards Concept Attainment Model. Specifically, E1 and E2 group had higher favourable reaction towards Concept Attainment Model as compared to E3 group. On the other hand E1 and E2 groups had equally favourable reactions and the student-teachers of both E1 and E2 groups had equally favourable reactions towards Inquiry Training Model.

Phase Three-The student-teachers of E1, E2 and E3 groups attained differential competency in Concept Attainment Model at the beginning of the coaching in school. The student teachers of E2 group had significantly higher competency at the beginning of the coaching stage as compared to E1 and E3 groups. On the other hand, both E1 and E3 groups had competency at the beginning of the coaching stage to the same degree. The student-teachers of E1, E2 and E3 groups attained differential competency at the end of the coaching in school. The mean competency score on TAG of E3 group is significantly lower than that of E1 and E2 groups. On the other hand, E1 and E2 groups attained competency to the same degree
where as the student-teachers of both E1 and E2 groups taught through Inquiry Training Model with equal competency.

The student-teachers of E1, E2 and E3 groups had favourable reactions towards Concept Attainment Model and that of the student-teachers of both E1 and E2 groups had equally favourable reactions towards Inquiry Training Model. The student-teachers of E3 group had higher willingness in comparison to E1 an E2 groups, but the willingness of E3 group was neutral. On the other hand, E1 and E2 groups had equal but negative willingness towards Concept Attainment Model. The student-teachers of E1 and E2 group were not willing to implement the Inquiry Training Model of the same degree. Students taught by E3 group had significantly higher favourable reactions towards Concept Attainment Model as compared to students taught by E1 and E2 groups. On the other hand, the students taught by E1 and E2 groups the student-teachers had equally unfavourable reactions and the school-student had unfavourable reactions to the same extent towards Inquiry Training Model.

Gupta (1992) carried out a study of relative effectiveness of some information processing models of teaching on mental processes and attitude towards science for Ph. D. In this study, he investigated the relative effectiveness of Concept Attainment Model, Inductive Thinking Model and Inquiry Training Model of Teaching on reasoning ability, scientific creativity, ability to see the problems, inquisitiveness ability, persistency and attitude of students toward science. The purpose of his study was to study individual and relative effectiveness of teaching through Concept Attainment Model, Inductive Thinking Model and Inquiry Training Model of teaching on reasoning ability, scientific creativity, ability to see the problems, inquisitiveness ability, persistency and attitude toward science.

He selected a sample of three intact sections of class IX using the purposive sampling method and the quasi-experimental, non-equivalent group design was used. Three experimental groups were formed; first group was taught through Concept Attainment Model, second group through Inductive Thinking Model and
third group Inquiry Training Model of teaching with the pre-test and post-test design. General Mental Ability Test, Reasoning Ability test, Verbal Test of Scientific Creativity, Test of Creativity and Science Attitude Scale were the tools used for collection of the data. Mean, S.D., ‘t’-test and ANOVA (Analysis of Variance) were used for analysis of the data.

He found that Concept Attainment Model, Inductive Thinking Model and Inquiry Training Model of teaching were found effective in developing some mental processes like reasoning ability and scientific creativity among students whereas all these three models could not foster inquisitiveness, persistency among students. Concept Attainment Model, Inductive Thinking Model and Inquiry Training Model of teaching was found to promote favourable attitude of students towards science and are equally effective in fostering attitude of students towards science. Inductive Thinking Model and Inquiry Training Model of teaching were found to promote problem awareness ability among students and were equally effective in enhancing problem awareness ability among the students where as Concept Attainment Model could not foster problem awareness ability among students. None of the three models of teaching was effective in developing a few mental processes like persistency and inquisitiveness ability in the students and also equally effective in not developing some other mental processes like reasoning ability and scientific creativity among students.

Mahajan (1992) carried out a comparative study of the effectiveness of two models of teaching, viz. Bruner's Concept Attainment Model and Ausubel's Advance Organiser Model, on the teaching abilities of student-teachers and on achievement of students in various schools for his doctoral study wherein the methods of teaching are tested against the teaching abilities of student-teachers in junior college of education. It works in two phases college-based laboratory phase and school-based coaching phase.

The purpose of his study was to enable student-teachers to be familiar with various steps involved in models of teaching, to enable student-teachers to use
the teaching-analysis guide to observe lessons, to enable student-teachers to write the lesson notes according to the mode and to teach in peer group and to enable student-teachers to plan a complete unit in Mathematics for a longer period and to teach accordingly the classroom situation.

A pilot study was conducted to validate the programmes, namely lesson notes and other teaching material, based on the two models. On the basis of the scores on the Teaching Competence Scale and the uniform criterion for evaluation of teaching practices three groups were formed, namely, High (H), Middle (M) and Low (L) consisting of 15 student-teachers in each group. Three treatments were assigned to 9 sub-groups of H, M and L groups and all other factors were controlled. For data collection the tools used were Teaching Competence Assessment Set Uniform Criterion for Evaluating Teacher Practice and Achievement Test for students. The data was analyzed using ANOVA and for further comparisons between the multiple mean Schelt's tests was used.

During the peer-group sessions as well as classroom teaching sessions, the group which was taught by the Concept Attainment Model based on Bruner's theory was found to be superior to the group which was taught by the Advance Organizer Model based on Ausubel's theory and the group which was taught by the routine method, so far as the teaching ability of the student-teacher is concerned. The achievements of students were taught by the Concept Attainment Model based on Bruner's theory was found to be better than those of the students taught by the Ausubel's Advance Organizer Model and the routine method.

Mohanti (1992) planned a doctoral study of the relative effectiveness of using the Jurisprudential Inquiry Model and the Concept Attainment Model in the cognitive development in moral judgement, moral-concepts and personal values of secondary school students. The study was planned to study the effectiveness of the Jurisprudential Inquiry Model on the development of moral-judgement and personal values of secondary school children, to study the effectiveness of Concept Attainment Model on the development of moral-judgement and moral-concepts of secondary
school children, to determine the relative effectiveness of Jurisprudential Inquiry Model and Concept Attainment Model on the development of moral-judgement and moral concepts of secondary school children, to compare the effects of Jurisprudential Inquiry Model and Concept Attainment Model on the personal values of secondary school children and to determine the relative effectiveness of Jurisprudential Inquiry Model on developing the model concept of secondary school children, to study the effect of Concept Attainment Model on the personal values of secondary school children and to find out the relationship between development of moral judgement and personal values.

The sample of the study consisted of 290 children of Class VIII belonging to four Highschools containing two boys Highschools and two girls High schools were taken for conducting the experiment. The tools used for data collection were included Group Test of Mental Ability, Socio-Economic Status Scale, Defining Issue Test, Moral Concept Development Test and Personal Value Questionnaire. Mean, SD, 't'-test and correlation were used to analyze the data.

In his study he found that Jurisprudential Inquiry Model was effective for the development of moral judgement of students but not the Concept Attainment Model, Jurisprudential Inquiry Model was a better treatment than Concept Attainment Model for development of moral judgement of students and Concept Attainment Model produced better effect on the development of moral concept of students than Jurisprudential Inquiry Model. Social and health values developed through Concept Attainment Model, but religious, democratic, aesthetic, economic, knowledge, hedonistic power and family product values did not and the relationship between moral judgement and values like social, democratic, aesthetic, knowledge, power and health were significant and positive. But there indeed a negative and significant relationship moral judgement and economic and between moral judgement and family prestige issues. Jurisprudential Inquiry Model was more effective on development of social, economic, Knowledge and power value than Concept Attainment Model, but there was significant difference in the effects of the two components on other values and it was effective for the development of moral judgement of boys and girls.
Concept Attainment Model produced greater effect on the development of moral judgement of girls than of boys and it was more effective for the development of the moral concepts of boys than of girls. There was no difference in the development of moral concepts among boys and girls on Jurisprudential Inquiry Model treatment. There was a significant and positive relationship between Moral Concept Development Test scores and Socio-Economic Status Scale scores and the partial correlation between intelligence and Moral Concept Development Test Scores, after partiaillng out Defining Issue Test scores, is found to be positive and significant.

Viney (1992) carried out a doctoral study on effectiveness of different models of teaching on achievement in mathematical concepts and attitude in relation to intelligence and cognitive style to compare the effectiveness of the Concept Attainment Model and the Computer Model in terms of mathematical concepts, study the effect of intelligence on attainment of concepts in Mathematics and whether the two models of teaching affect the attitude of the students towards Mathematics.

He took a sample of 200 students of Class XI. The students were randomly selected. The tools used were included Advanced Progressive Matrices, Group Embedded Figure Test, Mathematics Attitude Scale and the achievement Test developed by him for the collection of data. For analyzing the data Mean, Median, Skewness, Kurtosis, Frequency polygon and ANOVA were used.

He found that the Computer Model of teaching was found to be superior to the Concept Attainment Model for teaching concepts in Mathematics and for inculcating positive attitude and high-ability students required better mathematical concepts and a more positive attitude than average and low-ability students. Field-independent students attained more concepts than field-dependent students. Cognitive style and level of intelligence were found to be interacting and high-ability field-independent students developed high attitude and achieved significantly higher score on mathematical concepts than average and below average-ability field-independent students where as high-ability and field-independent students scored higher and showed better attitude towards Mathematics than high-average and low-ability field-
dependent students.

Shelleyann Scott (2003) wrote an article Innovative use of teaching repertoire: a study in transfer of complex strategies into classroom practice by novice teachers. This article reports on an unexpected finding from a larger study. The research was focused on examining the effectiveness of a coalescent curriculum structure of the skill development units in a one-year intensive teacher professional preparation program. Effectiveness was determined by ascertaining the transfer of complex models of teaching into the regular teaching repertoire by graduates. The entire population of two consecutive cohorts was interviewed by telephone, using a semi-structured schedule.

The findings presented in this article relate to a sub-group of the total sample that was found to have adopted a more complex approach of integrating two or more models, either within one lesson, or over a series of lessons. The teachers who successfully and regularly utilized two or more complex strategies, appeared to exhibit high levels of self-efficacy, sound self-reflection techniques and reported feeling more in control and less stressed than their less adventurous colleagues.

Agarwal (2004) studied the effect of Teaching Strategies in Relation to Creativity on Conceptual Learning of Class XI Students of Commerce. In this study she studied that teaching is a complex activity carried on in the complex situation of the school by complex organisms-human beings (teachers) directed towards more complex organisms (students) that are constantly undergoing complex changes. In the present fast-growing age, lot of information has to be collected from multifarious sources, integrated, and then processed in a gainful manner not only within self but also to the next generations. Teachers handle information coming from outside, organize data, enable the learner to raise problems, generate concepts and solutions to the problems with the use of verbal and non-verbal symbols. He is a powerful agent in determining the processing of information by reducing the amount of natural behaviour of children instituting the instructional patterns, building a social system and regulating the instructional process.
The objectives of her study were categorized into two broad objectives. First category (i) to study the relative effectiveness of Advance Organizer Model, Concept Attainment Model and Conventional Method on conceptual learning and retention of concepts, (ii) to compare the performance of the pupils on conceptual learning and retention of concepts, in relation to their creative abilities. Second category (i) to compare adjusted mean learning scores of the students belonging to Advance Organizer Model, Concept Attainment Model and Conventional Method by taking intelligence and pre-test as covariates, (ii) to compare adjusted mean retention scores of the students belonging to Advance Organizer Model, Concept Attainment Model and Conventional Method by taking Intelligence and pre-test as covariates; (iii) to study the effect of treatment, creativity and their Interaction on concept learning and concept retention of students.

The sample of 96 students having 32 students in each group consisting of three intact sections of Class XI was taken from three Senior Secondary schools. The three groups were highly comparable with respect to sex, age, past achievement in social studies, etc. This experimental design consisted of two experimental groups and one control group taking as pre-test and post-test measures. The experimental groups were taught through the Advance Organizer Model and the Concept Attainment Model. The control group was taught through the Conventional Method.

Standard Progressive Matrices by J. C. Raven, Baqer Mehdi's Test of Creative Thinking, and the Concept Attainment test developed by herself were the tools used for data collection. The statistical techniques used for the analysis of data included descriptive, inferential, and graphical. The nature of data was studied by computing mean, standard deviation, skewness, kurtosis, etc. applying t-test, ANOVA and ANCOVA, the data was analyzed.

In her study she found that the Advance Organizer Model and the Concept Attainment Model were found more effective than the Conventional Method in fostering concept learning. Concept Attainment Model was found more effective than the Conventional Method in the measure of concept retention. There was no
significant difference between the Advance Organizer Model and the Conventional Method in the measure of concept retention while both were found equally effective in the measure of concept learning of Class-XI students of commerce. Advance organizer Model and Concept Attainment Model were found significantly different in the measure of concept retention while both were found equally effective in fostering concept learning. The high creative group showed better concept learning when taught by Advance Organizer Model. The study also showed through intergroup comparison a non-significant result for the students of low creative abilities yet the mean scores on learning outcomes for low creative group was found maximum in Concept Attainment Model, followed by low creative pupils in Advance Organizer Model and minimum in Conventional Method group. The mean learning scores for high creative group was found maximum in Advance Organizer Model, followed by high creative group in Concept Attainment Model and minimum in the Conventional Method. The concept retention of the pupils was not significantly influenced by their creative abilities and was significantly influenced by the teaching strategies they were exposed to.

3.4 TRENDS IN STUDY

On-going through the literature in different sections of this chapter, it can be established that many of these studies have been short-term studies with a limited treatment. Some studies have not even specified duration of treatment, number of exposures, number of demonstrations, practice and feedback session, etc. Some similarities can be observed in these investigations with regard to objectives, hypothesis, sample, population, sampling technique, variable studied, experimental design, research methodology, tool used for data collection, analysis of data and even the inference drawn.

Few scholars have tried to consider the two models and comparing their effects with that of conventional methods where as some scholars have tried to restrict themselves to the framework of a single model and one or two dependent variables. The most tried variables are achievement or willingness of the teachers to
try these models. Some have even studied teacher training in relation to models of teaching. However, most of the researches have accepted that models of teaching to have promising effect on the creativity of the students taught through them.

Which models help to motivate children so as to enhance learning capacity and even learn beyond that, is also an unanswered issue, as is imperative of these studies. No theoretical base can be built on these literatures. None of these studies has attempted to investigate the effectiveness of Concept Attainment Model, Inductive Thinking Model of teaching on criteria variable like Reasoning Ability, Scientific Creativity, Attitude Towards Science etc. No study seems to have given due care to the objectives of teaching a particular discipline and relate the same with the models teaching investigated into. There is no piece of research that compares the range of models of teaching with respect to the spectrum of educational objectives and these researches have even identified the need to variables pertaining to cognitive and creativity aspect of human personality.

In this way review of these studies indicates that there is a need to develop skills cutting across the school subjects like higher mental abilities, risk taking factors, scientific outlook and the like and the skills needed for development of ten core components of National Curriculum as stated in the National Policy on Education, 1986. For this purpose there is a need to use the various strategies of teaching at school level.

The review has indicated clearly that relative effectiveness of Concept Attainment Model, Inductive Thinking Model of teaching and Traditional Method in terms of Reasoning Ability and Scientific Creativity referred to above and Attitude Towards Science is the need of hour. The present investigator has, therefore, undertaken the problem assessing differential effectiveness of Concept Attainment Model, Inductive Thinking Model of teaching and a Traditional Method of teaching on students' Achievement in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science through science teaching at class IX stage within the same experimental paradigm in the present study.