Chapter – II
REVIEW OF RELATED RESEARCH

It is very evident from the two large volumes of the Handbooks of Research on Teaching by Gage (1963) and Traverse (1973). Buch (1974 and 1979) have recorded few studies on teaching in his survey on educational research. Peterson and Walberg (1979) also have given a concise account of research on teaching. Though the area of research on teaching learning process is few decades old (Thorndike 1912) the information about the direct implication of teaching strategy is very little. These studies provide broad generalization instead of some specific conclusions and thus teaching has usually been left to the competency of individual teacher. Research on various dimensions of teaching are available but the significance of any particular dimension is still having a question mark. Handbooks of research on teaching provide a wealth of information about teaching, but this information is so diverge, and often fragmentary that it does not leave any clear conception about the nature of teaching or perhaps of the fundamental requirements for building up a theory of teaching. Experimental data on teacher behaviour has been summarized by Ryans (1960) and from his study it is quite clear that categorization of teaching in the forms of broad dimensions is rather difficult. Lawrence

( 66 )
In his paper "Anatomy of teaching" have said that 'teaching processes are merely mirror images of learning process. This concept of teaching is also not very clear because there is no taxonomy of learning processes which can act as frame work for the complex Interaction between the curricula, teaching method and Individual differences.

Research on teaching style was quite abundant. Two contrasting teaching styles as Dominative Vs Interactive' (Anderson 1939), 'Teacher centered Vs pupil centered' (Withall, 1949; Anderson, 1959) have been compared but for the search for the effective teaching style was persuaded with the much more excitement during the period. Rosenshine (1979) have used the term direct method for the teacher centered teaching style and have suggested that direct instruction is the more effective way of teaching. Horwitz (1979) reviewed the researches on educational outcomes of open classroom teaching with traditional teaching. These studies can be grouped as studies on cognitive outcome and studies on effective outcome. Cognitive outcome include composite achievement, achievement in mathematics, achievement in reading, creativity and problem solving. It can be concluded that the students of the open approach tend to be more creative than those of traditional approach (Perterson 1979). Affective outcomes included self-concept, attitude toward school, attitude toward
teacher, curiosity, locus of control, anxiety and independence. Horwitz (1979) found that open instruction favored students attitude toward school, where as no significant difference was found between these approaches for the self-concept, locus of control and anxiety (Peterson, 1979).

Chronbach, (1957) is of the opinion that the quest for the effective style or method or technique should he upgraded. Berliner and Cahen (1973) are also of the same opinion and according to them "Given this set of learner characteristics, what is the best way to tailor the instruction for this particular type of learner".

Flanders (1960) studied the direct and indirect teaching technique and found that indirect category results in high achievement in teaching of science and mathematics. In India also studies on direct and indirect teaching behaviour are there. Desai (1977) used the 'Flanders interaction analysis category system' for changing the teacher behaviour and found that FIACS is more effective in modifying the teachers indirect behaviour. From the findings of the study conducted at Jabalpur in Govt. collage of Education (1971) it can be concluded that students like those teachers who have used indirect influence. Lulla (1974) tried to find out teacher classroom behaviour and its effect on pupils achievement. Finding of the study indicate that
were taught by trained teachers in using indirect teaching behaviour scored higher as compared to their counterparts studying under the teachers who were not provided any training.

Bennett (1976) found that formal and mixed teaching style is better than informal teaching style when achievement in reading, mathematics and English have been taken. Wright (1975) also found that pupils of formal setting have higher achievement test scores in all areas than the pupils of informal setting. These two groups do not differ in cognitive style, feelings of control, self esteem or creativity. Midley and Mitzel (1963) have reported few pioneering studies in a chapter in the handbook of research on teaching. Studies in different dimensions of behaviour are found in this chapter. They have given three major dimensions as emotional climate, social organization and Verbal emphasis.

Sharma (1972) and Padma (1976) tried to find out the effect of different teaching patterns on cognitive attainment of pupils. Sharma (1972) found that the narrow questioning technique was more effective than other teaching patterns in attending the knowledge and comprehension, Debnath (1971) studied the teaching efficiency; its measurement and some determinants. Teaching efficiency depends upon the knowledge of the subject matter, mastery of method of
teaching, academic qualifications. Samantaroy (1971) tried to find out the relationship between the teacher attitude and teaching efficiency. Positive correlation was found between the two variables. He also found that teacher adjustment plays an important role in improving the teaching efficiency. Chakraborty (1978) studied the strategies of classroom teaching and found that lecturing and questioning-answering by using behavioural objectives is more effective than lecturing and questioning-answering for knowledge, comprehension, application and total achievement. Roy (1977) tried to find out the affect of classroom questioning on pupils' achievement and found that lecturing, questioning and response without feedback and questioning response feedback sequence, these three teaching styles had equal effect on development of knowledge and application ability and total achievement of pupils. Similarly Shaida (1976) studied the effect of teaching patterns on pupils' achievement. Findings of the study shows that the teaching pattern of narrow questioning with feedback produces significantly higher mean for the development of knowledge and its retention.

Innovations in education brought revolutionary changes in teaching. During 1960s teaching machines have been introduced and programmed instruction promised to revolutionize education. In most of the researches programmed instruction was compared with
conventional classroom teaching. Kulik and Kulik (1979) have reported that programmed instruction is effective over the conventional classroom teaching. It also reduces the time required for students to complete course work. Computer based teaching came into existence during 1970s. Both historically and conceptually the use of computer in teaching is closely related to work in programmed instruction. Edwards (1975) after briefing the studies on computer based teaching concluded that computer based teaching led to greater student achievement and it took less time to learn. Jamison (1974) and his colleagues are of the opinion that no conclusion can be drawn about the effectiveness of computer based teaching. A group of psychologists have developed a new approach of instruction i.e. Personalized System of Instruction (PSI) and this system was found more effective for achievement (Hursh, 1976; Robin, 1976; Taveggia, 1976, Johnson and Ruskin, 1977).

Research on the relations between the behavior of science teachers and other variables, such as behaviors of their pupils, is meager. The scarcity of such researches on science teaching is especially unfortunate, for the structure of science and its continuous contact with manipulatable objects offer numerous opportunities for class and diversified appraisal of pupil behaviors. This lack of research also seems inconsistent with the numerous 'grand' objectives of
science education spelled out from time to time. Achievement of such objectives does appear to be amenable to operational definition and therefore to experimental study as a function of teacher behavior (Henry, 1947). Most of the researches involving pupil behaviour has utilized pupil gain on achievement tests as the sole or primary description of changed pupil behavior.

Jacobs and Bollenbacher (1959) studied the results of full year of biological instruction by live television watched by ninth grade pupils. After the covariance adjustment for the difference. In the pre-test score only the pupil in the school rated above average academically showed a significantly higher gain favoring the television over the non-television classes. Anderson et.al. (1956) and Smith and Anderson (1958) studied the effects of showing film in the biology classes, they found that students scored high who were shown with the film. Schwab and Brandwein (1962) have characterized science teaching as "Rhetoric of conclusions". They are of the opinion that if science is taught on product alone, student will learn technological applications of science and will only learn about science. Parakh (1965) have tried to study the teacher pupil interaction in high school biology classes. MoKeachie and Kulik (1975) found that comparisons with the lecture method on measures of retention, high level thinking, attitudes and motivation tended to favour the discussion method. Webb (1982), Slavin (1980a,
1980b), Johnson Maruyema, Johnson Nelson and Skon (1981) have studied the comparative learning method. Another approach to instructions the individual instruction which includes the mastry leading (Bloom, 1968 and Block, 1971), programmed instruction (Skinner, 1954) computer assisted instruction. (Ragosta Holland and Jamison, 1982).

During 1972, Greenberg's study was concerned with the differential effects of the traditional and individual teaching methods on achievement gains. Male students enrolled in the 9th grade at Memorial Junior High School, New Jersey were used as subjects for the study. Four experimental groups received individualized instruction, four groups received conventional instruction and four control groups received instruction in a different course of study. Statistically significant differences in gain in knowledge occurred between the individualized and conventional instructional groups and these differences favored the conventional instructional group. Slavin et al., (1984) studied the effectiveness of team-assisted individualization on the science achievement. Sample consisted of 1371 students in third, fourth and fifth grade classroom in a sub-urban school. Out of these, 113 students (8.2%) received special education services for two hours per day. Results indicated statistically significant treatment effect favoring team-assisted individualization for science achievement. Lidho
and Khan (1990) carried out a study on bright under achievers among socially backward counseling and remedial measures. The samples comprised of 60 subjects were divided into control and experimental group (30 each). The experimental groups were treated to individual counseling in order to help under achievers to improve their scholastic achievement. The results revealed that, individual counseling helped the scholastic achievement of the experimental group.

Classroom is the most vital for the transactional business going on between school and society. The uniqueness of the classroom is due to the type of membership enjoyed by its members. The study of classroom environment is of great significance, as learning is the product of environment. As an agent of intellectual stimulation conducive classroom environment is an important factor in strengthening the child's level of education. Schooling has been widely recognized to have influence in ones cognitive development. Several studies indicated that, good classroom environment is essential for improving the learning potential of the students. Rice et al., during 1998 conducted a study to assess knowledge and comprehension levels of science achievers in 7th grade classes. Results suggested that a concept map might be used in assessing declarative and procedural knowledge both of which have a place in the science classroom. Mellad (1998) compared to teacher's concepts of the learning and
teaching of science with their classroom practice when teaching science lessons. The results revealed that a general correspondence to be established between pre service teacher's conceptions about teaching and learning science and their classroom environment. Jean (1999) examined teacher student interactions in urban at risk classrooms, differential behaviour and student satisfaction with school. Multiple methods of data collection including classroom observation, interviews and self-support questionnaire were used for 61 children studying in 3rd grade. Results suggest that, perception of caring, supportive relationship with a teacher and positive classroom environments were related to school satisfaction as early as 3rd grade. Marrison (1999) studied two behavioral dimensions of classroom structure. Results showed that high structured classrooms had the most work involvement. There were no interaction effects of classroom structure with gender of child. Kalyani and Radhakrishna (2002) conducted the study to measure the impact of classroom environment on the intelligence of Ashrama school children. The sample of 180 tribal schoolchildren was randomly selected in the age range of 9-12 years. RPM was used to assess the intelligence and a pre-tested schedule with a maximum score of 159 with 61 items was used to measure the classroom environment of the children. The results indicated that, some of the components of classroom environment
namely, physical facility, methods of teaching, teacher's characteristics were significantly correlated with the intelligence.

Science is the product of creative thinking by scientists over a period of time. Children tend to be naturally creative, but their creativity is dampened as a result of authoritarian system of education. The discovery and development of the creative genius of our children should be of prime importance in our education system. Teachers and education have a great responsibility to children and society to see that this ability is manifested to the maximum of the individual's potential.

Pathak and Verma (1995) studied on creativity and their scholastic achievement. The results revealed that, the high and low creative subjects were found to be significantly differed on scholastic achievement in the field of science. It signifies that, the high creatives were of high scholastic achievement in science field. Chowdhary and Ghosh (1996) conducted a study to find out the relationship between the achievement in science and creativity. The sample comprised of 160 students of class 9th studying in the English medium schools under CBSE. It was found that, there were significant relationship among the achievement in science and scores in creativity. Dutta (1988) reported that there is positive and significant relationship of achievement in science with various factors of creativity and total verbal creativity.
Attitude towards science involves linking of science lessons, enjoyment of laboratory work and visiting places of scientific interests. It seems scientific attitude has predominantly cognitive orientation, while attitude towards science have effective orientations. A number of studies indicated that, the science attitude is a powerful determinant of science learning. Sathyanarayana Murthy and Gopalkrishna (1989) focused on scientific attitude and attitude towards science of X class students. Purposive sampling methods were implemented. Scientific attitude test (developed by Victor Biels and George Zakharide) and attitude towards science (developed by Wilson) were administered to the whole group. Results revealed that, there is no development in scientific attitude in the subjects regarding attitude towards science but, the activities like guest lecture, educational film shows brought a positive change in the attitude of the children to some extent. A study by Pillai (1990) found that biology achievement in children significantly differed according to the differences in science attitude and attitude towards science. These two variables are contributing independently to biology achievement. The sample comprised of 800 students studying in 9th standard in Kerela. Test standardized by Nayar was used for measuring science aptitude and attitude towards science. From the above studies it is clear that attitude towards science brought a positive change in the attitude of the children.
Jeyamani and Chandramani (1992) illustrated the effect of stimulation model through the computer-assisted instruction for science achievement. The students using computer-assisted instruction of stimulation methods performed better than the other groups. Reddy and Ramar (1995) conducted a study on effectiveness of multimedia based modular approach in teaching science to low achievers. The results revealed that, there was significant difference between the post test mean scores of control group slow learners taught through traditional lecture method and experimental group slow learners taught through computer assisted instruction for science subject. Further, the achievement of experimental group slow learners was higher than the achievement of control group slow learners,

The above mentioned on teaching and teaching strategies/methods are there. Still there needs of alternate teaching strategies in order to equip the teachers to accomplish various level of educational goal. Such alternatives are available in the form of model of teaching.

Teaching is a process by which the teacher creates a shared environment with students including sets of values and beliefs, which in turn colour views of reality, A model of teaching is a plan or pattern that can be used to shape curriculum or to design instruction in the
classroom settings. Models are prescriptive teaching strategies designed to accomplish particular instructional goals.

**Studies Related to the Advance Organizer Model (AOM)**

Rodegres, Cathy Allyn (1981) conducted a study to find out the effect of a Comparative Advance Organizer Model (AOM) that has on student expectancy for success and achievement. The research questions were derived from previous research in the areas, viz.:

1. Instructional strategies which enhance learning particularly comparative AOM.
2. Learner motivation and the effect of expectancy for success; and
3. The influence of academic self-esteem on school programme.

Specific predictions were made based on past research conducted in these areas. This was essentially an exploratory study intended to identify these effects, beyond enhancement of incorporation of new information into cognitive structure which may result from exposure to an Advance Organizer Model. While the predictions that the AO group would exhibit greater enhancement of expectancy for success and achievement than the Control Group were not supported, the AO did evidence strong effects. In particular, the AO suppressed the positive relationships between esteem and achievement, expectancy for success and achievement, and level of
prior knowledge and achievement which were generally found in learning situations.

Borine. Robesta Carol (1982) conducted a study to understand the effects of advance organizers of varying length on the comprehension and retention of VII Grade students. The purpose of the study was to investigate three institutional methods based on Ausubel's concept of meaningful verbal learning. Specifically, the effectiveness of 200 word AOs, 20 word AOs, and no AOs were investigated using expository passages. The sample comprised 121 students of VII grade. The findings of the study were reported under four categories, viz., At-level readers on immediate comprehension; Above-level readers on immediate comprehension, At-level readers on delayed retention; and Above-level readers on delayed retention. In response to the above four categories, it was found that on immediate comprehension the 20 word AO and at-level readers were superior to the 200 word AO readers. For above-level readers, there were no facilitate effects among the 200 word AO, 20 word AO and no AO readers. Results indicate that 20 word AO at-level readers were superior to the 200 word and no AO on delayed retention. For the above-level readers on delayed retention, there were no facilitative efforts among the 200 word, 20 word and no AO readers.
Chang, Moon Kil (1982) examined the effect of Filmic Advance Organizers (FAOs) on the learning and retention of facts and concepts from a sound film by the regular and mainstreamed educable mentally retarded learners (EMR). FAOs referred to a set of tape narrated slides presented in advance of a sound film from which the slides were made to give a brief general overview of the film. A 2 x 3 factorial design was utilized with ability levels (regular to EMR) and presentation modes (FAOs x films x films control) as independent variables, and the post-test scores as dependent variables. All subjects, selected from 6th, 7th and 8th graders in two middle schools in Louisville, Kentucky, were assigned at random to the six groups. Each of the three groups received one of the treatments, FAO and film, film or control. Likewise, each of the three EMR groups received the three identical treatments. A 17-item multiple choice test which yielded Kuder-Richardson-Hoyt reliability of 0.70 for the regular groups, and 0.31 for the EMRs, was administered immediately after the treatment and 17 days later. All subjects were pre-tested one week prior to the treatment to test initial learning. A two-way ANOVA and Duncan’s Multiple Range Test were performed separately on the 60 observations included in the final analysis. The results indicate that—1. on the immediate and delayed retention tests, interaction between ability levels and presentation modes were not significant at 0.05 level, 2. on the immediate retention
test, significant effects were found at 0.01 level for the regular FAO group, and at 0.05 level for the EMR FAO group, and 3. on the delayed retention test, a significant effect for the regular FAO group was found.

Nides, Alexander George (1984) conducted a study to locate correlative effects of learning style preferences of VIII grade students on achievement in the learning of Anthropological concepts when an Advance Organizer was employed to facilitate learning for the purpose of explaining possible learning style sources of variance in the inconclusive findings of Advance organizer research. The study was conducted with VIII grade social studies students. 21 learning style preferences were assessed by the learning style inventory in the preference domains environmental, emotional, sociological and physical. The AO accompanying reading achievement test comes from the anthropology curriculum process. Reading ability was statistically controlled. The hypotheses were tested by using correlation analysis. It concluded that learning style variables expressed as preference for environmental, emotional, sociological and physical factors not account for variability in achievement when an AO was employed in the learning of anthropological concepts for the failure of other research to affirm the efficacy of AO.
Ghosh, S.K. (1986) conducted a study to make an appraisal of the relative effectiveness of two different types of AO on the criteria of immediate learning and retention, i.e., cognitive subscription by having learners of different cognitive styles and different levels of readiness for learning. The specific objectives of the study were: to develop two types of AOs, (a) prose passage type and (b) pictorial type, to develop instructional material in Bengali on the basis of Ausubelian principles of "progressive differentiation" and "integrative reconciliation". The sample consisted of 480, IX class students.

The study reveals that: the cognitive subsumption of the concept of life science was facilitated by the advance introduction of relevant sub-suming concepts; both types of Advance Organizer facilitated the retention of subject matter even after an interval of four weeks, instructional strategy with the pictorial type of Advance Organizer was found better than the prose-passage type of Advance Organizer; and to subjects like life science, the pictorial type of AOs enhance learning and retention,

Avalos, Carlos Elipo (1986) attempted to improve student learning by using advance organisers and organisers at the middle and end of each textbook chapter. The purpose of this study was to investigate the separate and combined effects on students' learning of:
1. The use of Advance Organizer and organisers at the middle & of each learning task; 2. The enhancement of students’ prerequisites, and
3. Master learning, cognitive achievement and affective outcomes were two dependent variables representing students’ learning. Two studies were conducted in different high schools—1. In the first study (algebra), three groups were used. One group used Conventional Instruction (CI) which was the control group, the second group used CI with organisers, and the third group used organisers, enhancement of prerequisite and master learning. 2. In the second study (biology), each of the three teachers taught four classes under conventional methods of instruction, one class was the control group, the second class used enhancement of prerequisites; the third class used organisers and the fourth class used both enhancement of prerequisites and organisers. The results of algebra study showed that the use of organisers alone and the combined use of organisers, enhancement of prerequisites and mastery learning had significant positive effects on students' learning. The combined use of three strategies was slightly better than organisers alone in improving students' achievement. In the biology study, organisers were not effective in improving students' learning.

Pandey, S.N. (1986) compared the effectiveness of AOM for teaching to Class VIII students and found advance organizer model superior to conventional teaching in term of achievement.
Rolheiser - Bennett, Noreen Carol (1986) compared the effects of four theory-driven models of teaching on student learning. Meta analysis was used to analyze and synthesize experimental research on teaching strategies; Advance Organizer (AO), Memory Model (MM), Synectics (S) and Cooperative Learning (CL). The purpose of this study was to begin the establishment of a database, permitting cross-model estimates of student effects across a variety of outcomes, to assess the state of research, and to generate intra and cross-model research. Results indicate that use of any one of the four models of teaching is efficacious on a wide variety of outcomes. The results strongly support the rationale that pre-service and in-service programmes can profitably direct their efforts towards increasing teachers' repertoire of research based models of teaching.

Budhisagar, M. (1987) developed and compared an instructional material using AOM and Operant Conditioning Model (PLM) for teaching Educational Psychology to B.Ed, students. The institutional materials PLM and AOM were found to be effective in terms of achievement of students and different criterion tests and reaction of students. The PLM and AOM were found superior to the traditional method and PLM and AOM were equally effective when students' mean achievements course were adjusted with respect to intelligence.
Kaushik. N K, (1988) studied the long-term effect of advance organizers in relation to reading ability, intelligence and scientific attitude of the learners and found that the general introduction or an overview, which generally preceded the learning material, was less effective as compared to the advance organizers. Secondly, the benefit derived from advance organizers was positively correlated with higher intelligence, reading comprehension and scientific attitude.

Gupta, S. (1991) conducted a study to examine the effectiveness of AOM in developing teaching competence among student-teachers under simulated as well as classroom conditions and found that AOM was very effective.

Willerman, Mavin and Richard A. Mac Harg (1991) the study investigated the effect of concept map used as an advance organizer can improve the science achievement of eighth-grade students. Eighty-two eighth-grade students in four science classes participated in this study. The experimental group completed the concept map at the beginning of the science unit under the teacher's supervision. At the end of the two-week unit a science test was administered to the experimental and the control group. The results of a one-tailed $t$ test indicated that there was a significant difference between the two groups. The effect size is 0.40. It appears that the concept map can
provide the classroom teachers with a meaningful and practical structured approach for using advance organizers in their classes.

Baggett, James Lamer (1993) compared the relative merits of using different concept map presentations as AO in teaching photosynthesis to community college science students. This was done using the Ausubelian approach of concept maps as AO in sequencing and presenting lecture material. The subjects in the study were grade III students from six intact biology classes in a southern Mississippi Community College. A no concept map control group and two concept maps experimental groups were utilized. The experimental design was pre-test - post-test Multiple linear regression analysis was employed to test the hypotheses at the 0.05 level of significance. As AO, the photosynthesis concept maps and the photosynthesis physical science concept maps were found to be effective when used for photosynthesis instruction in community college biology classes.

Raina, (1994) reported that Advance Organizer Model was more effective than Biological Science Enquiry Model in term of pupil's achievements. But the respect to the pupil interest in inquiry activities, biological science enquiry model was found to be more effective than advance organizer model.
Mehra & Sangwan (1998) reported that Advance Organizer Model teaching was more effective than traditional classroom teaching at teaching in a segment of Biology at school level.

Bhushan & Mehar (1999) comparing the effectiveness of Advancer Organizer Model with conventional teaching with respect to cognitive style it was found that advance organizer model was found as effective as traditional method of teaching.

Mehra and Khare (2002) conducted a study to compare the effect of three teaching strategies viz. - inductive thinking model, advanced organizer model and conventional method of teaching on attitudes of students towards science technology. The sample consisted of 108 students belonging to two colleges of Rewari. The results showed that students taught by inductive thinking model lead to development of better attitudes towards science technology as compared to advanced organizer model or conventional method of teaching. But low intelligence group was benefited more than their high intelligence counterparts.

Viswanath, H. N. (2002) studied advance organizer model over the sample of X standard students and found, the model effectiveness in terms of achievement in environmental science.
Pratima (2005) conducted study on student of class IX. To find out the effectiveness of AOM, teaching social studies at secondary level and reported–1. AOM model has been found more effective than CM in teaching of social studies at secondary level. 2. AOM found to be more effective than CM in terms of pupil learning and pupil have shown favorable reaction of the AOM Method.

Dange and Gangashree (2008) conducted experiment on 50 student in which 25 selected for experimental group (AOM) and 25 for traditional teaching. Pre-test – Post-test experimental and control were designed. Findings are as : 1. There is no significant difference between mean scores on pre-test in Biology of experimental and control group. 2. There is significant difference between mean scores on post test in Biology experimental group and control group. 3. These significant difference between mean score on pre-test and post-test in Biology of experimental group. 4. These only slightly difference between mean scores on pre-test and post-test in Biology of control group.

Hudson Shihusa and Fred N. Keraro (2009) investigated the effect of using advance organizers on students’ motivation to learn biology. The research design used was quasi-experimental design where the nonrandomised Solomon Four group was adopted. The
findings indicate that students taught using advance organizers had a higher level of motivation than those taught using conventional teaching methods. The findings further indicate that following the intervention, male students had a significantly higher level of motivation than their female counterparts. This paper concludes by discussing the implications of these findings on current practice.

**Studies Related to Concept Attainment Model**

Chitriv, U.G. (1983) evaluated and compared the effectiveness of Ausubel and Bruner strategies for acquisition of concepts in mathematics. The major objectives of the study were: to ascertain the comparative effectiveness of Bruner and Ausubel strategies with the traditional one on various criteria of concept acquisition in mathematics; and to ascertain the effectiveness of the Ausubel and Bruner strategy in the acquisition of concepts in mathematics separately for the students of different conceptual style preferences. The sample consisted of three sections of XI Grade students. The major findings were: Both Ausubel and Bruner strategies were superior to the traditional strategy for teaching mathematical concepts to XI grade students, so far as knowledge transfer and heuristic transfer of the concepts were concerned; Ausubel and Bruner strategies were equally effective for teaching mathematical concepts to XI grade
students so far as students’ ability to acquire knowledge of the concepts was concerned; The Ausubel strategy was superior to the Bruner strategy for teaching mathematical concepts to XI grade students, so far as enhancing the concept transfer was concerned,

Passi, BK., L.C. Singh, and Sansanwal (1985) conducted a study to find the effectiveness of training in Concept Attainment Model (CAM) in terms of understanding of and reaction towards the models. They also studied the resultant willingness of the teacher educators to implement the models in teacher education programmes and to develop a strategy of training in the models of teaching. Teacher educators were willing to implement models of teaching in the teacher education programme if a support system was available; and the training strategy comprising theoretical discussion, demonstrations and peer practice plus feedback was found effective in terms of developing, understanding favourable reactions and willingness to implement models of teaching in teacher training programme.

Sushma (1987) compared the effectiveness of Concept Attainment Model (CAM) and Biological Science Inquiry Model (BSIM) for teaching biological science to class VIII students. Concept attainment model was found more effective than BSIM. BSIM was
found more effective than Conventional Method. CAM changed the altitude more favourably than BSIM.

Grewal and Kaur (1987) conducted a study to compare the outcome of three approaches to teaching, namely, the Bruner's model, the Ausubel's model and the traditional method, quantified on the basis of the achievement scores. In this study, pre-test - post-test - Control group design was followed. The sample consisted of 105 students of class IX.

The findings reveal that there was a difference in the efficacy of CAM, AOM and conventional method for learning of concepts in science, it also reveals that CAM was more effective than AOM.

Baveja, Bharathi (1988) compared the efficacy of CAM and ITM with traditional methods in attaining Biological concepts. The experiment was conducted on a sample of 22 students of class IX from an English medium school.

The results of this study indicate that: 1. The models’ specific outcomes were realized. 2. The students of experimental groups with model approach of teaching showed better conceptualization. 3. Teaching through models enhanced retention.
Singh, D.K. (1990) compared the effectiveness of Inquiry Training Model (ITM) and Concept Attainment Model (CAM) on the achievement of IX Standard students in Physical Science and found that both were equally effective.

Gupta. N K (1991) conducted a study to design and develop an instructional plan on the teaching of selected units in Physics at class IX level, based on the Concept Attainment Model (CAM) and Inductive Training Model (ITM) The study was intended to find out the relative effectiveness of training through CAM and ITM on Pupils' achievements: Pupils' self concept: and students' attitude towards science. The findings of the study reveal that the ITM was more effective than CAM on achievement and on the promotion of attitude towards science. Neither of the two models were effective in bringing about significant changes in the self concept.

Agarwal, R., and K.S. Mishra (1988) studied the effectiveness of the Reception strategy in enhancing the attainment of science concepts and found it to be effective.

Chaudhury, K. (1989) investigated and found that the teaching skills and competence developed among student-teachers through the use of CAM were easily transferable in other teaching situations, besides the teaching of concepts. This study also recommended the
use of CAM instead of spending much more time on the microteaching technique to develop the teaching skills.

Bava, MS. (1991) attempted to review the research possibilities on conceptual learning (Bruner's view) and indicated that there was a dearth of research studies in the area of concept learning.

Jamini, N. (1991) investigated the relative effectiveness of AOM and CAM on conceptual learning efficacy and retention of chemistry concepts in relation to divergent thinking which indicated that although both AOM and CAM were equally effective in fostering concept learning, AOM was comparatively more beneficial in concept learning to pupils with high divergent thinking while CAM was more beneficial to pupils with low divergent thinking.

Manocha, V (1991) studied Reception as well as Selection strategies of CAM in comparison to the conventional method for teaching of concepts in biology and reveals that there was no significant difference between Reception and Selection Strategies with respect to achievement scores.

Khan, M.S and M.H Siddiqui (1992) conducted a study on the effectiveness of CAM strategies and found that (1) CAM strategies were more effective over traditional approach; (2) personality factors had no significant effect on the CAM process; (3) these strategies were
responsive to the needs of disadvantage learners; and (4) attainment of disjunctive concepts was more difficult than the attainment of conjunctive concepts.

Mahajan, J. S. (1992) found that during the peer group sessions as well as classroom teaching sessions, the group taught by CAM was found to be superior to the group taught by AOM as well as the routine method as far as the teaching ability of student-teacher was concerned.