CHAPTER - I

INTRODUCTION
We live in a world of materials, time and space. Mathematics provides a system for describing these in terms of quantity of magnitude. Without this system, it would be impossible to talk with others about this aspect of the world. It involves two levels of knowledge. On one hand are quantitative attributes and relationships of the objects in the world, and on the other are symbols used to represent these attributes and relationships. This dual nature of mathematics has important implications for what is taught as mathematics and how it is taught. Mathematics is a mystery to many. Situations which require mathematical solutions leaves us frustrated. These feelings are particularly disturbing for the teacher who is faced with the task of helping children learn and feel comfortable with mathematics.

The teacher must take note of the implications of dual nature of knowledge in mathematics.
The first implication is that it includes both a physical and a symbol system for representing the physical reality. Children do not know mathematics if they manipulate symbol for reasons they do not understand or if they have no knowledge of symbol system for organizing the physical reality they do understand. Good instruction should include both. Second implication indicates from where learner must obtain mathematical information. Knowledge of the physical materials is directly accessible to the learner, whereas the symbol system is not. Social mediation is necessary for the child to obtain this information. Teacher must provide information about the symbols and relate to the physical reality the learner is experiencing.

In the past there has been a tendency to teach all of mathematics as if it were a symbol without reference to the world. This is the other extreme. Teacher should teach keeping in view the dual nature of the mathematics.

The nature of mathematics is not the only important consideration in teaching mathematics. The characteristics of the learner and his intellectual development are also crucial. The pre-operational child's thought is governed by perception rather than by logical reasoning. Teachers must realize this fact that the pre-operational child cannot see the relationships between two independent actions performed on objects. A child at this stage knows that two sets of two objects make four altogether, and that two objects remain when two objects are removed from a
set of four, but the child does not see the logical connection between the two actions. The child does not see a relationship between actions that we know as addition and subtraction. The child can learn alone relationship if given an opportunity to manipulate objects and if provided with symbolic knowledge. He cannot abstract principles and apply to new situations. A child at the concrete operational stage (6 - 9 years) needs to perform physical actions on objects in order to understand mathematical ideas. The mental actions which take his understanding beyond independent physical actions and the relationship of one action to others are now understood. The teacher, while selecting and arranging learning activities for the learner should bear in mind, the level of intellectual development of the child.

Teachers of mathematics have as their primary objective the promotion of learning the mathematics. This is not a simple task. The content to be learned and the maturity of the students vary from grade to grade, and learning has varied aspects and can take place through many avenues. The students may not all learn things in the same ways, or at the same speed, or with the same facility and completeness. The teacher has the dual task of setting appropriate classroom objectives and planning learning activities which in his judgement give promise of proceeding his student with kind of experiences that can bring them to the attainment of objectives.
Effective instruction cannot be guaranteed by any single simple formula. The teacher has to select subject matter, mode of presentation, learning activities, suiting to the age and intellectual development of students. There are four instructional problems:

(1) helping the students to acquire initial understanding of new concepts and principles;

(2) helping them to strengthen these beyond the point of mere 'threshold' understanding;

(3) helping them maintain understandings and skills already attained; and

(4) helping them build the background for significant transfer of these skills and understanding to their physical, social and intellectual environment.

Curriculum and methods are intimately interlinked. Even the best curriculum and the most perfect syllabus remain dead unless quickened into life by suitable pedagogy of teaching. If curriculum is the totality of all experiences that the school arranges for the learner then methods are the suitable ways of bringing the learner to receive these experiences. A curricular programme can be brought into operation only through appropriate methods of teaching. Ultimately, a method is a body of pedagogical principles and procedures. In the procedural part when the nonhuman media are included, scope of the instructional devices or methods is immensely enhanced. Gradually by the impact of
educational technology, our traditional methods of teaching are going to be changed. More dynamic and non-traditional methods of teaching are replacing the traditional ones. Using film strips or at least a tape-recorder may increase the effectiveness of a method many times more. This is one aspect of development concerning research on methods. Another new development is that more and more interactional approaches are incorporated into teaching methods to make them more dynamic and effective. Our growing awareness of group dynamics and group behaviour is at the rest of this development. Teacher is being looked upon as a group leader.

Mathematics teachers use traditional and non-traditional methods of teaching mathematics. Some of them are discussed below:

Lecture Method: This method of instruction is most famous and is used by most of the teachers to teach most of subjects. It is a common fault of teachers to employ too extensively the method of telling or of giving a coherent discussion of a topic and then proceeding with the assumption that the discussion or lecture has been followed and completely understood by all students. Secondary school students are seldom able to assimilate adequately and immediately any lengthy, one sided teacher given lecture about unfamiliar subject matter. Points of difficulty will arise and unless they are cleared up, they will fail to register with the students, failure to get these points cleared
up may easily result in blocking the understanding of the subsequent events.

This does not mean that lecture of discussion is always and entirely out of place. There are many times when judicious telling or explanation may not only proper but is absolutely necessary. The discussion should be done at proper time and it should not be one-sided, it should be interspersed with frequent questions by both the teacher and the students.

**Debate:** A debate is a programme in which two or more students holding contradictory opinions on a particular problem present formal speeches advocating their positions and subsequently have the opportunity to formally refute the views held by others on a particular problem. The rest of the class is encouraged to ask the debaters questions. The debate has a moderator and not a chairman.

**Interview:** An interview is a programme in which a small group of students interrogates an expert in the expectation of drawing facts and opinions out of him or of having him defend some position. The expert may be teacher or outside visitor or student who has thoroughly familiarized himself with a particular topic.

**Project Method:** A project is a problematic act carried to
Completion in its natural setting. Project method is the practical outcome of the pragmatic education philosophy of John Dewey, a well-known American philosopher-cum-educationist.

Assignment Method: Assignment method is the embodiment of both lecture-demonstration method and the individual laboratory work by the students. So, it includes the merits of both the methods and is best suited for students of High and Higher Secondary Classes provided that the assignments are well-planned and drawn up according to the age, interests, aptitudes and intelligence of the students. The whole of the prescribed course is divided into a number of well-connected portions to be covered in a week or so, and are called as assignments.

Programmed Instructions: Programmed Instruction is essentially a well-discipline and experienced approach to instruction, characterised by explicitness, by sophisticated behavioural analysis and by careful control of stimuli and response and organised to elicit behavioural sequences that have been empirically determined. PIM is educational material (called Programmed Learning) as well as a teaching method.

According to Corey (1930), "PI entered upon the educational scene by the side door, by the way of psychology". The PI may be thought to have emerged from the dynamic efforts of American Psychologists during second decade of the present century.
B.F. Skinner (1954) presented a research paper, "The Science of Learning and the Art of Teaching" on the basis of his experiments. It was first and most common type of programme viz., step by step programme. The reinforcement principle plays an important role in programmed learning approach.

In step by step linear programme the material to be learnt is presented in small steps. The learner is always or nearly correct but the problem continuously goes on becoming harder. Then Crowder (1959) introduced branching programme. It was Gilbert (1963) who came out with the mathematics programming.

So programmed instruction is a standardized sequence of learning events designed to produce a measurable learning effect on acceptable population.

Inductive-Deductive Method:

Inductive-deductive or Indo-deductive method is a combination of two separate methods - Inductive and Deductive.

Inductive Method: The method of induction is the way of proving any universal truth by showing that if it is true of any particular case, it is true of the next case in the same serial order. Inductive method takes into account of the process of induction.

While adopting this method students are required not to accept the already discovered formula without knowing how it has
been established. They are helped in its discovery by adopting inductive reasoning. In inductive reasoning one proceeds from particular to general, from concrete facts to abstract rules and from the special examples to the general formula. The results are always generalized by studying particular concrete cases and examples. If one rule applies to a particular case and is equally applicable to the different similar cases, it is accepted as a generalized rule or formula.

**Deductive Method:** In deductive method one follows deductive reasoning which is just opposite to the Inductive reasoning. In this method one has to proceed from general to particular and abstract to concrete. It is an unpsychological method. Here emphasis is given on the learning of facts without caring for the child. Deductive method is not a method of discovery but a method of presentation. No originality and creativity is developed by this method. Here memory decides everything. Pupils have every doubt about the formula and they do not know why is it to be taken for granted. This method is suitable at the practice or application state. The finished form of Mathematics is deductive. Deductive approach is not suitable for the lower classes due to its abstract nature but at the advanced stage, this method suits properly. In this deductive method the relationship remain nominal.

**Analytic and Synthetic Method:** Analytic and Synthetic method are two methods which, inspite of their opposing nature, are used in combination.
Etymologically the word 'analytic' has been derived from the word 'analysis' which means to take apart or to separate the things that are together. In other words, analysis is a process of breaking a thing into its smaller parts. By analysing a problem, thus, we mean to break the problem into simpler elements or unfold its hidden aspects in such a way that its solution may appear quite obvious. In analytic method, one moves from unknown to known by adopting the process of analysis. The beginning is always made from the conclusion or what is to be proved and then by operating it analytically the unknown is ultimately linked with the known.

In contrast to analytic method, synthetic method takes into consideration the process of synthesis. In synthesis, the smaller constituents or parts of a thing are combined or put together so as to give something new. Synthetic method leads us from known to unknown as the known bits of information are synthesised for reaching the unknown. What is already given or known is arranged in such a way that the synthesised structure may lead us to the desired results or conclusion. Here the start is always made from the hypothesis and not with the conclusion as in analytic method.

Laboratory Method: Laboratory method of teaching mathematics is that method in which we try to make the students learn mathematics by doing experiments and laboratory work in the mathematics room or laboratory on the same lines as they learn sciences by performing experiments in the science rooms or laboratories.
This method involves the maxims of teachings like 'learning by doing', 'learning by observation', and 'concrete to abstract' etc. The present day teaching is criticised vehemently on the ground that it provides a bundle of theoretical knowledge without any practical ground. J.W.A. Young has elaborated the task of laboratory method in the following words:

"The laboratory method aims to arouse teachers to a belief, not only theoretical but practical and effective as well that mathematical dishes must be made appetizing and palatable. They are to be accepted with pleasure and digested with ease."

Heuristic Method: Etymologically, the term 'heuristic' has been derived from the Latin word 'heurisko' which means 'I have found out'. The method as such was originated by Professor H.E. Armstrong. He was of the view that instead of the teacher, the child must be made to discover things himself. It is of no use to acquaint the students with facts rather they should be made to investigate or discover the facts. Knowledge is not the way or method of enquiry or investigation that should be aimed in the teaching and learning process.

Keeping in view of the above ideas he propagated the use of Heuristic Method. Elaborating the meaning of this method he writes "Heuristic method is the method of teaching which places
the students as far as possible in the attitude of a discoverer."

Any method, which is opposed to dogmatic method of teaching, which can make the students to learn or acquire knowledge independently by exercising their thinking and reasoning powers and which can foster the habit of self-activity and self-dependence can be called as heuristic method.

In this way, in true sense heuristic method aims to develop a particular type of attitude, namely as 'heuristic attitude' among the students. It seeks to bring a change in the nature of learner. He must not remain as a mere passive listener or receiver of the knowledge. From a passive recipient, he must be changed into an active independent enquirer, investigator and researcher. Instead of telling the things he must get opportunity of discovering them. In this way all the good new methods like Inducto-deductive method, Analytic-synthetic method, laboratory method, can take the form and shape of heuristic method, provided if the development of heuristic attitude may be properly aimed in the teaching-learning process.

**Drill Work:** Learning of mathematics needs sufficient practice or drill work. Knowledge of mathematics is said to be useful only when the students become able to use the learned facts. The ability to apply or use the knowledge comes through practice or drill work. Whatever principle or formula is learnt in any branch of mathematics its application becomes easy and simple through drill work. The concepts, facts and so many fundamentals of
mathematics become quite clear by revising and practising them through drill work. Drill work gives every opportunity to realise the basic aims and objectives of teaching mathematics. Students get opportunity to work independently. They try to analyse and solve the problems. Slowly and slowly drill work gives them opportunity for self-development. Later on this habit makes them courageous and bold to face the hardships of life. Drill work, in a way, is the most efficient means of fixing the impressions in the minds. Drill work helps not only in retaining the knowledge but also in the learning of skills.

So out of all these methods it is not possible to champion any existent in instructional method as clearly superior to any other. Each teaching method and each teaching strategy for forming groups, has its own unique strengths and weaknesses. Appropriate teaching activities depend on many factors, societal needs as stated in school curriculum, the nature of the subject fields, educational objectives, teacher characteristics, learning principles learner's characteristics, available instructional media, size of instructional group and so on. So there are many other methods of teaching and learning but no single method is sufficient in itself. Therefore, the teaching strategies are needed for teaching-learning process. So the need arises to prepare the different teaching strategies, and their effect on the said sample.
Teaching Strategies:

Teaching strategy is a plan for attaining learning objectives. It is made up of methods and techniques which will ensure that the learner does in fact reach the objective.

A teaching continuum is -

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<th>Exposition</th>
<th>Directed Inquiry</th>
<th>Discovery</th>
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Different methods which can be considered to chalk out a strategy are:

1. Lecture Method.
2. Demonstration Method.
3. Experimental Method.
4. Field Trips.
5. Role Playing.
6. Student Reports.

One or more methods along with different media combination can be involved in formulating a teaching strategy. The investigator has planned the above three strategies to teach some topics of mathematics.
Many research studies concerning different strategies and their effectiveness in relation to various process psychological and support variables have been conducted in the past. Some findings of the studies having relevance to the present study are given below:

**Intelligence and Achievement:**

The findings of the investigations by Rao, S.N. (1963) revealed that the High and Low achievers did not show significant difference in general mental ability.

Rastogi, K.G. (1964) found significantly positive relationship between intelligence and achievement both in science and English.

Sinha, D.N. (1965) found that in their intellectual capacity, the more successful students were significantly superior with a mean I.Q. of 112.98 as against that of 102.49 of the low achievers.

Study by Singh, B.N.K. (1965) revealed that academic achievement was significantly and positively related to intelligence, concept formation ability and academic motivation.

Feldman (1965) reported that on transfer test subjects of high ability did better than those of low ability, but subjects of low ability did better from study by text than study by programme.
Rao, D.G. (1965) concluded in his study that intelligence, study habits, and school attitudes were significantly related to the prediction of scholastic achievement.

Verma, M. (1966) revealed that intelligence had positive correlation with the achievement.

Vidhu, M. (1968) revealed that the correlation between intelligence and academic performance was positive and highly significant.

Joshi, J.N. (1970) concluded his study that superior intelligence is associated with higher scores on the algebraic concepts.

Jha, V. (1970) found in his study that there was a significant positive relationship between achievement in science and general intelligence but there was no relationship between achievement in science and extroversion.

Findings of study by Puranik, G.A. and Kundley, S. (1971) revealed that educationally backward and bright children differed significantly on intelligence, vocabulary and arithmetic ability bright ones scoring high on each test.

The findings of the study by Chaudhary, N. (1971) concluded that n-achievement and intelligence were not significantly and positively related to each other.

Pathak, A.B. (1972) revealed in his study that the high achievers had a significantly higher mean I.Q. (131.2) than the lower achievers.
The study by Gupta, R.C. (1972) concluded that there is significant positive correlation between intelligence and achievement in mathematics.

Sansumwal, D.N. (1978) concluded in his study that the mean achievement score of students belonging to high intelligence group was significantly higher than that of average and low intelligence group students. Also, the mean achievement of students belonging to average intelligence group was significantly higher than that of low intelligence group.

Thomas Gene (1981) while comparing the significantly different mean scores of high mental ability subjects over low mental ability subjects revealed a definite relationship between high mental ability and high achievement and concluded that mental ability appears to be a powerful predictor of achievement.

The study by Adaval, S.B. and others (1961) revealed the causes of failure in high school examination. According to their study, majority of the students who failed were below average in intelligence and they were introverts.

**Personality and Achievement:**

Brierlay (1961) has shown that intellectual performance may be broken down into at least three independent components. When this is done, it is found that the extroverts tend to be faster but less accurate and less persistent. In other types of performance (e.g., learning and psychomotor functions), the extroverts start
well but slip back progressively relative to introverts.

Rao, S.N. (1963) found that differences in achievement were significantly related to aspects of personality like neurotic difficulties, morale and sense of responsibility.

A study of Doty and Doty (1964) revealed that the achievement through programmed instruction appeared to be related to personality.

Gaur, J.C. (1967) in his study found that girl isolates are introverts lack common sense and fail to find immediate solution of problems. They are below average in intelligence. Isolate boys are introverts, aggressive poor in intelligence and their academic achievements is very poor when compared with the academic achievement of the normal group.

Vidhu, M. (1968) revealed that extroversion and academic achievement were negatively associated. The introverts were found to take less time than extroverts on Raven's Progressive matrices in the age group of twenty to twenty-five.

Abraham, P.A. (1969) revealed in his study that the influence of the temperamental dimensions of neuroticism (introversion and extroversion) on academic achievement showed sex differences.

Mohan and Kumar (1973) conducted a quantitative analysis of the performance of introverts and extroverts on the standard progressive matrices test. The performance of 100 students was examined in terms of items done correctly, wrongly abandoned and
not attempted, as a function of difficulty level and time spent on the test. In terms of overall I.Q. scores, the two personality types come out about equal.

Wankowski (1973) found that extroverts had obtained better grades at secondary school and were more likely to obtain a good degree at university. He concluded that, generally high neuroticism and extroversion combine to inhibit academic achievement.

Leith's (1974) studied the interactions between personality and different teaching methods in determining achievement on a genetics course. Over 200 students who had no previous knowledge of the material to be learned were involved in the study. Two teaching strategies were compared: Discovery learning stressed individuality, personal interaction, flexibility and spontaneity in teaching, tolerance of uncertainty and error making, and concern with global effects rather, than precise detail. The other approach, reception learning emphasised obedience, regularity, attentiveness, formality and direct instructions. These two methods were equally effective overall but there was clear tendency for the extroverts, to benefit more from the informal discovery learning and for introverts to learn better from the formal reception approach. This interaction was observed when achievement was tested one week after the learning period and was even more marked when subjects were tested without warning a month later.

Leith's another experiment (1974) showed that the extroverts are more easily bored by formal and isolated learning conditions.
Apparently, they need a greater amount of stimulation to maintain their interest and attention and this may be provided either by novelty and variation in the method of instruction or by social contact with fellow students. Given these conditions, they may even respond better than introverts, who are likely to feel overwhelmed by excessive uncertainty, and noisy companionships. The introverts, however, do better when conditions are structured and quite, thus introverts are not intrinsically better students than extroverts.

Eysenck (1974) found that generally introverts do better at school and achieve higher university grades, although extroverts are sometimes rated better by their teachers at primary school level. The advantage of introverts become progressively clear into the university years. This may be because there is less variance in intelligence, and personality differences therefore became relatively more important.

Methods and Achievements:

Khushdil (1960) compared the integrated and traditional approaches and found that in respect of assimilation and acquisition of knowledge, the former was more effective than the later.

Mehrotra, R.N. (1972) found that mainly four non-directive techniques were found to be in use viz. T-Group, Team teaching Group, Discussions and working in Groups; Secondly, he found that teacher education institutions were found to use group
discussion method by the way of tutorial groups, and working in groups method was utilised in organising cocurricular activities.

Study by Mitra, K.R. (197*0 revealed the following findings: (1) By for the Majority of the teachers were found dissatisfied with the existing methodology of teaching English; (2) There was a positive correlation between the students achievement in English and Hindi; (3) The results of the experiment also indicated the effectiveness and superiority of the evolved methodology.

The findings of the investigation by Reddy, N.Y. (1975) revealed that the mean score of the programmed instruction group was higher than that of the conventional group.

Waters, G.H. (1975) concluded that the individualised laboratory approach significantly improved the mathematics achievement of under achieving third grade students.

Patel, A.D. (1977) in his study concluded that the more anxious students could learn better through programmed learning material than their counterparts.

The findings of the investigation by Sodhi, G.S. (1977) revealed that the programmed learning method through branching frames was superior to lecture method in terms of total achievement and category-wise achievement in Chemistry.
Chakraborty, M. (1978) found that lecturing and questioning answering by using behavioural objectives was found to be more of active than lecturing and questioning answering for knowledge comprehension, application and total achievement at post test level and knowledge application and total achievement at retention level.

Grant, O.K. (1978) studied that the students participating in this experiment performed better when taught by the best linear approximation approach achieved a higher score on the achievement post-test than those studying calculus using the traditional approach.

Kirkpatrick, M.A. (1978) concluded in his study that there were no significant differences among the mean scores of the three groups as measured by the preachievement test and using Duncan's Multiple range test at the .05 level of significance the P.I.Group mean was no significantly different from the control group w.r.t. the post-achievement test.

Yassin, M.O.M. (1980) found in his study that the combination method was superior to the traditional method.

The findings of the investigation by Blume, G.W. (1981) revealed that abstract and verbal addition and subtraction problems are of equal difficulty for children at the Kindergarten and first grade levels.
Study by Fulton, A.N. (1931) revealed significant mean score differences between the control group and method A on the science concepts test. Differences at the .05 level also existed between method B and method C and the control group.

Ross, R.A. (1981) found that the teaching methodology as presented in the Southern Baptist Curriculum Base Design is effective in producing changes in the affective domain.

The findings of the investigation by Hawkins, V.J. (1982) revealed that situation learning did not produce an overwhelming achievement or extensive gain compared to the traditional learning group.

Study by Stuker, Earl (1982) revealed that the use of the Gems Program was no better than commercial programmes for developing computations and problem solving skills.

Methods and Sex:

Robert, R.R. (1972) found in his study that there was no significant difference in the gain scores of boys and girls under the two methods.

Pate, J.M. (1976) concluded that there was a significant difference between the means of the total experimental group experimental male sub-group and experimental female sub-group when compared to those of the total control group.
Sethi, A.S. (1976) concluded in his study that the interaction differences in performance of boys and girls appeared in to be independent of the modes of presentation.

Shitole, C.B. (1976) found in his study that the Programmed Learning Method is superior than the traditional one irrespective of the category and sex of the student.

Everett, F.F. (1980) studied that for intermediate Algebra, female students are more persistent and achieve better than males.

Clasen, D.R. (1982) concluded in his study that an attitude inventory towards earth science revealed significant sex differences, with males having a more positive attitude than females toward the study of earth science.

Methods and Intelligence:

Pandya, N.L. (1974) found that the experimental group achieved more in all the four tests; (2) the gain of the students of the experimental group at the post-test scores was significantly greater than the pre-test scores, (3) learning through programmed instruction material benefitted the students with high middle and low I.Q.

Dudley, A.G. (1983) found that differences in solution strategies were not apparent for permutations of the addition problem types. Problem permutations for the subtraction problems
in which the total followed the subtraction, in the data presentation initially appeared to be difficult for the average and the below average group.

The findings of the investigation by Gosain, K.K. (1977) revealed that there was no relation between sex and attainment through programmed instruction either in small steps or large steps.

Intelligence, Sex and Achievement:

Srivastava (1968) studied the important characteristics of achievement of students in different areas of curricular learning and the effect of intelligence and sex on the achievement in different areas.

Bhusan, A. (1973) found that (1) the mean of the attainment scores on post-test was found to be 78%; (2) the post-test scores were neither related with sex variable nor with the initial levels of the students in mathematics; (3) the post-test scores were significantly correlated with intelligence; (4) average attainment score of female group was found to be higher but less variable than the male group; (5) the t-ratio for post-test scores was not significant.

Study by Lalithamma, K.N. (1975) revealed that (1) there was significant difference in the performance of boys and girls in mathematics the difference being in favour of boys; (2) intelli-
gene and interest in mathematics were higher in boys and urban pupils than in their respective counterparts; (3) the achievement in mathematics was positively related to intelligence interest in mathematics study habits and socio-economic status.

Verma, M. (1977) concluded in his study that the performance of extraverts was significantly higher than that of intraverts.

Intelligence, Personality and Achievement:

Sinha, N.C.P. (1967) concluded in his study that (1) the two groups were significantly discriminated (beyond 0.01 level) on all the variables, namely, intelligence, achievement motivation, extraversion intraversion; (2) intelligence and academic achievement were significantly related (beyond 0.01 level); (3) academic achievement was found to be positively and significantly related to introversion-extroversion at .05 level.

Methods, Intelligence and Achievement:

Patel, C.B. (1975) concluded in his study that (1) the programmed learning material (PLM) planned to be more effective than conventional method; (2) high and low I.Q. groups of students performed better with PLM than with conventional teaching.

Chandrakala (1976) concluded in his study that (1) the three treatments, viz., programmed instruction (P.I.) lecture method (LM) and Traditional Method (TM) were equally effective in terms of students performance.
1.2 EMERGENCE OF THE PROBLEM:

A critical review of the literature in the field of instructional methodology leads one to conclude, that none of the teaching methods has distinctly emerged as a superior method over the others. The findings are controversial and inconclusive. It can be hypothesized that to teach a heterogeneous group, flexible and varied programme of instruction will suit. In most of the school, grouping of students is done randomly. This type of grouping gives rise to mixed ability groups. In order to teach a mixed ability group an integrated methodology - a teaching strategy integrating, different methods, materials and media suiting to the differential needs of the group should be evolved. Bruner Taba Ausebel and some others have evolved teaching strategies. In the present study the investigator intends to try some new teaching strategies for effective mathematics instructions.

1.3 STATEMENT OF THE PROBLEM:

"To study the effectiveness of different strategies of teaching on achievement in Mathematics in relation to intelligence, sex and personality".

1.4 OBJECTIVES OF THE STUDY:

1. Whether achievement in Mathematics is affected by different strategies of teaching or not.

2. Whether different strategies have differential effects on achievement of male and female students.
3. Whether levels of intelligence interact with teaching strategies in terms of achievement, or not.

4. Whether personality acts as a potential factor in selection of a teaching strategy or not.

1.5 HYPOTHESES:

The study will be advanced on the basis of following hypotheses:

1. Significant differences in mathematics achievement do not arise due to different strategies of teaching.

2. Intelligence does not account for differential achievement in Mathematics.

3. Sex does not account for the differential achievement in Mathematics.

4. Personality do not significantly effect achievement in Mathematics.

5a) There is no significant interaction between levels intelligence and strategies of teaching.

(b) There is no significant interaction between sex and strategies of teaching.

(c) There is no significant interaction between personality and strategies of teaching.
(d) There is no significant interaction between personality and intelligence.
(e) There is no significant interaction between intelligence and sex.
(f) There is no significant interaction between sex and personality.

6. No significant interaction of second order or third order will be observed due to intelligence, sex, personality and strategies of teaching.

7. There is not significant interaction among levels of intelligence and sex.