1.0.0. RATIONAL OF THE STUDY

The problem under the present study entitled "Classroom Questioning and Pupil Achievement: An Enquiry into Teaching Style" is a piece of experimental research. It seeks to find out the effect of three different teaching styles on the development of knowledge, comprehension and application abilities as well as the total achievement of the pupils of class VIII. The content of teaching has been selected from geography. With the classroom questioning behaviour of the teacher as an essential element of his style of teaching the study stresses on identifying an effective teaching style that may help the classroom teacher to produce better learning effect.

Any meaningful piece of educational research will acquire its rationale in the way it attempts to fulfil.
the desiderata of the current educational situation, the way it may add to the existing fund of knowledge in the particular area of research, or the way it may propose to help systematising the current theory and practices of education.

Currently the secondary education curriculum is in the process of change due to the implementation of uniform educational structure (ten plus two plus three) in this country. Now, curriculum reforms, in large measure, envisages more innovative and effective ways of teaching. And, newer ways of teaching can hardly be identified without a real understanding of the phenomenon of teaching through experimentation in real classroom setting. It is evident, therefore, that developing or reforming a curriculum is inseparably connected with and urgently necessitates researches on teaching and teacher behaviour.

In the national educational scene quality of education is another burning problem. Educational authorities are anxious, guardians are alarmed at the 'falling standard' or the low performance of the students in general in all levels of education, especially at the school stage. Whether standards are falling or the general performance of the school student is low, is really a debatable question; but,
the fact remains that instructional process in average Indian schools leaves much to be desired. And there lies the rub. Any attempt at revitalizing our educational system will necessitate more dynamic and scientific methods of teaching to be followed. And this will materialize only when effective ways of teaching are identified through well designed research on teaching. For this very reason the Report of Education Commission (1964-66) particularly stresses research on teaching methods:

The failure to develop proper educational research on teaching methods... Little has been done to find out in crucial sectors the methods that are best suited to our conditions and needs.

Modernizing the teacher education programmes - both preservice and in-service - is another urgent problem haunting the educational experts. University education departments, colleges of education and different national and state-level centres for teacher training are at a loss to formulate effective and adequate programmes for teacher education in absence of empirical evidences which would indicate the effectivity and adequacy of the programmes. The truth is that establishing a rationale for teacher education programmes needs intensive and extensive research on teaching, which is still lacking in this country. It is again worthwhile to remember the opinion of Commission (1964-66):
In each selected university, a Department or Institute or preferably a School of Education should be established to develop research and training programmes in collaboration with other disciplines. Its main function would be to work with a view to developing research and evolving better curricula and techniques of teaching.

As is evident from 'A Survey of Research in Education' (Buch, 1974) educational research in this country is an affair of nearly last three decades. But researches on teaching and teacher behaviour form a very very small portion of the total educational research in this country. Vast areas remain unexplored although the last decade has seen a spurt in this respect. "The actual place that teaching and teacher behaviour occupies in the total educational process is not reflected in the amount of research produced in the area." (Buch and Yadav, 1974).

The citations in the foregoing paragraphs about some of the more urgent problems in our system of education which have direct linkage with researches on teaching for their solution, only go to stress the point that such problems have to be tackled with more and more meaningful researches in this direction. Understanding the real nature of teaching so that the teacher in the classroom could be helped with suggestions as to what method has to be adopted for an effective process
of instruction becomes, then a sine qua non for resolving many of the problems in our educational situation.

Buch (1972) delineates the perspective of contemporary researches on classroom teaching: 'The contemporary emphasis in research on classroom phenomena is towards paying more attention on teaching as distinguished from learning. Studies designed to analyse teaching acquire their rationale in the light of the increasing realisation that not only a full understanding of the processes governing learning but a clear and definite understanding of the complex phenomenon of teaching will be needed to ensure the desired learning outcomes.' To Gage (1972) teaching is a series of events wherein teacher attempts to change the behaviour of students along the intended direction. Research on teaching, therefore, by implication includes the study of relationships between variables at least one of which refers to a teacher characteristic or behaviour of a teacher. Accordingly, to the researchers the central problem in the area of teacher behaviour has been the selection of a set of concepts to describe what goes on in the classroom. In this respect many a concept has been put forward or developed during the last few decades. Some of the more significant concepts are: pattern, critical behaviour (Flanders, 1970);
interaction pattern (Morine, Spaulding and Greenberg, 1971); strategy (Taba, 1969, Smith, 1963, Hough and Duncan, 1970; strategy—venture—move (Smith and Meux, 1970); episode—monologue—logical operation (Smith, 1963); cognitive structure (Gage, 1972); teaching cycle—pedagogical move (Bellack et al., 1966) and cognitive map (Mitra, 1972).

These concepts try to focus on different aspects of teaching-learning situation in the classroom. All these concepts have gone a long way to understanding the processes involved in the three aspects of teacher behaviour, namely, cognitive, affective and psychomotor. The concepts of strategies of teaching, pedagogical moves, critical behaviours and the like, follow a certain sequence with measurable probability and also they are related to certain educational outcomes. Keeping, therefore, in view the two main aims of research in the area of teacher behaviour, viz., specifying conditions for maximum pupil outcome and contributing to the development of a theory of instruction, the identification of such broad, permanent and general patterns of teacher behaviour would surely lead to better teaching—learning situation in schools. The present study is an offshoot of such thinking.

The number of studies on teaching as reported in the two 'Handbooks on Teaching' (One edited by Gage 1963; and
the other by Travers 1973) is quite impressive. Yet the results of research for the last two decades has made very little impact on teaching in the vast majority of schools in this country and even abroad. Not has it stimulated any sweeping change, except at the hands of a few enthusiastic experimenters. The reason for this is that even after an impressively large number of studies on many aspects of teaching, still many other aspects remain vastly unexplored. Research on teaching has remained largely descriptive. Perhaps time has not yet come when one can prescribe to the classroom teacher an effective way to teach. The simple reason is that problems embedded in research on classroom teaching are numerous and complex. In fact, actual teaching operations in the classroom are so varied, so complex, so fluid in nature as almost to defy any description whatsoever. Yet the researchers in this area are analyzing and trying out the concepts of teaching - some of these concepts have already been mentioned - and presenting still newer ones with the hope of understanding the classroom phenomena in a better way. One such concept is the style of teaching that has been experimented on in the present study.

From the foregoing discussion the logic of undertaking a study on teaching and teacher behaviour may be found in
the following lines of thinking: (a) From national educational point of view revitalising the system of education and developing new curricula depend ultimately upon more dynamic ways of teaching. And effective ways of teaching can be identified only through continuous research in the area. (b) For modernizing the teacher education programmes research on teaching is urgently necessary. (c) In order to help the classroom teacher in a better way classroom phenomena have to be thoroughly understood first through rigorous research. (d) If teaching is to be built into a science, scientifically designed experimental studies on teaching have to be undertaken. (e) From the point of view of fundamental research, newer concepts of teaching have to be tried out in order to help building up of a theory of teaching.

The present investigation was undertaken on the basis of thinking delineated above.

1.1.0. Teaching and Teaching Behaviour

In the earlier section (caption 1.0.0) a broader overview of the work to be done has been given. It has been mentioned that the present study aims at understanding teaching in relation to instructional objectives in the cognitive domain by undertaking experimental research. In
order to specify what aspects of teaching are to be studied, why and how, it is required to define and analyse teaching and teaching behaviour.

Teaching has been defined by many persons. Some of the more prominent contributors to the concept of teaching are: Thorndike (1913), Morrison (1934), Brubacher (1939), Smith (1961, 1963, 1971), Gage (1963), Hughes (1963), Green (1964), Turner (1964), Gagne (1965), Ryans (1965), Macdonald (1965), Amidon and Hunter (1967), Searles (1967), Skinner (1968), Flanders (1970), Smith and Meux (1970), Hough and Duncan (1970), Mitra (1972) and Bidwell (1973). It may be worthwhile to take a few samples of these definitions of teaching.

Thorndike : Teaching is the arrangement of situations which lead to desirable bonds and make them satisfying.

Skinner : Teaching is the arrangement of contingencies of reinforcement under which students learn.

Morrison : Teaching is intimate contact between a more mature personality and a less mature which is designed to further the education of the latter.
<table>
<thead>
<tr>
<th>Author</th>
<th>Description</th>
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<tbody>
<tr>
<td>Ryans</td>
<td>The functioning of the teacher system is described as teacher information processing, information forwarding, and information control.</td>
</tr>
<tr>
<td>Gage</td>
<td>By teaching, we mean any interpersonal influence aimed at changing the ways in which other persons can or will behave. The influence has to impinge on the other person through his perceptual and cognitive processes.</td>
</tr>
<tr>
<td>Flanders</td>
<td>Teaching behaviour, by its very nature, exists in a context of social interaction. The acts of teaching lead to reciprocal contacts between the teacher and the pupils, and the interchange itself is called teaching.</td>
</tr>
<tr>
<td>Smith</td>
<td>Teaching is a system of actions involving an agent, a situation, an end-in-view, and two sets of factors in the situation - one set over which the agent has no control (for example, size of classroom and physical characteristics of pupils) and one set which the agent can modify with respect to end-in-view (for example, assignments and ways of asking questions).</td>
</tr>
<tr>
<td>Mitra</td>
<td>Teaching is a series of acts carried out by a teacher and guided by the formulation of teaching task in a formalised instructional situation.</td>
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For the purpose of the present study it is not required to compare and contrast all the definitions of teaching referred to above and all those quoted here. Main aspects of teaching that are focussed in these definitions have to be considered and then it may be judged how far some of these specific aspects of teaching could be brought under experimental study in order to understand classroom phenomena in a better way. The task has been simplified by Mitra (1972) who has classified the definitions of teaching broadly into three types: (i) imparting knowledge or skill, (ii) doing anything and everything that may lead to learning, and (iii) a social act of influence. It is evident from this classification that the definitions of teaching differ in their scope, emphasis and focus. Some of the definitions have too broad a scope, as for example, that of Gage's, which defines teaching as an act of 'interpersonal influence aimed at changing the ways in which other persons can or will behave,' while some are too narrow in scope, such as that of Skinner's, which defines teaching as 'the arrangement of contingencies of reinforcement.' Mitra (1972) has interestingly remarked: In Gage's approach one finds a broadening of the concept to such an extent that it may include salesmanship as well as hypnosis.
For Skinner, on the other hand, it is narrowed down to 'arrangement of contingencies of reinforcement.' Again, in defining teaching some persons (like Smith and others) emphasise the activities of the teacher giving less importance to teacher-pupil interaction in the classroom, while some persons (like Flanders and others) equate teaching solely to interaction process in the classroom and relegate to the background the teacher's conscious efforts to influence and change the behaviour of his pupils in the desirable and prefixed direction.

Perhaps the focus and emphasis of the definitions of teaching may be clearer if one looks at them from the viewpoint of models of teaching. An examination of the researches done till date in the area of teaching will indicate that teaching models have their basis on one or more of the definitions of teaching. Models of teaching are developed according to the way one works at the processes of teaching and learning. Even the teacher in the classroom has a teaching model however indistinctly he keeps it in his view. Different researchers have put forward different models of teaching in order to explore the classroom phenomena, as they have been listed down by Joyce and Weil (1972). There are four main groups of these
models: Information processing models of teaching emphasise the information processing capability of the students. The social interaction models of teaching have their orientation towards the improvement of the individual's ability to relate to others. The third group of models are those which largely draw on personality development as a major source. The behaviour modification models are developed from an analysis of the process by which human behaviour is shaped and reinforced. It may be seen that the types (i) and (ii) of Mitra's classification of the definitions of teaching conform to information processing models while type (iii) may be viewed under social interaction models of teaching. Among the models, however, the behaviour modification model seems to be more workable for the studies of classroom phenomena, as it is largely worked upon by the researchers in this area.

Following the orientation of behaviour modification models an analysis of the definitions of teaching will help one to arrive at certain specific aspects of teaching that may be utilised in studying the teaching-learning process in the classrooms. Firstly, teaching seems to facilitate learning. But very many things may facilitate learning. The concept of teaching here is not specific enough to
justify useful operationalisation. Secondly, the process of interaction seems to be the elemental aspect of teaching-learning situation in the classroom. It covers all verbal and non-verbal activities of the teacher and the pupils in the classroom. Thirdly, effective teaching seems to connote, among other things, a sense of direction - an element of conscious goal-achieving behaviour on the part of the teacher without which teaching may not facilitate learning to the desired extent or interaction in the teaching-learning situation may become haphazard, diffused and ultimately fruitless. These three aspects of teaching as may be exhibited by the teacher in the classroom situation will form the basis of studying teaching in the context of the present investigation. Teaching may, therefore, be defined, for the purpose of the present enquiry, as an interactive process between the teacher and the pupil in the classroom situation with predetermined goals to be achieved.

Teaching Behaviour:

Teaching behaviour is the phenomenon of enquiry under the present study. For a scientific study of teaching to know behaviour it is required what is specifically meant by it. The problem is that in the research literature often it is
found that the terms teaching, teacher behaviour and teaching behaviour have been interchangeably used, meaning thereby that these terms perhaps connote the same thing. In the context of the present study it has been thought proper to resolve this anomaly and confusion by clearly distinguishing between these terms. Teaching has already been defined in the earlier section. In this section teaching behaviour will be defined and distinguished from teacher behaviour.

If one observes a real classroom situation, one will find that there are two different sets of activities involved in the situation. One set of activities is exhibited by the teacher himself. These are: teacher asking questions, listening, confirming, clarifying, reprimanding, showing something to pupils, observing their efforts and so on. These activities of the teacher in the classroom have been recognized by Smith and Meux (1970) as teacher behaviour. During the teaching-learning process another set of activities is exhibited by the pupils. These may include: asking questions, responding, observing an experiment and so on. These are pupil behaviours.
Teaching behaviour, by implication, includes all the activities exhibited in the total teaching-learning situation in the classroom. From the examination of definitions of teaching and according to the definition of teaching accepted for the present study, it is clear that teaching behaviour will include both teacher behaviours and pupil behaviours in the classroom situation, and will imply both verbal and non-verbal behaviours of the teacher and the pupils. It may be pointed out here that there are certain behaviours on the part of the teacher as well as the pupils which have hardly any bearing on the goal-achieving aspect of teaching (vide the accepted definition of teaching in the earlier section). Examples of such behaviours are: teacher scratching his head while talking, student blinking eyes while responding, etc. These are mostly unavoidable mannerisms of normal psycho-somatic origin, and may be safely omitted from the purview of teaching behaviour. Teaching behaviour, thus, stands specified as the total set of teacher and pupil behaviours occurring in the classroom situation which generates learning.

1.2.0 An Approach to Teaching Style

Although teaching and teaching behaviour have already been defined specifically, yet the difficulty of studying
them experimentally lies in the fact that there may be innumerable teaching behaviours called into play in the real classroom situation. With a view to identifying an effective way of teaching as has been visualised in the present study, one has to take an approach in studying numerous teaching behaviours and the consequent learning outcome. In such a situation researchers have often taken help of some hypothetical constructs or concepts to understand the modus operandi of the teaching behaviours. The rationale of conceptualising lies in the basic fact that the teaching behaviours in the classroom show some regularity and order - to assert a bit more optimistically - a logical order. This consistency and order in the apparent variety of occurrence of teaching behaviours in the classroom situation form the basis of conceiving the style of teaching to understand classroom phenomena. The clarification of the concept of teaching style will necessarily require exploring the other relevant concepts (as has been mentioned in the caption 1.0.0) in this respect. In this section these concepts are briefly discussed first and then follows the exposition of the concept of teaching style.

The concept of 'pattern' of teaching behaviour has been mainly due to Flanders (1970). According to him...
behaviour is defined as acts by the teacher which occur in the context of classroom interaction, an 'event' may be considered as the shortest possible act that a trained observer can identify and record. Often, during classroom interaction, the same sequence of events occurs again and again; such a sequence can be called a pattern. This idea of pattern has been accepted by Sharma (1972) in her study. Here the terminology used is the 'pattern of teacher classroom behaviour' instead of 'patterns of teaching.' During the study, not only the teacher behaviours but also the pupil behaviours are used in the development of patterns. It is worth noting that Flanders (1970) has excluded pupil behaviours in the classroom in defining teaching behaviour. This lacuna in the definition has been overcome by Padma (1975) as is the position taken in the present study in defining teaching behaviour. The 'pattern' of Flanders (1970) seems to be akin to the 'pattern' of Padma's study (1975) but for a little difference. Here (in Padma's study) the pattern is not only considered as the repetition of a sequence of certain teaching behaviours, but also takes into account the approach being involved in the process.
Marine, Spaulding and Greenberg (1971) have come out with the concept of 'interaction pattern' which is a unit of exchange between the teacher and the pupil, beginning always with a question by the teacher followed generally by a student's answer, and ending with the teacher's reaction to the student's answer. In the study of Morine, Spaulding and Greenberg (1971) different kinds of 'interaction patterns' could be distinguished from one another by the difference in the ending of the pattern, i.e., by the teacher's reaction to the student's answer.

In understanding classroom phenomena the concept of 'strategy' has been put forward by many persons like Smith et al. (1967), Taba (1969), Smith and Meux (1970), Hough and Duncan (1970), Gerhard (1971), Fraenkel (1973), and also by Flanders (1970). 'Traditionally', Gerhard (1971) holds, 'teaching strategies have been classified as a series of methods ranging from lecture, discussion, and recitation to the multi-method, the project, the self-discovery, and the self-selection approach. Provided with these methods, how do we use them to promote process and how
do they fit within the behavioural approach? It is clear from Gerhard's (1971) statement that he equates teaching strategies to teaching methods. Again, Fraenkel (1973) has looked upon strategies of teaching exclusive of the pupils' learning activities. While Gerhard's statement about teaching strategies is too global to bring the concept under the purview of experimental study, Fraenkel's definition suffers from incompleteness due to exclusion of pupil behaviours in the classroom.

The concept of teaching strategy has been more searchingly looked into by Smith (1963), Smith and Meux (1970), Taba (1969), Hough and Duncan (1970) as well as Flanders (1970). Taba (1969) thinks that it is useless to study teaching in general as a global process serving all objectives of education. Rather, she holds, it seems necessary to identify the particular teaching strategies required by particular types of learning goals, such as, generating certain cognitive operations, stimulating certain types of enquiry, and integrating certain bits of information into larger concepts. These strategies must be composed in the light of a theoretical framework in which appropriate dimensions of teaching-learning situations are covered. Taba's teaching strategies consist of a series
of sequential sub-units like focussing, extending thought on the same plane, lifting thought to a higher plane, and controlling thought. Thus, according to Taba the classroom teacher is required to make quick and subtle judgements about the cognitive processes of the pupils when the discussion has got to the point that an attempt at generalisation is called for.

Smith and Meux (1970) referred to 'strategy' as a pattern of acts that serve to attain certain outcomes and to guard against certain others. To insure that certain learnings will be acquired in as brief a time as possible, to induce pupils to engage in an exchange of ideas, and to minimise the number of wrong responses as the pupils attempt to learn concepts and principles, are some of the general objectives towards which a strategy may be directed. In a study Smith and Meux (1967) operationalised 'strategy' as a particular sequence of sub-topics within the teaching of a given topic. The categories of topics according to them are causes, concepts, evaluations, interpretations, procedures, rules, reasons, and particular information. In each of these categories of topics classroom discourse could be further atomised into 'ventures' and 'moves', a 'move' being the smallest sector of discussion in which a
single piece of information about any of the topics is described or discussed. Thus, a strategy may be seen as a particular sequence of moves. Different teachers could be described and contrasted in terms of the common sequences of moves which occurred in their classes. Smith (1963) alone, however, atomises a teaching strategy in a bit different way. The smaller movements constituting the tactical elements of 'strategy' are considered by him as 'episodes', which are nothing but a string of mutual utterances between the teacher and his pupils. Vis-à-vis episodes there may be 'monologues' in the classroom, which are utterances made by either the teacher or the pupils, and stand alone. Further, episodes may be viewed as logical operations, that is, a form of rule-guided behaviour, correctible by criteria, in which definite limits are set and the chances of behaving ineffectually are reduced. If the teacher is aware of logical operations and knows the rules by which they are performed, he will be in a position to monitor his behaviour in so far as these operations are involved in it. The examples of logical operations are defining, describing, inferring, explaining, etc. It is worth noticing that the idea of logical operations quite fits into the definition of teaching strategy as given by Smith and Meux (1970).
Hough and Duncan (1970) define strategy somewhat in the line of Smith (1963) and Smith and Meux (1970). According to them strategy is composed of a series of moves, where a move is defined as a single event that starts with the initiation of a behaviour and ends with its transition to another behaviour. Strategies are often used in conjunction with tactics which are defined as a pattern of appraisal behaviours used to support the primary instructional pattern, i.e., strategy. Thinking of the classroom situation, teacher asking a question, followed by a move to student response, and a student response, followed by a move to another teacher question, form a strategy. This strategy is supported by appraisal behaviours (tactics), such as confirmation or corrective feedback.

Flanders (1970) has also defined 'strategy'. The concept of pattern as expounded by Flanders has already been discussed at the beginning of this section. According to him a strategy is nothing but a number of patterns strung together. Thus,

Smaller to Larger

(Events) ---- (Sequence of events) ---- (Strategies)
The idea of 'patterns' has been further extended with a little modification into the concept of 'critical behaviours' by Flanders (1970). Thinking of the least effective classroom only a limited number of behaviour patterns are necessary to describe the process of interaction. These patterns might be a part of lecturing, asking narrow questions, giving restrictive directions, and so on. Such patterns are the most common, easiest to adopt and involve straightforward application. Now, in order to push up teaching effectiveness, a few new patterns need only be understood and added to the repertoire of teaching behaviours. According to Flanders (1970) these are known as critical behaviours, viz., making use of pupils ideas, and providing more effective explanations with praise, direction, and criticism. Thus, a few additional patterns greatly increase the possible sequences of teaching behaviours in the classroom with the result that these new skills (critical behaviours) permit a large increase in teaching effectiveness.

Bellack, et al. (1966) have shown that verbal performance of teachers and pupils in the classroom may be described by analysing the classroom discourse in terms of some basic categories. These are 'pedagogical
moves', 'teaching cycles' and various categories of meaning. Classroom phenomena may be viewed as a kind of language game. The basic unit of discourse is defined as a pedagogical move. These moves are classified in four major categories according to the pedagogical functions they serve in the classroom discussion, viz., structuring, soliciting, responding and reacting. These four types of moves describe the verbal manoeuvres of both teachers and pupils in the classroom discourse and set the framework for the analysis of meanings communicated in the classroom. Within each type of move there may be different kinds of meaning associated by the teacher and the pupils in the classroom communication. It has been observed that the structuring and soliciting moves are initiatory, while responding and reacting moves are reflexive. Pedagogical moves are found to occur in the classroom discourse in certain cyclical patterns and combinations of moves with different associated meanings. These are designated as 'teaching cycles.' The focus of teaching is on combinations of pedagogical moves and sequences of linguistic events in the classroom. Thus, by utilising the concept of teaching cycles, it is possible to determine
the extent to which solicitations elicit single or multiple responses, or the regularity with which reactions follow responses. Teaching cycles provide a way of describing pedagogical moves in relationship to each other. If a single pedagogical move is compared to a move in chess or single play in football, then teaching cycle may be considered as an interrelated series of moves or plays.

Gage (1972) puts forward the idea of 'cognitive structure' to understand the teaching-learning phenomena. He proposes that teaching processes in general may be conceived as 'exertion of psychological force.' Psychological force is difficult to define exactly, but it involves the effects of stimuli that get into the human organism via sensation and perception and act upon their central nervous system. According to Gage there exist three kinds of teaching force. How these forces exactly operate to produce learning is a challenging problem to the researchers. Since teaching is conceived as exertion of three kinds of force that bring about learning, one may speak of teaching by conditioning the learner, teaching by modelling or initiation on the part of the learner, and lastly, teaching by changing the 'cognitive structure' of the
Teaching by changing the cognitive structure of the learner consists in arranging for the pupils to understand facts, concepts and principles in such relationships that the desired kinds of learning may result. If the teacher wants a pupil to understand a new phenomenon, he can induce him to understand it by showing how it is merely an instance of a general principle. In doing so, he can exert perceptual and cognitive force in terms of similarity and contrast, grouping, emphasis, analogy, context, logic, etc. Properly used these forces will make the pupil see the cue to a concept, a principle, or the solution to a problem. These forces operate to bring about the change in cognitive structure that many kinds of learning consist in. 'Cognitive structure', thus, refers to the organisation of facts, concepts and principles. Such a structure is not quite arbitrary. It is determined partly by how human mind works and partly by the subject, that is, the intellectual discipline to be studied. The cognitive structure of logical processes is compelling in nature and makes conclusion easier to reach, once appropriate premises have been stated. The tighter the logical or perceptual ties that hold a body of ideas or facts together the better the teacher can teach this way.
Somewhat in line with Gage, Mitra (1972) also tries to explain the teaching-learning process from the standpoint of psychology by forwarding the concept of 'cognitive map.' It may be seen that in formulating the teaching task in a given situation, the teacher makes an assessment of the stage of development of the learner with respect to the learning outcome finally to be reached. In doing this assessment, a teacher should have a 'cognitive map' in his mind in which is delineated a goal and a path to the goal in terms of subject-matter knowledge under consideration. While there is room here for individual organization of the cognitive map, it is limited usually by the logic of the subject or structure of the discipline as it is called in education. The cognitive map is widely shared by the teachers and has more or less clear-cut areal-wise and step-wise divisions which the learner has to pass to reach mastery. The teacher only makes an assessment of the position of the pupil on this map. In order to know where the pupil is at the moment, how far he has to go, in which direction, etc., the teacher may either elicit responses in a prearranged or spontaneous manner or depend upon his recollection of responses already made by the pupil earlier. The degree of
sophistication or objectivity is unimportant from the point of view of a psychological theory of teaching. The important thing to note is that the teacher must have a differentiated cognitive map of the behaviour domain for which he is responsible and that he must observe pupil behaviour relevant to behaviour domain and form a judgement about his location in the map.

The set of concepts that have been discussed in the foregoing paragraphs try to focus on different aspects of teaching-learning situation in the classroom. To highlight some of the more significant aspects of this discussion which are crucial for the present study:

(i) In order to study teaching scientifically teaching behaviour in the classroom should better be considered from micro point of view, i.e., instead of viewing teaching behaviour globally they have to be atomised.
(ii) Due to sequence and order in the occurrence of these micro units of teaching behaviours larger units may be conceived which are nothing but combinations of these micro units. Patterns, strategies, or teaching cycles can be identified as these larger units of teaching behaviours which are, in all probability, related to different educational outcomes. (iii) Looking at the
classroom phenomena from the point of view of criterion of effectiveness of teaching, the question still remains as to how to select a particular combination of teaching behaviours or to vary the teaching operations so that teaching will eventuate into learning. The ideas of critical behaviours, cognitive structure and cognitive map are different approaches to tackle this question. The present concept of teaching style is an approach to study teaching in this direction.

Often in the literature on teaching the word 'style' has been very loosely used in respect of teacher classroom behaviour. It has, in general, implied the characteristic way the teacher carries on with his job in the classroom situation. From a study of researches done on this concept, it seems that there are larger proportions of teacher personality aspects which mainly account for his style of teaching.

Numerous attempts have been made to categorise teachers in terms of the general teaching styles they adopt. A well known comparison of general styles is that between so-called authoritarian and democratic teachers. This stemmed from the social psychology of Kurt Lewin
and his followers (e.g., Lippitt and White, 1943), and although it was initially applied in studies of children's club groups under different styles of leaders, the possible relevance to educational arguments over teacher-centred and learner-centred classrooms soon made for a popular line of investigation.

Ryans (1969) in his study of characteristics of teachers has identified three general ways in which teachers differ in their behaviour: (2) Warm, understanding, friendly versus aloof, egocentric, restricted behaviour; (ii) Responsible, businesslike, systematic versus evading, unplanned, slipshod behaviour; and (iii) Stimulating, imaginative versus dull, routine behaviour. The above variables of teacher classroom behaviour as studied by Ryans (1969) clearly bespeak general classroom style of the teacher emphasizing personality aspects.

Even the idea of teacher classroom style is germane to the basic concepts of many of the representative systems of interaction analysis. In fact, directness and indirectness of teacher behaviour as conceived in the Flanders Interaction Analysis Category System have a very clear correspondence to authoritarian and democratic
styles of teacher in the classroom. This fact has found support from the studies of Anderson and Brewer (1946), Lippitt and White (1943), Withall (1949), Flanders (1951), Perkins (1951), and Cogan (1956).

Flanders (1967) himself remarks: 'Most of the researchers have their own favorite words to describe essentially the same behavior patterns, viz., Anderson and Brewer: dominative vs. integrative; Lippitt and White: authoritarian vs. democratic vs. laissez-faire; Withall, Flanders, Perkins: teacher-centred vs. student-centred; and Cogan: preclusive vs. inclusive'. These studies, however, could not throw enough light on the questions: 'Why and when should a teacher react in either a dominative (authoritarian) or integrative (democratic) manner?' Only an adequate theory of instruction could specify the effects of integrative or dominative style for different types of situations that occur frequently in the classroom. In other words, there is a need for a dynamic explanation of how short-term patterns of teacher influence affect momentary situations so that the flexibility of the teacher's behavior is taken into account.

Shumsky (1968), after being in search of teaching style, expresses his thinking somewhat in a similar line, but in a more concerned tone:
Administrative and other issues regarding policy decisions may prove secondary in terms of their effect on what really happens to children. The main problem of schooling, potentially more influential than the hotly debated issues is the quality of teaching behaviour to the classroom. What are the dimensions and variations of the teaching style? Why do teachers teach the way they teach? What is the threat and challenge the teachers perceive in various teaching styles? What is the impact of specific styles on children? How can teaching styles be improved and what is blocking this improvement? Progress on these questions will result in higher academic achievement and better intellectual, social and emotional functioning of the children.

As is evident from Shumky's (1968) citation he conceives the teaching style in terms of a teaching method and does not specify it in terms of concrete teaching behaviours as exhibited in a real classroom.

Davis (1972), however, viewed style as a 'process of thought patterning' in her study. The point of interest here is that the process was specified in terms of sequence, intensity and duration. Although the 'style' concept by Davis (1972) has very limited application in classroom situation, it gives a clue to the fact that effectiveness of a style of teaching will perhaps depend upon the teaching behaviours it includes. Seperson (1973) compared the teaching styles of student teachers with those of
their cooperating teachers, but he could not operationalise the concept of style of teaching.

In many studies it has been seen that the meaning attached to 'style of teaching' includes in its perview quite a large proportion of teacher personality aspect. This makes the concept of teaching style a highly nebulous one which is less susceptible to quantification. Researchers seem to have tried so far to interpret teaching style in global terms, but the point, however, is to make it more objective and skill-oriented. Gallagher (1970) has been able to bring objectivity into the concept of style. 'Style' as one of the dimensions in Gallagher's (1970) Topic Classification System deals with the mode of handling the discussion in the classroom. The focus is on a type of information processing in the larger sense of the term. The focus can be on 'description', of defining and describing aspects of a concept or happening; on 'expansion' which leads the class off in other lines of thinking or new associations; on 'explanation', or the attempts to present reasoned arguments through sequential steps. It has been suggested that the emphasis on various styles influences the students' own way of information processing.

Baird (1973) made an exploratory study of the dimensions and effects of teaching style. His descriptive
framework consists of six dimensions of teaching style: the didactic, generalist, and researcher approaches to subject matter, student response, ambiguity and warmth. Baird (1973) has tried to strike a balance between specificity and generality of the concept of teaching style. He has included in his framework of teaching style a very global dimension like the generalist approach to subject matter as also a very specific dimension like student response. This indicates a possibility of developing styles of teaching including in their dimensions one or more of the elements from a large set of teaching behaviours in the classroom situation.

This possibility of developing teaching styles gets supported and takes a concrete shape in the argument of Turner (1971) who has conceptualised teaching along three primary dimensions: structure, substance and style. According to him, to assert that certain teaching behaviours on the part of the teacher, must be performed in order for teaching to occur, and to assert that performance of certain teaching behaviours in the classroom increases the possibility that teaching will eventuate in learning, is to make assertions about structure of teaching. Substance in teaching is not an operation or
classroom behaviour of either the teacher or the pupils. It is what the teacher and the pupils operate on or with. Substance may be considered as one of the varieties of teaching which may be hypothesised to interact with the other two dimensions - structure and style. To assert how variation in performance of the teaching operations or behaviours in the classroom, on the part of the teacher, bears on learning outcomes, is to make a statement about teaching style. To quote Turner (1971):

Style in teaching is wholly a matter of synthetic proposition. Propositions about style deal with variations in the way in which the operations involved in teaching are performed.

It is evident that variation in teaching behaviours in the classroom situation is the crux of the concept of teaching style. In a real classroom teaching behaviour is a large set of behaviours exhibited by the teacher as well as the pupils. The problem is how to effect this variation in teaching behaviour. The variation may be meaningfully effected by selecting the major categories of teaching behaviours and then developing teaching styles on the basis of one or more of these categories. In the present investigation styles have been developed with three component elements: Classroom questioning, response of the
pupils, and feedback, given by the teacher (vide caption 1.4.1). It may easily be seen that these are the three major categories of teacher-pupil behaviours in the classroom. Thus, one of the teaching styles ($S_2$) has been conceived in which questioning and response occur. Another style of teaching ($S_3$) has been developed in which questioning, response and feedback may be sequenced in all possible ways and will continue during the classroom discourse in short or long chains. A third style ($S_1$) has been conceived in which questioning is minimum, pupil response is, therefore, minimum, and there is no feedback given by the teacher. In a real classroom this style of teaching can be identified as 'lecturing' only.

It may be seen that questioning and feedback are the two essential elements of the concept of teaching style in the context of the present study. For maximization of learning which is the goal of teaching, it seems imperative that these two aspects of teacher classroom behaviour should be stressed. Teaching being an interactive process, without a question from the teacher interaction in the classroom does not properly trigger off, and the learner cannot easily get down to the process of learning. And the role of teacher feedback is to give satisfaction and
confidence to learner so that he may come out with greater intellectual participation in the class.

This concept of teaching style demands that it is not enough that a teacher has all these teaching behaviours (components of styles) present in his repertoire; he must know very well how to vary the teaching behaviours to their best utilization in different learning situations. Only then pupil outcome may be maximised.

The above discussion may be summarized to suggest that (i) there is a need to experiment and find out what effective teaching is; and (ii) every research needs to be explained within its conceptual framework. With this broad guidelines in view the present investigation envisages to find out certain styles of teaching which may be effective in pupils' achievement of certain instructional objectives, and to interpret the findings in terms of the specified styles of teaching and objectives of the study only in the context of the included pupil samples. In the following caption efforts have been made to discuss research relating to different dimensions of teaching behaviour which may serve to generate the hypotheses for the present study.
1.3.0 Trends of Research on Teaching

Better teaching is a condition for better learning, and 'how to teach better' is a problem that has always challenged the thinking mind. Systematic studies on teaching, however, began to appear in the first and second quarters of the present century. Barr's study (1929) on 'characteristic difference in the performance of the good and the poor teachers' may be considered as one of the initial milestones. But in the last decade and a half the number of studies on teaching has increased well enough to justify the publication of two 'Handbooks of Research on Teaching' (Gage, 1963; Travers, 1973) and numerous other reviews and reports of researches in the area are constantly pouring in.

In the beginning studies on teaching were largely influenced by the facts of 'learning'. Even teaching was considered to be a mirror image of learning. It was thought that if one knows about the aspects of learning one could develop a better way of teaching by adapting these aspects in the process of teaching. But in the contemporary researches on teaching focus is gradually shifting towards studying it from its own independent standpoint. This has given rise to the trend of conceptualising teaching (as
discussed in caption 1.2.0.) in terms of its component skills or teaching behaviours (discussed in caption 1.1.0.), the ultimate aim being establishment of a theory (or theories) of teaching.

The discussion of the researches on teaching will be clearer if the nature of the variables studied, and the approaches to methodology adopted are kept in view. In respect of variables, the studies on teaching fall into three major categories according as they investigate (i) presage, (ii) process or (iii) product variables. Commonly studied presage variables are teacher's age, sex, experience, speech ability and so on. 'Process' variables include teacher asking questions, pupil responding, teacher giving feedback, etc. The outcomes as a result of the process constitute the 'product' variables such as pupils' attitudes, achievements, abilities, etc. Thus, the studies on teaching are found to examine the relationship between presage-process, presage-product, and process-product variables. Process-product studies seem to be of crucial importance in view of their possibility to establish relationship between teaching behaviour and pupil outcome and there is a definite stress on such studies in order to locate teacher effectiveness. With regard to methodology
adopted by the contemporary researches on teaching. Rosenshine and Furst (1973) have introduced the paradigm of 'descriptive-correlational-experimental loop' for the study of teaching which is parallel to the classification of such studies into descriptive, presage-process, and process-product studies.

With the above ideas in view one may perhaps explain the failure of the first major study, that of Barr and his associates (1967) at Wisconsin, to single out significant factors of teacher effectiveness. In these studies teacher effectiveness has been evaluated on the basis of the criteria like (i) efficiency rating of one sort or another, and (ii) measured pupil gains. Different members of the Wisconsin group (Jayne, 1945; Schmid, 1950; Lamke, 1951; Erickson, 1954; Bar, 1961; and Peronto, 1967) used different techniques and criteria in their study. It can be seen that these studies have attempted to establish a direct relationship between the presage and product variables by-passing the process variables, which may be attributed to failure of obtaining any consistent and significant results. However, the results of these studies have left for the succeeding researchers a clue to the importance of process variables in studying teacher effectiveness.
Representative analytical and descriptive studies were made by Ryans (1969), Smith and Meux (1962, Bellack et al. (1966), Hughes (1963), Perkins (1965), Waimon (1962) and Taba (1964). Ryans (1969) studied teacher behaviour in terms of its components, patterns, variations and relationships and identified patterns of teacher behaviour which differentiated teachers with respect to some personality characteristics. Smith and Meux have analysed the oral discourses in seventeen high school classes in different school subjects, and have identified certain logical operations (vide caption 1.2.0) in teaching. However, a significant observation has been that teachers do not employ logical operations as appropriate in adequate measure. Bellack and others (1966) analysed the linguistic behaviour of fifteen high school classes. The amount of learning by the pupils was also measured. They identified a number of pedagogical moves and teaching cycles (vide caption 1.2.0). But the more discussed topics were not found to produce more learning. Hughes (1962) categorised teaching acts into seven classes and observed thirtyfive teachers for ninety minutes in each class. She asserted that teachers demonstrated different patterns in teaching and that responsiveness on the part of the teacher to children's remarks, questions, etc., would lead
them to better involvement in content and stimulate use of higher mental processes. Perkins (1964) attempted to measure student-behaviour, learning activity, teacher behaviour and teacher-role variables which were presumed to be related to differential achievement. Large percentages of teachers were found to demonstrate listening-helping behaviour, while very few teachers were found to use pupils' answers or ideas, ask 'thinking' questions, or to use praising. Waimon (1962) studied correlative teachers' responses in the class in nineteen lessons. He found that learner directed correlation mostly sought to change the learner's needs and goals or his learned ideas or skills. Taba's (1964) endeavour was to analyse and relate teaching strategies and thought processes (vide caption 1.2.0). She observed that findings about general cognitive styles failed to shed light on the processes by which these styles are acquired. This is why she emphasised specific teacher behaviour that exerted influence on the thinking of students. The nature of classroom questioning, what the teacher gives to the students or takes from them, the timing of these acts in the total sequence, which ideas are picked up for elaboration and which are passed over, points at which approval and
and disapproval are given, etc., are some of the crucial aspects of teaching behaviours which, Taba asserts, are possibly related to development of pupils' ability to think.

Studies have been undertaken to relate teacher characteristics as predictor variables to aspects of process taken as criterion variables. Some studies, again, have sought to relate descriptive variables to measure of student achievement or other outcomes. These two types of studies have adopted correlational approach in respect of methodology.

Furst (1967) involved fifteen teachers and 345 pupils for seven hours of instruction. Pre-test and post-test on knowledge were administered, with four days of instruction in between. Teachers of high achievement groups tended to be more indirect, low achieving teachers were more direct, and teachers of average groups tended to minimise affective behaviour, concentrating on lecturing. Herman (1967) also had similar findings.

In respect of the nature of questions asked by the teachers different studies yielded different results. Kleinman (1964) found that high achieving teachers asked more high level questions whereas Spaulding (1965) found that they asked fewer open-ended questions. Thompson and
Bowers (1968) found them using both divergent and convergent questions. Church (1971) concluded from his studies that both these types of questions had a place and had their own optimum levels depending on the nature of the classroom objectives of the teacher. Johns (1966) found that if the teacher uses more of the pupils' ideas, they will not only have better attitudes but also ask more thought-provoking questions. Dool (1966) found support for this observation. Johns (1968) also similarly found that there is a positive relationship between teacher influence pattern and levels of thought-provoking questions asked by the pupils. It was also observed by him that indirect influences elicited more of such questions. Amidon and Gianmatteo (1967) compared thirtythree superior teachers with a sample of 120 randomly selected teachers. The superior teachers were found to be more indirect, asked broader questions, and elicited more student initiated verbalisation as compared to the random group teachers. Similarly, Pankratz (1967) compared high and low proficiency teachers and found that the former used more of students' ideas and opinions. Rogers and Davis (1970) have researched on teachers asking questions on a higher cognitive level.

Gage (1963) suggested that investigators in the area of teaching and teacher behaviour should focus upon
specific aspects of teacher's task rather than on all parts of teaching at once. Explaining ability, feedback given by the teacher, pupil participation, may be some of these aspects which the researchers may do well to work upon. Accordingly Fortune, Gage and Shutes (1966) compared the explaining ability of forty student teachers across different topics with different groups of pupils and concluded that this ability is likely to change with different topics, but remain relatively constant across different groups of pupils. Hiller, Fisher and Kaiss (1968) as well as Dell and Hiller (1968) tried to find out the significant components of explaining ability of teachers. They found 'verbal fluency' and 'vagueness' to be reliably related to teachers' effectiveness across the lessons.

After a thorough examination of a large number of studies Rosenshine (1966) concluded that gesture and movement, rule and example pattern, and explaining links are three significant variables of teaching which may differentiate between more effective and less effective teachers. Nuthall (1970) commented that these variables relate to organisation of teacher communication, but sequences of ideas and their supporting details need further research. Hughes (1971) studied different aspects of pupil participation, e.g., degree and frequency, trying to relate them to pupil achievement. He found that the amount of pupil participation
has no effect at all on the learning of the sample pupils of eleventh grade. Similarly Church (1971) could not get significant results for pupils' opportunity to answer with their achievement. He commented 'It may be possible that though questions are important in promoting pupil learning, the actual answer of those questions may not matter much.' Zahrilk (1968) concentrated his attention on developing a system for analysing the nature and value of the teacher's reactions or 'feedback' following pupils' responses. It was found that the frequency of some kinds of feedback varied with the grade level, with the stage of development of the lesson, and with teachers' judgements of the correctness of the response. Church (1971) also studied feedback types such as, no comment, repetitions of all or parts of pupils' answer, simple comments, complex comments and summary comments. Analysing the effect of 'feedback as a whole' he found it to be related to pupil achievement.

From the foregoing discussion it is evident that process-product studies have come to the forefront of research on teaching. 'What kinds of classroom events are related to what kinds of learning outcomes?' is the important question, as posed by Bellack and others (1966), which still remains to be answered by the researchers in the field. Earlier Gage (1965) pointed to the need for
research relating teacher characteristics to pupil growth. After an extensive survey of literature Gage identified five global characteristics as components of effective teaching. These are: warmth, cognitive organisation, orderliness, indirectness, and problem-solving ability. Similarly, in their review of process-product studies, Rosenshine and Furst (1971) identified five process variables that received strong support in correlational studies relating them to pupil achievement. These variables are: clarity, variability, enthusiasm, task-orientation and business-like behaviour, and student opportunity to learn. It has been observed by the authors that all the relationships between theoretically or logically appealing process qualities and student achievement are not significant, and not even positive in all cases.

By and large the experimental studies on teaching and teacher behaviour have attempted to investigate (i) the effect of process differences or treatment variations on achievement or other outcomes in pupils, and (ii) changes in teacher behaviour and teaching-learning process arising from training in interaction analysis, feedback and such other treatments on teachers and student teachers.
Biddle (1967) after reviewing research on teacher effectiveness pleaded for agreement on 'educational effects' to be produced in pupils to determine components of teacher effectiveness. Turner (1971) thinks that if research on teaching is really to be of value it must ultimately be able to show the relationship between teacher education programmes and subsequent teacher performance. Rosenshine and Furst (1971) suggested:

'Experimental studies in teacher education involve a number of steps. The first step is to determine whether teachers trained for specific performance criteria behave differently in their classroom from teachers who do not receive such training. But it is more important to determine whether the trained teachers engender greater cognitive or affective growth in their students compared to their controls.' These ideas have been put to research by many a researcher in the area, viz., by Miller (1966), Gunnison (1968), Carline (1969), Worthen (1968), Herman et al. (1969) and Domino (1971). Miller (1966) experimented on differential effectiveness of 'responsive teaching' and 'directive teaching' with four lessons of four teachers. It was found that students in the former group did not view the no lessons more favourably and display significantly higher levels of thinking as compared to those in the latter
group. However, studies by Snider (1966), Berkin (1967) and Measel (1967) did not confirm such result. Domino (1971) looked into the interaction between the students' achievement orientation and the teaching style they are exposed to. In the conforming style of teaching, instructional material was presented solely through lectures, great emphasis was placed on factual knowledge, classroom attendance was required, and course content closely paralleled textbook assignments. In the independent style of teaching, emphasis was given to ideas rather than facts and to active participation of the students in the learning process. Results indicated that there was no significant main effects of teaching style.

In a six week instruction conducted with grade VIII pupils, Lashier (1965) found positive relationship between indirect verbal behaviour of student teachers, and achievement and constructive attitude of pupils. Experimenting with twenty-four girls and thirty-seven boys, Schantz (1963) reported that indirect teacher influence produced learning increments in recall in both high and low ability groups. Soar (1968) obtained curvilinear relationship between teacher classroom behaviour and superior growth of pupils. Herman et al. (1969) matched ten teachers on the basis of teaching experience and
direct-indirect ratio. Each group of teachers taught one unit in teacher-centred style and another unit in pupil-centred style. The result was inconsistent and inconclusive as it favoured teacher-centred instruction in one unit and pupil-centred instruction in the other. Houston and Pilliner (1974) experimenting on new and old style of teaching in physics reported that the 'open-ended style' of teaching was superior in achieving the more complex cognitive objectives and favourable attitudes.

Mitra (1970) has broadly classified the research trend on teaching into two classes: (i) Criterion approach, and (ii) Interaction approach. Criterion approach: "It is concerned with the criteria of teacher competence which are then sought to be predicted by a set of variables involving teacher personality and its antecedents and environmental or situational factors. Teaching enters into this model only as a secondary variable and in a global manner, chained to the antecedent variables of personality and situation on the one hand, and to the consequences of teaching, leading to some measurable degree of effectiveness as defined by a set of criteria, on the other." Interaction approach:
'The second approach considers teaching process more directly, but considers it as classroom social interaction. The teacher in a class does something and the pupils do some other things. The focus is on an accurate description of this sequence of classroom events of teacher-pupil interactional behaviour. Here the emphasis is on what actually goes on in the classroom. The consequences of teaching which inevitably figure prominently in the criterion approach are not of great or primary concern.'

It may be observed that the recent studies on teaching are not restricting themselves purely on one or the other of the approaches. The process-product studies these days emphasise 'consequences of teaching' following criterion approach while trying to look into 'what actually goes on in the classroom' according to interaction approach.

In India many a study on teaching effectiveness has adopted criterion approach. The Centre of Advanced Study in Education, Baroda (India) has applied both the approaches and completed quite a number of studies in the area of teaching and teacher behaviour. All the studies are not directly relevant to the present study. A few have bearing on the present investigation. Quraishi (1972) in a multivariate study found no relationship between personality
characteristics of teachers and their teaching behaviours. Lulla (1974) investigated the effect of directness and indirectness in teacher classroom influence on pupil achievement. The pupils under the experimental group of FIACS trained teachers scored higher on achievement test as compared to those taught by the control group of teachers. This implied the superiority of 'indirect teaching' in producing pupil achievement. In another experimental study, Sharma (1972) attempted to find out the relationship between four patterns of teacher classroom behaviour (narration, open questions, narrow questions, and open questions with feedback) and pupil achievement at knowledge, comprehension and application levels. Narrow questions (without feedback) as a pattern of teacher behaviour was found to produce higher achievement in terms of knowledge and comprehension objectives. Padma (1975) experimented on relative effectiveness of four patterns of teaching (treatment variables) viz., (i) lecturing with problem-solving approach, (ii) question-answer with problem-solving approach, (iii) question-answer and feedback with problem-solving approach, and (iv) lecturing without problem-solving approach, upon pupil achievement (dependent variable) in terms of application objective. The study was conducted with two experimental conditions -
surprised testing and planned testing. Under both these testing conditions, the four teaching patterns have equal affects on the development of applicational ability of the pupils, while in experiment I which involved Graeco-Latin square design, it was found that the four patterns have an effect on the retention of applicational ability.

Gage (1964) recognised a gap in the area of research on teaching dealing with cognitive variables. It may be mentioned here that the Centre of Advanced Study in Education, Baroda (India) has reviewed the research on teaching in order to find out the gaps and priorities in this area. It has been revealed that there is a need for experimental studies having process and product variables as independent and dependent variables respectively, specially in the cognitive domain. (vide Case Report, 1975).

After reviewing a large number of studies on teaching and teacher behaviour, Rosenshine and Furst (1971) also came to a similar conclusion: 'One conclusion which can be reached from the process-product research summarised here is that some of the cognitive and non-affective variables seem to be excellent predictors of student achievement. However, affective variables have been studied much more frequently in process product studies. More research on
non-affective variables seems warranted. Promising but insufficiently researched variables include multiple classification of questions, probing responses to student answers, variation of activities and the cognitive level of discourse, and use of structuring statements.

While launching upon a study on a complex phenomenon like teaching which is influenced and conditioned by a multitude of factors one may do well to remember the caution voiced by Morsh and Wilder (1954) which still seems to hold good: 'No single, specific, observable teacher act has yet been found whose frequency or percent of occurrence is invariably and significantly correlated with student achievement' . Moreover, both Howsain (1960) and Fattu (1962) observed that none of the teacher's characteristics like age, sex, marital status, intelligence, experience, cultural background, socio-economic background, scores on aptitude tests, job interest, voice quality and special aptitudes have any links with the teacher effectiveness. Rosenshine and Furst (1973) opens their chapter in the recent 'Second Handbook of Teaching' (ed. Travers, 1973) with the comment: 'The research on teaching in natural settings to date has tended to be chaotic, unorganised and self-serving.' Of course, the above
observations and comments about the overall situation in research on teaching need not discourage a researcher in the area, rather he should go ahead remembering Smith's (1971) encouraging note: '... it is no reason for pessimism, for every item of hard knowledge springs out of a slush pile of data and interpretations heaped up by adventures that left the main questions unanswered.'

1.3.1. Implications of the trend of research on teaching for the present study

The foregoing discussion on the research studies in the area of teaching and teacher behaviour crystallises some of the issues, questions and observations that may help the present investigator in formulating hypotheses for the study. These have been mentioned below:

(i) In respect of descriptive studies it may be said that they have adopted different focuses, approaches and emphases, and it is not possible to draw any simple generalisations from all of them taken together.

(ii) Presage variables like age, sex, SES and experience of the teacher indicate no clear relationship with teacher behaviour.
(iii) Many process variables like clarity, variation, cognitive organisation, open-minded style of teaching seem to influence pupil achievement.

(iv) Teacher questioning behaviour, and feedback given by the teacher are two of the important variables of teaching which needs further research in order to determine exactly how they are related to pupil achievement.

(v) Teacher questioning behaviour, pupil response, and feedback given by the teacher seem to be a set of three coherently linked variables of teaching-learning situation in the classroom, which when occur in a sequence, seem to influence learning outcomes considerably. Again, how is learning affected if feedback is absent in this sequence, or, how will pupil achievement be affected if questioning is minimised in the classroom discourse? These seem to be very pertinent questions in understanding the real nature of classroom phenomena. It is the point of interest of the present study as to how this variation in some of the teaching behaviours affect pupil achievement.

1.4.0. SPECIFICATION OF THE PROBLEM

In the very beginning (caption 1.0.0.) it has been stated that the present investigation is an attempt to find out the effects of three styles of teaching on knowledge,
comprehension and application abilities as well as total attainment of the pupils, and thereby to identify a style of teaching which is likely to be more effective in realising the above mentioned instructional objectives. The problem reads as 'Classroom Questioning and Pupil Achievement: An Enquiry into Teaching Style'. Five units in geography comprised the teaching content selected for the study and these units were taught in grade VIII. In this experimental study the treatment (or independent) variables have been three styles of teaching, viz., Style $S_1$ (lecturing), Style $S_2$ (questioning and response) and Style $S_3$ (questioning - response - feedback sequence) (vide caption 1.2.0.). The criterion (or dependent) variables have been pupil achievement in terms of knowledge, comprehension, application and total attainment (composite of these three).

In the discussion to follow the key concepts and terms used in the statement of the problem have been clarified with citation of research evidences wherever necessary. This would further help concretisation of hypotheses for the study.
1.4.1. Three Teaching Styles

The term 'teaching style' has been explained in caption 1.2.0. The three teaching styles developed for the present study are: (i) Lecturing (Style $S_1$), (ii) Questioning and response - without feedback (Style $S_2$) and (iii) Questioning - response - feedback sequence (Style $S_3$). The different variables included in these styles of teaching are discussed below:

1.4.1.1 Questioning and Response

This forms one of the major variables included in the teaching styles, especially in the case of Styles $S_2$ and $S_3$. The title of the study acquires its justification for this reason also. In fact, the present study attempts to look into teacher questioning behaviour in the classroom. It tries to ascertain what effect the classroom question of the teacher - with or without feedback - produces on the learning outcome of the pupils.

Questioning and response are two concomitant aspects of teaching behaviour as exhibited by the teacher and the pupils in the classroom. They are two interacting and inter-dependent phases of the bipolar process of teaching and learning, and as such this variable (questioning and
response) denote, to a considerable extent, what actually constitutes a teaching style that the teacher follows in the classroom.

Different aspects of teacher classroom questioning have been investigated by different researchers. Some have focussed attention on the type of questions asked by the teacher, some have tried to delve deep into the frequency of questions put to the class by the teacher, and so on. In other words, it may be said that different studies in this respect have attempted to highlight the different components of this variable (questioning and response).

Rosenshine (1969) reports a few studies (Conners and Eisenberg, 1966; Harris and Serwer, 1966; Wallen, 1966) where a significant positive relation between the frequency of questions and achievement could be detected. The type of questions has been studied by Furst (1967), Thompson and Bowers (1968) and Hunkins (1967, 1968). Furst found that the effective teachers use more of analytic and evaluative type of questions than empirical type of questions, while Thompson and Bowers found the successful teachers asking both convergent and divergent categories of questions. In Hunkin's study, evaluation and analysis questions were found to effect pupil learning better. Sharma (1972) found that the pattern of teaching involving narrow questions was
more effective in achieving knowledge and comprehension objectives. Beseda (1973), however, found that more use of divergent questions, could not produce significant gain in social studies achievement or critical thinking ability. Hunkin's study (1970) also supports the above view, i.e., the role of question is still imprecise with regard to critical thinking. Watts (1971) found that among the high school seniors who received questions that required them to apply the principles to new examples performed significantly better. Adhikary (1972) reported that the prospective teacher's question asking behaviour could be changed through the instruction by the increased use of convergent, divergent and evaluative questions and decreased use of cognitive-memory and managerial questions in both written and oral form. Chism's (1972) conclusion was that teachers can lift the level of their pupils' thinking by using Taba's model in structuring their questions. Downs (1972) reaffirmed the findings of many other studies that question asking behaviour of preservice teachers can be changed. He also indicated that questioning skills can be acquired without relating questioning to any one subject area. Hoskin (1972) found an inconclusive evidence as to the relationship of the level of cognitive questions used by the teacher to the cognitive questions posed by the
pupils. Shepardson (1972), however, got a significant positive correlation between the relative frequency of teacher probing responses and the amount of verbal student participation.

From the discussion of the above studies no definite stand can be taken as regards the type of classroom questioning to be adopted in preparing the lesson plans in three different styles of teaching. The type of question to be used had to be in accordance with the objectives of learning, i.e., knowledge, comprehension and application. More or less convergent questions were used for the development of lesson in the present study.

1.4.1.2. Lecturing

Lecturing forms one of the most prominent variables in teacher verbal behaviour in the classroom and as such it has been included as one of the categories in the Flanders Interaction Analysis Category System. In the classroom communication process when the teacher presents the subject matter without being interrupted by the pupil verbal behaviour, one can say that the teacher is lecturing. Thus, the impact of lecturing is opposite to questioning with regard to pupil participation in the lesson. The teacher is
said to be 'direct' when he lectures and 'indirect' when he adopts questioning behaviour. In the former case he restricts the pupils' freedom to participate, and in the latter he enhances the scope of pupil participation in the lesson. In a study by Bondesson and Larson (1970) principles were presented and exemplified by direction method as well as discovered from examples by discovery method. It was found that the former was superior to the latter in efficiency and transfer value. This may make one feel that lecture method is superior. But further results of the study showed that the methods were differently effective with different materials. Thus, one cannot be sure whether lecturing is really superior to other ways of teaching. Precisely for this reason lecturing has been considered as one of the teaching styles with a view to putting it to test for its comparative effectivity.

1.4.1.3. Feedback

In the teaching-learning process when the student responds he may receive feedback from the teacher. In general, feedback may be looked upon as those acts or happening in the teaching - learning process by which the pupils are able to know if they are progressing in the direction envisaged by the teacher. In the present study
feedback is considered in the above sense only.

Although one can teach without providing feedback, yet it has to be regarded as one of the important conditions of student responsiveness. Turner (1967) holds that teacher acknowledging the current response and giving positive reinforcement wherever necessary act as reinforcers to the pupils. This is one of the essential ways of providing feedback to the pupils in the classroom situation.

Zahorik (1969) explored and analysed the different sources and types of feedback. Teacher's verbal remarks, non-verbal cues may act as feedback device, even books, films and tests can provide feedback. Rosenshine (1971) has reported a number of experimental studies dealing with teacher's use of praise, approval, criticism and student's ideas in the classroom situation. All these variables are different ways of providing feedback, and these are found to be related to pupil achievement either positively or negatively. The contribution of feedback to pupil achievement does not yet seem to be clear. Church (1971) aptly comments: 'What is needed now are further studies to determine just what it is about the comments following pupil answers which is so important. Is it the feedback
regarding correctness which plays the crucial role? Or is it the extra information provided by the discussion of wrong answers? Here Church raises the question of corrective feedback with positive feedback. Which should be used, and if both, in what proportion - these are some of the questions that remain to be answered by research.

The present study, of course, does not give major emphasis on the role of feedback in pupil achievement. But, since it is evident that the teacher can adopt different ways of providing feedback to increase pupil participation and hence pupil achievement, feedback finds its place in the present study as a component of the teaching styles. Under the scope of the present study feedback will mean teacher's use of praise, repetition of pupil responses, acknowledging, approving and integrating pupil ideas.

1.4.2. Pupil Achievement

It has been stated earlier that the present study has taken up pupil achievement as the dependent or criterion variable. Pupil achievement has been considered at three levels of hierarchical objectives in the cognitive domain as classified by Bloom (1957). These are knowledge,
comprehension and application. In a similar study Padma (1975) took up application ability of the pupils as criterion variable to see the comparative effectivity of the four teaching patterns in teaching science. In another study Sharma (1972) considered pupil attainment (Social Studies) in knowledge, comprehension and application as product variables to work out the relationship of the patterns of teacher classroom behaviour with pupil attainment in terms of the above three instructional objectives. In the case of Padma (1975) the teaching pattern could not be differentiated in terms of development of application ability under planned testing condition, and in case of Sharma (1972) a pattern involving narrow questions was found to be effective in realising the knowledge and comprehension objectives. It was therefore, thought fit to take up all the three instructional objectives again in order to test the comparative effectivity of the three teaching styles in the teaching of geography, although, the research evidence in favour of such argument and expectation are not easily available in the area of teaching in Indian conditions.

1.4.3 Objectives

The problem of the study may now be stated more specifically in terms of objectives. The study is an attempt
to find the relation between the process variables of three teaching styles, viz., (i) lecturing ($S_1$), (ii) questioning and response - without feedback ($S_2$), and (iii) questioning - response - feedback sequence ($S_3$) and the product variable of pupil achievement in terms of knowledge, comprehension, application and total achievement.

The general objective of the study is to find the relative effectiveness of three different styles of teaching, namely, (i) lecturing ($S_1$), (ii) questioning and response - without feedback and (iii) questioning - response - feedback sequence upon the pupil achievement for the instructional objectives of (a) knowledge, (b) comprehension, (c) application and (d) total achievement belonging to cognitive domain of educational objectives.

1.4.4. Assumptions

(i) There are certain styles of teaching which the teacher should create in the classroom.

(ii) The teacher can be programmed to produce these styles of teaching.

(iii) Knowledge, comprehension and application abilities are measurable with multiple choice items.
(iv) The above mentioned abilities are common across various units of geography teaching.

(v) As the teacher is programmed there is no carry over effect in the teacher behaviour from one style of teaching to another.

1.4.5. Hypotheses

The following null hypotheses have been formulated for the purpose of the present experimental study:

(i) There will be no significant difference in the mean achievement score for knowledge when the pupils are taught by either of the three styles, $S_1$, $S_2$ or $S_3$.

(ii) There will be no significant difference in the mean achievement score for comprehension when the pupils are taught by either of the three styles $S_1$, $S_2$ or $S_3$.

(iii) There will be no significant difference in the mean achievement score for application when the pupils are taught by either of the three styles $S_1$, $S_2$ or $S_3$.

(iv) There will be no significant difference in the mean total achievement score when the pupils are taught by either of the three styles $S_1$, $S_2$ or $S_3$.

For testing the hypotheses 0.05 level of significance is accepted.