2.1 LEARNING:

The educational system requires the students to acquire a large and diverse set of learned capabilities during their school careers and at the core of the entire process of education lies the facilitation of learning. Educational practices—teaching methods, strategies or modes of instruction that are employed to facilitate the learning of skills and capabilities are always rooted in a particular learning viewpoint and reflect a particular philosophy of education and of human nature.

Researchers in the field of learning are divided into different theoretical orientations or ‘schools’. Two major families of contemporary learning theories which have been developing throughout the twentieth century are conditioning theories of the stimulus-response (S-R) associationistic family also known as Behavioristic viewpoint and cognitive theories of the Gestalt field family. The two approaches differ sharply in several respects, yet an area of commonality is also discernible. Both are scientific approaches to the study of man and both assume man’s basic nature to be neither innately good nor innately bad.

Conditioning theories of the stimulus response (S-R) associationistic family or Behaviorist viewpoint: Learning for S-R associationists is a change in behaviour that occurs through linking stimuli and responses according to associative principles by way of formation of connections of some sort between series of stimuli and responses. Stimuli- the cause of learning- are environmental agents which act upon an organism so as
either to cause it to respond or to increase the probability of a response of a certain class or kind. Responses or effects are reaction of an organism to either external or internal stimulation (Bigge and Hunt, 1969).

Thorndike (1949) and most early behaviourists regarded learning as an internal event not open to observation, but they refused to use mentalistic concepts that couldn't be linked directly to observable and measurable behavior (performance). They stuck to the observable and measurable, speaking of stimuli, responses, reinforcement etc. Early Behavioristic work on classical conditioning and on instrumental conditioning (Thorndike, 1949) examined the effect of contiguity, repetition, practice and consequences (reinforcement). Several versions of behaviorism, that developed shared a distaste of mentalistic concepts, preference for discussion of observable performance, concern with rigorous experimental design and scientific method. Behavioral theories are more similar to one other than to cognitive theories, although behaviorists disagree among themselves about the relative importance of different variables and even about the nature of the learning process itself. They tend to concentrate on the kinds of learning that involve overt stimulation, overt responses and gradual improvement with practice and tend to avoid certain complex learning that involves cognitive activity leading to insights.

Models of the learning process based on the tenets of behaviorism can be further separated into contiguity and reinforcement theories. The contiguity theories predict that an association between a stimulus and a response will be formed or strengthened when the two occur together in close temporal or spatial relationship. Two important traditions in contiguity theory are those of verbal learning and respondent conditioning or classical conditioning. In reinforcement theories, associations are developed and strengthened by the consequences of the
response. Put in other words, these theories postulate that a given response will become more or less frequent in a particular situation depending upon its consequences. Thorndike’s Instrumental Conditioning and Skinner’s Operant Conditioning are examples of reinforcement theories.

A popular contemporary psychology of learning that represents Stimulus Response family is Skinner’s (1953) Operant Conditioning theory of learning. Whereas in Classical Conditioning, a previously neutral stimulus elicits a response through repeated pairing with an unconditioned stimulus, in Operant Conditioning, by contrast, the response must be made before a positive reinforcer, such as a reward, is given or before a negative reinforcer, such as an aversive stimulus, is removed. Such a response when followed by a reward has a tendency to be repeated. A basic rule that emerges from the application of the principles of operant conditioning to teaching is - Shape behavior by supplying step by step reinforcement. The most widely accepted learning model based on behavioristic principles is Programmed Instruction. Personalized system of Instruction is a direct application of Operant Conditioning principles to education. Certain guidelines for improving teaching based on behavioral principles as given by skinner (1984) are : be clear about what is to be taught; teach first things first; stop making all students advance at the same rate. A basic criticism of the SR view is that instructors who use programmed instruction and behavior modification techniques may become preoccupied with power and control. Skinner remains the dominant force in Behaviorism and in learning psychology generally.

Contemporary SR associationists also called Neobehaviorists, such as Skinner (1953), Guthrie (1967) do not place as much emphasis upon the operation of the brain and nervous system as did the pure Behaviourists like Thorndike (1949) and their
interest lies in the analysis of behaviour per se rather than in the neural mechanism behind it. Secondly, they tend to focus attention upon response modification as well as stimulus substitution. Thirdly, they try to explain behavior that appears purposive but develop mechanical explanations for apparent purposiveness in a way that the assumption of conscious behavior or intelligent experience is not required. Purposiveness is regarded by them as product of a pattern of stimulation, in which certain stimuli are more potent than the rest and thus lead an organism in one way rather than another. Also whereas Behaviourism was atomistic, i.e. focused on the elements of a situation, Neobehaviorists talk in terms of stimulus situations, complex configurations of stimulation and 'molar behavior'.

Therefore, we observe that modern Behavioristic approaches stress the experimental study of behaviour, the role of reinforcement, and the power of the environment to shape behavior. They see learning as consisting of gradual generalization and discrimination of associations among stimuli, responses, and stimulus-response linkages. Nevertheless, behavioristic theories of learning have found it difficult to explain the ability of humans to rapidly master a complex behavioral performance and this has been handled adequately by Social Learning theory which equates learning with much more than observable behavior. Its leading exponent is Bandura (1971) and his theory places special emphasis on the important roles played by vicarious, symbolic and self regulatory processes. Observational learning/ modelling or how a person learns from observing the performance of another person, has been the central concept in Social Learning theory. Since both learning and performance are influenced by reinforcement, Social Learning theory is seen to have its roots in the behavioristic perspective on learning but its emphasis on the importance of representing the modelled behavior in memory is common with
modern cognitive conceptions of learning.

Cognitive theories of the Gestalt field family: Cognitive theorists emphasize the role of mental activities intervening between the environment and the person's action upon that environment. They do not give the central role to environmental influences in explaining learning outcomes and instead stress the critical role of the learners' activities in determining what is learned from any experience. Research on the cognitive aspects of learning dates back to the early work of Gestalt psychologists for whom learning was not the stamping in of an association between a stimulus and response by contiguity but an organization of various elements in a situation by the learner into a meaningful whole or pattern.

In the cognitive approach, learning to a Gestalt field theorist is a purposive, imaginative and creative enterprise linked with thought or conceptualization and is a process of gaining or changing insights, outlooks or thought patterns. Insights occur when an individual, in pursuing his purposes, sees new ways of utilizing elements of his environment, including his own bodily structure. Insight is defined by Gestalt field theorists as a series of patterns or relationships, first appearing as vague 'hunches' which may or may not be true and which, in terms of trial answers, may or may not help a person towards his goal. Unless the learner sees their meanings for themselves and adopts them as his own, they don't become insights for him. The theories that grew out of Gestalt psychology are termed Gestalt field or Configurational psychology. Other names - Organismic, Field, Cognitive-field or Cognitive discovery, have also become associated with it.

Cognitive field theory or Cognitive psychology of learning, a leading contemporary representative of the Gestalt field family, has been developed as a result of the attempts to construct
scientific principles of learning highly applicable to classroom situations. It describes how a learner gains understanding of himself and his world in a situation where his self and his environment compose a totality of mutually interdependent, coexisting events. Cognitive psychology is derived from principles of field theory stressing that our perceptions are influenced by ways stimuli are arranged, by experiences and by interests. Kurt (1941) emphasized this view with his concept of life space, which consists of every thing one needs to know about a person to understand her or his behavior in a specific psychological environment at a particular time. The life space concept calls attention to the fact that in order to understand behavior, observer must try to see things from the subject’s point of view at a given moment, i.e. be subjective. Field theory centers on the idea that all psychological activity of a person occurs in a field, it is a part of a totality of coexisting factors that are mutually interdependent.

Important characteristics of Cognitive field theory of learning are its relativistic approach to the study of perception and reality, interpretation of intelligent behavior as purposive, emphasis upon psychological functions rather than objects, a situational as opposed to historical point of view, and stress upon the principle of contemporaneity (Bigge and Hunt, 1969)

To a Cognitive field psychologist, learning is a dynamic process where by, through interactive experience, insights or cognitive structures of life spaces are changed so as to become more serviceable for future guidance. Goal or purpose is central to the theory since learning activity is goal directed. According to cognitive field psychology, child in a learning situation is not unfolding according to nature; neither is he being passively conditioned always to respond in a desired manner. Rather at his level of maturity and comprehension, he is differentiating
and restructuring himself and his environment, he is gaining or changing insights (Bigge and Hunt, 1969). Thus it is in connection with goal directed behavior that insightful learning occurs. Further they state learning is habit formation under cognitive field psychology wherein habit is fluid, effective, efficient action arising through a person's operating on the basis of the insights he possesses; and habits are goal related. In fact, the essence of Cognitive field psychology is that all intelligent human endeavor is purposive. Cognitive field theory involves the kind of generalizations about learning that may be applied to actual persons in school situations.

To summarize cognitive field theory of learning, a person learns through differentiating, generalizing and restructuring his person and his psychological environment in such a way as to acquire new or changed insights, and thereby achieves changes in motivation, group belongingness, time perspective and ideology; thus he gains in control of himself and his world (Bigge and Hunt, 1969).

Comparison of the two approaches to learning: It may be worthwhile here to point out certain basic differences in the two approaches. Gestalt field psychology essentially is an emergent synthesis that developed from conflict between the psychological tenets of Rousellian 'Romantic Naturalism' and those of 'Scientific Realism'. Rousellians argue that psychological development is primarily a matter of natural unfoldment and learning is a product of inner urges but Realistic psychologists see all development as a product of biological maturation and learning as a conditioning which comes from the environment's impinging upon an individual from without. Gestalt psychologists achieved emergent synthesis by developing an internally consistent new position through selecting and modifying knowledge from these two incompatible positions and adding new thinking as and when needed. They assume that a child is what he is because of an interaction between him and his culture. It is in
a person and his environment coming together in a psychological field that Gestalt field psychologists find the clue to psychological development and learning.

A Gestalt field psychologist thinks of a person's environment as psychological and as consisting of what he makes of what is around him. It is that portion of a life space or perceptual field which surrounds a person or self. A psychological environment includes impressions of parts of the physical environment but not necessarily all of it. At the same time it extends beyond its physical environment. Their conception of environment helps explain why two persons having quite similar physical and social environments, differ radically in their interpretations of their world. It may be mentioned here that an S-R theorist holds that a person's psychological and physical environments are identical; his environment consists of all his physical and social surroundings. As regards perception, a Gestalt field theorist sees it as a unitary process in which sensation hinges on meaning and meaning on sensation; and sensing and finding meaning occur simultaneously. For him, perception is highly selective, i.e. a person will rarely sense an object unless it has relevance to some purpose of the person and its meaning is always related to the total situation as against SR theorists who define perception as a two-step process (sensing and deriving meaning) which focuses on particular objects of the environment only in so far as previous conditioning directs.

Experience for a Gestalt field theorist is rooted in insightful behavior and is a psychological event which involves acting purposefully with anticipation of the probable consequences of such action. To them experience is interaction of a person and his perceived environment and has an active and passive element, combined in a peculiar fashion. To S-R theorist, experience could mean no more than the conditioning process
by which a person acquires a new response. Further, Thought to S-R theorist is not some mysterious mentalistic process which is the cause of behavior but the behavior itself. Thus thinking is symbolic or incipient trial and error behavior which culminates in learning. Like all other instances of an organism's behavior, it is a function or result of a set of antecedent or preceding conditions. But Gestalt field theorists interpret thinking to be a reflective process within which persons develop new or change major insights. So construed, reflective thinking differs significantly from deductive reasoning in that it contains both inductive (fact gathering) and deductive (logical) processes in such a way as to find, elaborate and test hypotheses. Both families of psychology use the term interaction to describe the person-environment process through which reality is perceived but each defines it differently. Whereas S-R theorists mean the alternating reaction of organism, then of environment and the temporal sequence of the interactive process is S-R-S-R, Gestalt field theorists imply that the interaction of a person and his environment are simultaneous and mutual—both mutually participate at the same time. Gestalt field psychology, closely allied to relativistic philosophy, assumes that whenever a person can, he seeks to manipulate purposefully all those aspects of his environment which at the time mean anything to him. Without denying independent existence of objects or even of other peoples ideas, they insist that each person sizes up or interprets his world in such a way that it will form a meaningful pattern for him and his interpretation is the reality on which he designs his actions. But an S-R theorist, like a realist, is very much an environmentalist and determinist in his approach to education. He assumes that the surrounding environment should and will, control closely the behaviors and learnings of students. So teaching practices advocated by them are closely allied with the realistic outlook. They recommend the selection of subject matter
by qualified adults prior to the teaching act, the inclusion of facts and skills that are useful in contemporary society and their inculcation into students.

As regards motivation, an S-R theorist holds all behavior to be stimulus directed, the stimulus may come from within the organism or without, thus implying that behavior is not related to purpose. Motivation is defined as an urge to act which results from stimulus; Selective response can be explained according to S-R principles without assuming the existence of purpose. A person selects one response rather than another because of the particular combination of prior conditioning and present physiological drives and stimuli which are operating at the moment of perception. A Gestalt field psychologist regards motivation as a product of disequilibrium within a life space, the tendency to release tension by proceeding towards a goal, including the overcoming of whatever barriers are in the way. Thus motivation, in their view, emerges from a dynamic psychological situation, characterized by a person's desire to do something and cannot be described merely as an impulse to act triggered by a stimulus.

A teacher with a Gestalt-field orientation is always concerned with the problem of personal involvement (i.e. helping students see a need to learn), the personal goals of the learner being relevant. He attempts to organize the teaching learning situation so that students adopt goals entirely new to them. He believes that unless the learner realizes the need to learn something, he will either not learn it at all or learn it only in a transitory and functionally useless way. But associationists hold that it is not that a student should want to learn something and only then will he be able to learn it. Instead anyone can learn anything of which he is capable if he will allow himself to be put through the pattern of activity necessary for
conditioning to take place, assuming thereby that activity with reinforcement automatically produces learning (Bigge and Hunt, 1969).

Thus in thinking about the learning processes of a learner, Gestalt field theorists prefer the term person to organism, psychological to physical or biological environment and interaction to action or reaction.

Learning is interpreted in terms of reorganization of perceptual or cognitive fields or systems wherein the learner, his environment and interaction with his environment all occur at once. In contrast S-R theorists define learning in terms of changes in strength of hypothetical variables (i.e. S-R connections, habit strengths etc.). By way of implication, an S-R associationistic teacher desires to change the behaviors of his students in a significant way; a Gestalt-field oriented teacher aspires to help students to change their understandings of significant problems and situations.

In a nutshell, Cognitive theorists view learning as active restructuring of perceptions and concepts, not passive responses to stimulation and reinforcement and stress the conceptual aspects of learning over the behavioristic aspects, and also stress the unique abilities of humans. Thus they concentrate on human learning, specifically meaningful learning as occurs in schools. Most learning, in their view, involves active processing of information so that it is organized meaningfully and retained as part of a general gestalt. The model that has emerged in this is the information processing model. Bits of information are not stored in isolation from one another. Instead, they are sorted, filed and cross indexed in systematic and meaningful ways. Thus we see at the core of most Cognitivists' thinking on learning is the memory system.
2.1.1 LEARNING THEORIES: Their Implications for Instruction

When viewed from the point of view of instructional strategies, an important aspect of the present study, Cognitive psychologists suggest that for effective teaching, a teacher has to ensure an adequate intersection of life spaces through probing the various regions of the lifespaces of his students. Human beings have a built in desire to learn since they wish to maintain a cognitive equilibrium and what learners learn on their own has more personal meaning than what they are told by others. Cognitive theorists also stress that much learning occurs through spontaneous discovery. Because people are active information processors, they continually discover new facts, concepts and even complex insights during routine daily interactions with the environment. The basic instructional technique advocated by Cognitive theorists is thus discovery learning, which is put into practice by arranging for pupils to find their own solutions to problems. Learning through discovery is regarded as being more meaningful and valuable since it occurs under conditions of intrinsic motivation. Thus cognitive psychology is sometimes referred to as Cognitive-Discovery approach to learning.

Many aspects of Cognitive-Discovery view are also illustrated by principles proposed by Piaget (1970), one of the most prolific of the Cognitive theorists; the primary principle being that human beings possess an innate tendency to bring coherence and stability to their perception of the world. So he urges teachers to assume that children have a built in desire to learn because they are more or less impelled to make sense of what they observe and experience (Biehler, 1978). He also holds that learning is its own reward and so recommends that teachers permit learners to interact with objects, situations and each other to form their own self rewarding conception of things, which in turn are more meaningful and permanent than
ideas acquired by memorizing material arranged and presented by others, as in expository teaching.

Bruner's (1960) interest in the Cognitive Discovery approach was initiated from his study on perception and thinking. He has been an outspoken critic of the behavioral, environmental and associationistic conceptions and has proposed a theory of cognitive development very similar to that of Piaget. Bruner (1966) argues that learning involves the active processing of information and it is organized and constructed in a unique way by each individual, that individuals attend selectively to the environment and that factual knowledge is acquired and stored in the form of active expectancies rather than passive associations and much learning occurs through discovery during exploration motivated by curiosity. He argues that stress on structure or overall pattern of a field of study aids learning and remembering. He claims that grasp of structure leads to mastery of principles that can be applied in a variety of ways, which paves the way for more complex learning. Instead of urging teachers to supervise learners as they work individually on programmes and acquire what others have described, he recommends that teachers present background information and pose questions intended to stimulate students to discuss topics until they experience the feeling they have discovered things for themselves.

Therefore, we see that for Bruner (1960) optimal sequencing is not the step-by-step sequencing that Behaviorists prefer. He believes that for maximal learning and retention, learners should be allowed to organize material according to their own interests. Moreover, his chief concern unlike Skinner's (1953) is not to minimize errors. He sees errors as useful for maintaining interest and stimulating hypotheses, provided learners are not made to feel ashamed of them.
In conclusion, we may say that a common constant purpose of Cognitive field psychology is enhancement of intelligence as teachers aid students in changing or restructuring the cognitive structures of their life spaces. And for this, there is not teacher or student, but teacher–student purposing, planning, fulfilment and evaluation of the learning tasks at hand.

It is possible, conclude Bigge and Hunt (1969), that Cognitive–Field psychology may come to command the support of both those who have thought that teachers should be centers of authority and those who have felt that classrooms should be child centered. Its adoption as a basis for teaching would lead to greater student participation than is permitted by traditional teachers, but participation would be of a different kind than that advocated by Rousellians. In contrast with either authoritarian or laissez-faire classrooms, the ideal classroom consistent with Cognitive field psychology would be democratic. Although it is not a compromise between the psychologies underlying traditionalism and permissivism but an emergent synthesis, it does lead to a kind of middle position—a position that permits students a considerable amount of freedom but within certain confines.

2.1.2 Theories of learning extended to learning of language: Since language is a highly transferable skill and skill in the use of words, whether oral or written, lies at the very core of human intelligence and is significant in problem-solving and since intelligence is taken to be a common factor in various language behaviours, the problem at hand is to examine and locate interactions of individual differences among learners with instructional treatments, if they exist. The research task is to formulate principles by which the adaptation of instruction can be made systematic and productive in accordance with the capabilities of the learners.
Language learning, a major aspect of school learning, can be subdivided into four interrelated skills, of which two are receptive and two are productive. Oral language skills are involved in decoding and encoding verbal communications. Written language skills include reading and other aspects of understanding written communications. Oral and written language knowledge is receptive if learners can decode and understand the communications. Expressive language skills involve not only receptive understanding but the ability to use language skills in active ways for purposes of communication. In both oral and written language, receptive understanding precedes and is much broader than expressive use. Individuals understand much more language than they use themselves and they can read with comprehension many more words than they use in their own written work.

Conditioning theories of the Stimulus–Response (S-R) Associationistic family, particularly the Behaviouristic school of thought, has contributed substantially to language learning. Behaviorism favors the view that language is a form of codified, patterned, social behaviour. Though admittedly more complex in its patterning than any non-linguistic behavior, language in their view is comparable to other forms of social behavior which exhibit regular, predictable patterns. The process of language learning, according to Behaviorists, can be explained in terms of conditioning. The model of conditioning that seems better able to account for the fact that a human child learns to use language is that of Operant Conditioning, though this does owe something to Classical Conditioning also.

As regards teaching of language, including communication skills, Behaviourist model of learning stresses the role of exposure, specific practice, one thing at a time, over learning or saturation learning. The basic assumptions for the teacher are that he has to introduce each new pattern of language
in a meaningful situation; that producing the correct linguistic response to a stimulus requires effort and attention; that the spoken language comes earlier than the written; that receptive experience of language is necessary before any productive use can begin; and learning takes place fast, if the correct response to a stimulus is immediately confirmed and still faster, if the learner is placed in a situation where he can produce only the correct response, because each incorrect response builds up a faulty behavior pattern that interferes with the process of conditioning.

Behaviorists put the learner in a 'linguistic-strait jacket' from wherein he is not allowed to make an error in using language as each error results in a bad habit being formed which would be difficult to eradicate. Every new item learnt must be reinforced by further practice through drill and repetition before further learning begins. Most of the methods used for teaching languages in the 1950's and 1960's made use of these assumptions from Behaviorism and so emphasized repeated, but spaced practice of language material in imitation of a given model, first orally and then in writing. Teachers 'phased' the activities in language classes so that at any given time, only one kind of activity was in progress.

By implication, second language learning is seen as a process of imitation and reinforcement by Behaviorists. Learners copy what they hear and by regular practice, they establish a set of acceptable habits in the new language. Properties of first language (L1) are thought to exercise an influence on the course of second language (L2) learning. Learners 'transfer' sounds, structures and usages from one language to the other. Similarities between the two languages cause positive transfer while differences cause negative transfer. First language habits may cause errors in second language. Problems of negative
transfer are thought to provide a major source of second language learning difficulty. The main aim of behavioristic teaching is, therefore, to form new, correct linguistic habits through intensive practice, eliminating interference errors in the process. Second language input is obtained from controlled, formal instruction.

Behavioral theory of learning has inspired the generation of instructional theorists who developed programmed instruction. It has been a source of guidance in the development of 'behavior modification' techniques for changing children's learning behavior. One very explicit use of behavior theory is by Mear (1971) for establishing receptive repertories in children learning a second language. However, the major gaps in the theory are its lack of satisfactory theoretical foundations of knowledge and information processing and its inability to deal with covert events that antecede and trigger overt responses; and its limited explanation of the manner in which responses get emitted, so that the practitioner is often hard put to identify or elicit responses that can serve as a basis for further learning.

Two fundamental questions about Behavior learning theory that are asked again and again are— (i) Does leaning truly take place on the basis of solely the variables indicated by theory? (ii) When language responses are acquired or modified by Behavior modification techniques, is this learning of the same character, resulting in the same kind of competence, as occurs in normal language learning? Carrol (1976) believes the answer to both these questions is in the negative. In support of his belief, he argues that what goes on in the verbal conditioning paradigm is that a change of behavior occurs only when subjects are consciously aware of and pleasantly disposed towards the arranged contingencies and he doubts that speech training conducted according to Behavior modification theory results
in true language acquisition.

Even research studies conducted to teach some kind of language system to lower animals, specially chimpanzees (Gardener and Gardner 1971, Premack and Premack, 1972) reveal several features in the learning behavior of the animals that could not be easily accounted for by Behavior theory Gardners (1971) state that though they never hesitated to apply the relevant principles of reward theory, certain other teaching techniques as guidance and observational learning were generally more effective than straight forward instrumental conditioning procedures. Some of the central tenets of Behaviourism have had to be abandoned primarily because it does not seem to distinguish between human and sub-human learners and between higher and lower forms of learning. Also the use of the term ‘conditioning’ implies that learning is the outcome of manipulation. This seems to deny completely that the learning is the outcome of manipulation. This seems to deny completely that the learner may have something to contribute to the process of learning. Yet it is evident that the learner does contribute. How else could one explain the fact that individual differences exist, even among animal learners.

Also as regards second language learners, it must be borne in mind that imitation alone does not provide a means of identifying the task facing them. They are continually confronted with the need to create and recognize novel utterances that go beyond the imitation of the model sentences they may have practised. Imitation is not a sufficient explanation of the way learners behave; not many of the errors that are theoretically predicted by the differences between first language and second language occur and in fact, many errors are found that seem unrelated to first language. In a research study, it was found that only 3% of the errors made were the interference errors
and 85% errors were thought to resemble those that appear in the course of first language acquisition. Thus it may be said that the systematic comparison of first language and second language in order to predict areas of greatest learning difficulty (contrastive analysis) explains only a small portion of what goes on in second language acquisition.

Although the basic view of Behaviorists that ‘language is behavior’ is criticized as being one sided and superficial, it needs to be pointed out here that the concept of language skills is derived from this view of language as behavior and in language teaching, this concept has proved highly productive. It has permitted us to define the objectives of language teaching in particular terms, and to evolve strategies for meeting these objectives. Even if the body of Behaviorist thinking is discredited, this corollary of Behaviorism is likely to remain important for language teaching.

Cognitive theory of learning provides a different basis for interpreting language learning phenomenon and for suggesting measures for promoting language skills. According to the Cognitivists, the learner of language possesses some kind of ‘data-processing mechanism’. The input to the learner is not just a number of utterances to be memorized and imitated; the input constitutes the samples of the language data, which he then processes. The output from this data processing is, again, not just a number of sentences; but a ‘system of rules’ which allows the learner to produce other sentences.

To illustrate, let us suppose the input to the learner consists of the following.

INPUT (Sentences)

1. This is my book.
2. This is a pencil.
3. This is Sheela.
4. This is Ramesh.
5. This is a glass.
6. This is my room.

If we assume, as do cognitivists, that the learner is not trying to memorize these in order to merely mimic them but is trying to process the sentences in order to find out if there is any general rule being exemplified through them, then he may be able to discover the following rules (output)

OUTPUT (Rules)

1. ‘a’ is not used with the names of people.
2. ‘a’ and ‘my’ are not used together.

These rules will prevent him from producing sentences like 'This is a Shekhar' or 'This is a my ball'. At the same time, it will enable him to produce sentences like 'This is Rekha', 'This is my house' etc.

Even a very limited amount of language data may be sufficient to reveal the underlying rule and once the rule is known, it can be used to produce an infinite number of new sentences. Thus it becomes evident that even a limited amount of exposure to language can result in an almost unlimited output, revealed in the learner's capacity to produce sentences which are 'new'. However, since a learner's exposure to language is only limited and gradual, he does not acquire all the rules at once and discovers each 'correct' rule only gradually. When the child makes errors like 'This is a Ravi' or 'Two mans have come', this is proof that he has been trying to use a 'rule' which he has 'discovered'. The incorrect rule that the child uses and then discards represents a hypothesis which he has formed on the basis of the data received by him. Thus language learning seems largely to be a process of hypothesis formation and try-out. At each step, the child seems to be
looking for a general rule which will cover a number of particular instances.

By implication, Cognitive theorists stress the role of insight, hypotheses formation, learning through discovery and exposure to experience. For the Cognitivists, the amount of exposure is not very important since he maintains that the 'processing mechanism' enables the learner to handle even limited input to provide effective learning. This has a significant effect on language teaching practice. Hypotheses formation and problem solving in preference to repetition and practice are emphasized. Cognitivists hold that a learner will not learn anything from mechanical drilling through substitution tables since he is not required to think about the meaning of the sentences he is producing. Even 'matching tables' which require the learner to think about the sentences which he is producing and where he may come up with an incorrect sentence, if he is not careful, are considered repetitive by them. Instead a case is made to give the learner of language the freedom to use language freely, even if this involves his making errors as errors evidence proof of creative language use. The learner is encouraged to 'experiment' with language and to try to learn through his errors. Even when he is forced to grapple with two tasks simultaneously, this creates a kind of tension which keeps him more alert mentally and sharpens the learning process. So he is confronted simultaneously with a variety of learning problems. Also it is believed that a more varied exposure to language patterns enables the learner to perceive the interrelationships existing in language more readily and thus increases his awareness of how language works.

Extending the cognitive theory to the learning of second language, it holds that learners use their cognitive abilities in a creative way to work out hypotheses about the structure of
the second language and so cognitive factors play the central role. Learners construct rules, try them out and alter them if they prove to be inadequate. Thus language learning proceeds in a series of transitional stages, as learners acquire more knowledge of second language. Learners are exposed to authentic use of second language in near natural situations and input is processed using natural strategies. Error analysis plays a central role in this approach. Errors tend to emerge when the learner makes the wrong deductions about the nature of second language such as assuming that a pattern is general, when in fact there are exceptions. The errors thus provide positive proof about the nature of the learning process.

However, it must be pointed out here that in any language, whether first language or second language, there are general rules which cover a large number of particular instances but such rules apply only to a part of the language, not the whole of it and there also is an area that is 'rule free' e.g. there are no rules in the English language to determine the past tense forms of irregular verbs like eat, go, drink, write etc. Here the learner has to learn all the individual examples. However, the cognitivists tend to look only at that portion of the language where 'general' rules apply, so that language learning is the process whereby the rules of language are discovered and internalised.

It may safely be stated that Cognitivist influences on language teaching have helped to shift the focus to the learner

Footnote: The theory of Innate Language Structures which investigates the natural faculty for learning language that the human child possesses, is given by psychologists who were mostly influenced by Chomsky. Since this theory is most relevant to the process by which a child learns his first language i.e. informally, naturally and spontaneously, it is not taken up for discussion here in the context of second language learning and teaching.
from the teacher and to establish that the teacher can only stimulate learning, not cause it and that there can hardly be dogmatism on language teaching. In the final analysis, the teachers’ task is to help create the kind of environment in which learning can take place.

2.2. RETENTION:

Formal education is based on the assumption that human beings can retain well and can transfer what they have learned in one situation to another. Learning is a relatively permanent change in behavior that results from practice or activity and thus involves a three step sequence of initial acquisition, retention and use. In Travers’ (1977) view, retention is the continued capacity to behave in a particular way that has been learned. The curve representing retention generally shows a sharp decline after training ceases, followed by a much less marked decline as additional time passes by. Methods for measuring retention differ in the extent to which they provide cues that can elicit the skill originally learned. Of the three methods, namely recall, recognition and saving the last mentioned, being the most sensitive is well suited for measuring retention of verbal materials.

Retention is inevitably linked to forgetting and memory. Forgetting is a normal, everyday event and everyday experience proves that whatever is learnt, particularly intellectual knowledge, is not easily or automatically retained. Forgetting is the gradual or rapid loss of a response in the repertoire of the individual (Travers, 1977). Why does one forget? Is it because the content was not learnt well or because it was not stored well in memory or because retrieval from memory is inefficient? For an answer to this a discussion of the structure of memory is essential.
2.2.1 Structure of Memory: Ever since the beginning of experimental study of memory, the concept of memory occupied a place of importance both in psychology and education. While most of the psychologists have postulated that the structure of memory is made up of two storage systems, a short-term store or short-term memory (STM) and long-term store or long-term memory (LTM), others hold that there is a single memory system. The issue being debated is whether there are two memory systems—(two distinct records of the information traced—one that fades within perhaps 30 minutes and the other that is relatively permanent) or just one.

Adams (1967) and Wickelgren (1973) make a strong case for two memory systems, bringing forth the arguments of (i) cases of brain injury in which memory functions are disturbed; (ii) differential decay function of information in the two cases, i.e. some conditions that facilitate STM interfere with LTM and vice-versa, so the curve representing retention is quite different in the two memory systems; (iii) tendency of the errors of recall in STM to be acoustic in nature (i.e. instead of the word ‘dark’ what is recalled may be ‘bark’) as compared to LTM wherein the tendency is to provide words of similar meanings (i.e. instead of recalling the correct word ‘dark’ one may produce ‘night’ instead); and (iv) seeming small capacity of STM as against relatively large capacity of LTM.

Norman (1970) opines that in recent years, the trend is to view memory as a complex system with several interacting stages, each of which has special characteristics and unique functions. Most theorists agree that external information is first translated into physiological form by the sensory system and stored for an exceedingly short time (perhaps only several hundred milliseconds) in a sensory register. It is then quickly translated into a form for storage in the second stage of the memory system, short term store of memory (STM) which has
a greater capacity than the sensory register and will hold information for a longer period of time. Depending on various factors, the information is then after practice and rehearsal, transferred to still another part of the memory system called long term memory. In view of research evidence that it may take as long as thirty minutes to transfer information from STM to LTM, STM would appear to be necessary to hold information long enough to make transfer possible. It does not hold or retain all the incoming information but only that which we attend to or concentrate on. In order to shift information from STM to LTM, one has necessarily to assimilate or code it. Research shows that coding is helped most by meaningfulness of the material learned (Ausubel, 1963) and that well organized material is better retained than poorly organized material because it probably allows it to enter directly into LTM (Travers, 1977). Likewise, factors like amount of material presented for study, overlearning in the case of relatively meaning less content and regular spaced review (which is not repetition but practice with an experimental cast), have been found to help transfer from STM to LTM and thus improve retention.

Furthermore, Piaget and Inhelder (1973) found a distinction between what is memorized and what can be retrieved from memory. Their research shows the process of remembering is a reconstructive process and not as a process analogous to that of pulling out an term of information from a card file. In considering ways to help students remember or retain, it is important to think not only how information might be stored in LTM but also about ways that information can later be retrieved when needed. In this connection, three strands of thought are discernible. In one school of thought, STM is viewed as a primary memory system since all information must primarily enter STM before being transferred to LTM; in
another, as a retrieval process; in a third, as the locus where information is organized prior to memorization. Sufficient research evidence (Ausubel 1963; Shuell, 1969) exists to prove that such organizing activities are vital for retention, i.e. for transfer from STM to LTM. Organizing strategies appear to be vital in preparing material for long term retention.

The fact that one can retrieve almost instantly much of the information stored in LTM implies that the memory system is organized. On the way in which LTM is organized, Classical theory postulates that memory is a system of ideas with associations linking together ideas in a complex network. Hierarchical model speaks of memory as being structured with specific ideas categorized under more general ideas. Recently, Kintsch and Keenan (1974) have proposed that LTM is structured in terms of propositions which are not precise records of the language we use, but are a kind of shorthand containing the essential meaning. They say a statement has a base structure (i.e. the meaning of the statement as recorded in memory) and a surface structure (the statement as it is actually said or written). Both simple and complex sentences are recorded with the same base structure and are ordered in a hierarchy and comprehension involves constructing a base structure for the proposition as it is heard. The surface structure of propositions is remembered only for a short time and is soon lost in STM. Access to a particular proposition stored in memory appears to involve a search process since one has to go to a block of propositions in order to retrieve a particular one. Despite its appeal, this approach is a model of adult memory only since that of children functions differently.

A recent theoretical formulation by Tulving (1972) proposes that LTM is organized in two major ways-episodic and semantic memory systems. While the former is a record of events that
happen to an individual and hence is autobiographical in nature, the latter is the memory necessary for the use of language and contains organized knowledge a person possesses about words and other verbal symbols, their meanings and referents, relationships among them and rules for manipulation of these symbolic concepts. He suggests that retention of information in episodic and semantic memory may be very different. In episodic memory, information may be more subject to interference and hence forgotten more readily than information in semantic memory. Whether information will enter episodic or semantic memory will depend on the way in which the individual encodes it initially. If it is presented in isolation, as a unique event with emphasis on its perceptible properties, it may be encoded into episodic memory. If the many conceptual and associate relationships between new information and information already in memory are emphasized it is likely to be encoded in semantic memory. Much of school learning is intended for semantic storage. Tulving’s (1972) analysis might help teachers ensure that more material gets into the right memory.

Further, memory is viewed by many psychologists (Bower, 1967; Wickens, 1970) as consisting of multiple components, features or attributes which represent different types of information that may be encoded during initial learning and that makes possible the subsequent recall of a particular memory.

A large portion of research studies on recall and retention revolve around the two concepts – decay and interference – as explanations of forgetting. Experts do not agree on the rate at which different pieces of information decay in the system but do agree that forgetting in STM is mainly a decay process – i.e. information fades from the system. The rate at which it decays depends on the extent to which it has been learned and the amount of material presented (as the amount increases,
short term retention decreases and forgetting increases) For information to be maintained in STM it must be rehearsed periodically since STM is the bottleneck in the information-processing system because of its limited capacity.

Information in short-term store that goes unrehearsed is forgotten within a matter of seconds, to be precise, in eighteen seconds (Peterson and Peterson, 1959). Although theoretically, information in short term store could be retained indefinitely by rehearsal, this would block all new learning by the person because of the limited capacity of short term memory, also termed memory span. When the short term memory span is filled, the only way for new information to enter is by replacing information already in short term memory. The amount of information in short term store can be stretched by a process of organization. Chunking is the reorganization of information to increase the amount of information in short term store. Thus both rehearsal and chunking are important processes in short term memory because they determine which and how much information remains in the memory store.

2.2.2 Transfer of Information to Long-term Memory: Information in the short term memory store is available for transfer to long-term memory through the processes of rehearsal and elaborative encoding. Rehearsal has a positive effect on the retention of information as rehearsal increases, the amount of retention also increases (Rundus and Atkinson, 1970). However, Craik and Lockhart (1972) suggest that maintenance rehearsal, in which the person rote reads the information in acoustic form, keeps information in short term store but does not promote long term retention whereas elaborative rehearsal promotes transfer of information to long term store. Nevertheless, it cannot be concluded that rote rehearsal has no effect on long term retention. Woodword, Bjork and Jongeward (1973) suggest that rote rehearsal influences long term retention as measured by recognition but
not recall. Elaborative encoding modifies the to-be-learned information in some manner that is more meaningful to the learner and this elaborated representation is what gets stored in long-term memory. Paivio (1971) has postulated that there are two elaborative encoding strategies—imagery system and verbal system. The imagery system stores information in images that are direct analogies to objects and actions based on perceptual qualities—shape, tone, smell. Verbal system stores information in an abstract linguistic form that is only arbitrarily related to objects or actions. Though independent of each other, information can be simultaneously encoded in both modes. When this dual encoding occurs, retention of information is enhanced beyond single encoding.

2.2.3 Access to knowledge in long-term memory: Thus information that is rehearsed or encoded in working memory goes to long-term memory for storage. When required by the learner, it is accessed from long-term store and sent to short-term memory. Sometimes previously learned information cannot be recalled to the working memory. This failure to transfer information from storage in long-term memory to short-term memory is called forgetting.

Of the three major theories of forgetting in long-term memory, the decay or disuse theory which postulates that memory traces in the long-term memory weaken over time when information is not used, is not today an important theory of forgetting. The interference and the retrieval theories are predominant ones. In the interference theory of forgetting, failure to recall information stems from the learning of other information so that the learning of one task interferes with the recall of another. Interference that causes forgetting occurs in two ways depending on whether the interfering material was learned before or after the to-be-recalled material. Retroactive effect occurs when new learning interferes with the recall of previously acquired information. Proactive effect occurs when previously acquired information interferes with the recall of newly acquired
information. Since there is a tendency for any two sets of related learnings to influence each other, negatively as well as positively, some writers prefer not to make the distinction, but instead to use the term ‘interactive inhibition’ to describe any negative effects of intervening events.

Retrieval theory, a major theory of forgetting, states that when forgetting occurs, information is not necessarily lost from long-term storage, but rather sufficient cues are not present to allow retrieval of the information. So the degree of recall depends upon the availability of appropriate retrieval cues.

Long term memory has also been likened to a large library where each book must be labeled by a code and filed on a shelf according to that code. It may be lost for indefinite periods if accidentally moved to another shelf or lost for ever if its code is not put in a central card file. Similarly, information stored in long term memory must be organized for efficient retrieval, and the learner must be able to use efficient strategies for retrieving desired information from memory. Retention is best when the context at the time of recall is consistent with the way in which the learner encoded the information. Retrieval theory relates elaborative encoding to the process of remembering. Remembering in this sense is a retrieval process related directly to the initial encoding of the information to be remembered.

Besides these major theories, forgetting is explained as resulting from reorganization, obliterateive subsumption and motivated forgetting. Reorganization, sometimes termed distortion or trace transformation, is regarded by contemporary psychologists like Biehler (1978) as a description of what happens to memory than as a cause of forgetting. Thus in the process of recalling a rarely used idea or skill, one tends to reorganize the
previously acquired material into some new patterns by generalizing and filling in the gaps with stray bits of related ideas that are still remembered. The subsumption theory (Ausubel, 1963) holds that forgetting occurs as once dissociable items lose their identity by being subsumed into more inclusive concepts and principles. These items are not remembered and are no longer discriminable because of being incorporated into the more general concepts. Forgetting may be motivated and intentional of some events or experiences are repressed because they are unpleasant. Such forgetting may also occur in relation to classroom learning if the events surrounding the learning experience are unpleasant for the student.

Since one has to live with a memory system from which there is a continuous loss through decay or interference and retrieval from which depends on appropriate retrieval cues, an important practical matter is how to reduce the loss, how to improve recall and retention. The dual process memory system reveals to the teacher that information is not necessarily and automatically transferred from short term to long term memory for is it effortlessly retrieved from long term memory for use, when needed. Transfer from short term to long term memory and its efficient retrieval are crucial problems in education. The teacher, through the use of appropriate instructional strategies, has to facilitate such transfer.

To conclude, Bruner's (1961) words in the context of memorising and retaining the learned material may be quoted. If (as one does in discovery) one organizes the information somehow so as to reduce the complexity by embedding it in ones cognitive structure and, thus, making it more personally meaningful, the material becomes more accessible. It seems to be a matter of how the material is placed in the memory that determines its ability to be recalled later. Bruner (1961)
relates the ability to remember the material under consideration to ego involvement and Kersh's (1964) work in this area seems to suggest that remembering is closely related to the problems of motivation. Kersh (1964) cites experimental evidence that a group will learn more initially when they do not have to use discovery techniques. However, a group that does use discovery techniques, even if they fail to discover, appear to have learnt something after all and retained much more of the material when requested a month or six weeks later. The former group when requested was quite forgetful. In an earlier paper, Kersh (1964) expressed the idea that attempts to gain understanding after one learns a rule (as in expositional learning) may prove to have an inhibitory effect upon recall. This has not been established or followed up later and needs to be examined. Moreover, there is also a lack of direct evidence regarding what type of discovery-unaided or guided-would promote the most recall and retention.

2.3 TRANSFER OF LEARNING:

All educational efforts aim at learning which can be transferred to new situations. Some of these new situations are to be met within the school curriculum; others are life situations outside the classroom. If transfer were not possible, it would be required to train the individual in each specific situation he will ever face.

When one practices a response to a specific stimulus situation, learning takes place. When a particular learning experience also influences an individual's ability to respond effectively to stimuli different in some ways from those he reacted to during learning, it is called transfer of learning. Transfer of learning is said to have taken place positively, when performance on one task may aid or facilitate performance on a second task,
i.e. when an outcome learned in one situation is remembered and is applied to a new situation; and negatively, when performance on one task inhibits or disrupts performance on a second task. Both proactive interference (old learning interfering with new) and retroactive interference (new learning wipes out old) are examples of negative transfer. At times, neither positive nor negative transfer occurs when learning in one situation is not perceived by the individual as related to a new situation. Zero transfer can occur either as a result of no effect of one task on another, or as a result of equal effects of positive and negative transfer that cancel each other.

There are two types of transfer occurring in educational settings. In lateral transfer, individual can perform a different but similar task of about the same level of complexity as that which they have learned (i.e. if new words have been learnt at school, children recognize in a newspaper, magazine or story book, words of about the same difficulty level). In vertical transfer, information and abilities acquired in one situation transfer to a more complex one usually in the same field. So when a person can perform a similar but more complex or more advanced task or skill, vertical transfer has taken place. An example of lateral transfer is when students in an English class practice writing in grammatical, clear prose and later can transfer this capability to other situations outside the english class. This lateral transfer is at the heart of education. An important form of lateral transfer is learning to learn or ‘mathemagenic skills’ also referred to as strategies which give birth to learning. However it is also involved in more specific learned capabilities such as intellectual or motor skills. Vertical transfer is thought of as involving transfer from an easy to a more difficult task. Much educational effort is aimed at identifying lower level tasks that will produce vertical transfer.
Another way of looking at transfer of learning is to categorize it as specific and general. Specific transfer occurs when a rule, fact or skill learned in one situation is applied in another very similar situation, i.e. where the two tasks have similar stimulus elements or similar response elements or both e.g. applying the rules of punctuation to write a job-application letter. General transfer involves dealing with new problems based on principles and attitudes learned in other, often dissimilar situations as using problems-solving heuristics to solve issues in personal life.

Research evidence indicates that transfer of training does exist between certain tasks. Wittrock (1966) points out that for teachers, transfer of training involves two aspects- learning leading to the achievement of a particular objective should transfer to problems of a similar nature and is referred to as a applicational transfer. A second aspect of transfer is that achievement of one objective should have some transfer to achievement of other objectives. This savings transfer reduce the time needed for learning to occur. In Gagne’s (1965) approach to learning hierarchies, savings transfer is involved. Thus it is a product of learning and of the conditions of learning and is not ‘glued on’ after learning.

**Connectionist and Gestalt psychologists' view of transfer of learning:**

Connectionists like Thorndike view transfer as limited to those situations in which the two tasks contained "identical elements"as specific facts or skills. Within the framework of Operant Conditioning (Skinner, 1953) which is representative of modern S-R associationists, transfer is an increased probability of responses of a certain class occurring in the future and one’s repertoire of conditional operant is the basis for transfer
of one’s learning. Stimulus and response generalization constitute basic forms of transfer. The essential nature of the former is that a response that comes to be elicited by a particular stimulus can also then be elected by a particular stimulus can also then be elected by a range of similar stimuli whereas that of the latter is that the learning of a response to a particular stimulus also strengthens all related responses. Skinner (1953) criticised the teaching procedures saying that there is a woefully inadequate number of reinforcers for the subjects matter elements themselves. According to Judd’s (1939) generalization theory, transfer is the sensed relationship between the elements of a situation. He emphasizes appropriateness of generalizations. However, it needs to be stated that though Judd’s position paralleled similar, but not identical findings of early Gestalt psychologists, his was a mechanistic concept of transfer. On the other hand, Cognitive field psychologists view transfer of learning always in the frame of reference of purposive intellectual pursuits. Gestalt psychologists, Goal Insight theory and Cognitive field psychology, despite having minor differences among their transfer theories, all impute a purposiveness to behavior that Judd (1939) could not see.

Cognitive field psychologists’ view of transfer of learning: Cognitive field psychologists think that transfer of learning occurs because of perceptual similarities between two situations and that it is in the form of generalizations, concepts or insights which are developed in one learning situation and employed in others; this process is called transposition- The phenomenon of responding to a new discrimination task on the basis of relationship among stimuli is called transposition. For transfer to occur the insights gained by a learner should not only be generalized but the learner should understand how the generalization can be used and he should want to use it. Thus transfer, in their view, is not automatic. Furthermore, cognitive field theorists are committed
to the proposition that transfer of learning to new tasks will be better if, in learning, the learner can discover relationships for himself and if he has opportunities to apply his learning to a variety of tasks. Consequently, they think that for transfer to occur at its highest level, students must be helped to understand many widely useful relationships, principles or generalizations and sensitivity to presence of opportunities must be fostered.

A summary by Bigge and Hunt (1969) includes the following as crucial points of Cognitive field psychology in regard to transfer of learning and its promotion - (i) opportunity for transfer may occur in many situations, i.e. it is not inherent in any subject but is possible from any field of knowledge; (ii) Instead of being dependent upon exercise with disciplinary subjects, it is greatly influenced by methods of teaching and learning which use lifelike situations and is further facilitated by teaching for large generalizations which have transfer value; (iii) Transfer is not automatic, hence opportunities for transfer must be recognized and person concerned must want to use them; (iv) it varies according to difficulty of generalization of subject matter and intellectual ability of individuals; (v) insights need not be put into words for their transfer to occur and the amount of intra problems insightful learning, not the number of trails as such, determines the amount of interproblem transfer.

Concluding Remarks: A two-stage theory of paired-associate learning (Underwood and Schulz, 1960) has served as an extremely useful analytical device. Similarly, work in stimulus predifferentiation and related effort in transfer and perceptual learning (Vanderplas, 1963) are additional areas which are beginning to show theoretical developments. Most transfer theories, including abilities theory are rooted in the belief that transfer does occur but do not agree on exactly what it is that transfers. In the identical elements theory, it is the more specific facts, skills or attitudes; in
generalization theory, the broader patterns of the means-ends relationships; in the abilities theory, the abilities as well as knowledge that forms the basis of transfer.

After an examination of the current status of transfer, Biehler (1978) concludes it is relatively strong in empirical findings and somewhat weaker in the development of theory, although a distinct effort at strengthening and developing theoretical conceptions of transfer is visible. There are at least six areas of investigation in transfer that are showing considerable progress in the development of theory—mediation, stimulus predifferentiation, transposition, paired associate verbal learning, learning set theory and mathematical models in transfer. The influence of several learner characteristics such as intelligence, motivation, anxiety, achievement need as also of methods of teaching and learning transfer is being widely recognized now. Sufficient information is not available about them to make overall generalizations about these factors which appear to be important in some learning situations and not in others.

Ellis (1965) has outlined certain research-substantiated principles of transfer, some of which are overall task similarity, learning to learn, insight, time interval between tasks, mediated transfer, bilateral tasks, tasks or stimulus variety, amount of practice on the original task, task characteristics, stimulus predifferentiation, and understanding the rule or principles (that are appropriate in solving new problems). He further specifies a few guidelines for teaching with which Biehler (1978) also agrees and the objective is that what is taught should transfer to new learning situations. These guidelines are -- maximizing similarity between teaching and the ultimate testing situation; providing adequate experience with the original task; providing for a variety of examples when teaching concepts and principles; labeling or identifying important feature of a task and making sure
that general principles are understood before expecting much transfer.

Beside these, Biehler (1978) suggests that exclusive emphasis on relevance and practicality may limit rather than enhance transfer. For better transfer, he suggests – systematically help learners master concepts and principles; encourage them in applying the principles and ideas they have learned to a wide variety of situations, teach heuristics (techniques of problem solving and methods of inquiry); give the students plenty of practice to the point where they respond almost reflexively when they encounter a particular type of situation in or out of the classroom.

Though transfer is apparent in impressive proportions in every day life, it cannot be taken for granted in all educational situations. The transfer problem is a question of degree and of the relative efficiency of educational procedures. For educational purposes, two psychological questions are most important. To how wide a range of different situations will a particular learning transfer? and what instructional methods promote the greatest degree of transfer? At this stage of discussion, it is worthwhile to quote Woolfolk's (1987) observation that discovery learning can ensure positive transfer to new situations.

One clear signal of transfer of learning is the ability to use information and skills to solve problems. Problem solving as the application of knowledge and skills to achieve certain goals is a skill that can be learned and taught (Silver, 1985). Gagne places problem-solving at the highest rung of the hierarchy of learning because when problems solution is achieved something is also learned in the sense that the individuals capability is more or less permanently changed (Gagne, 1970). All the lower states of learning are important mainly as a means to problems-solving. Both S-R
psychologists and field theorists agree that teachers should do everything possible to encourage students to function as independent problem solvers but disagree as to the best way to do this. While Skinner advocates programmed learning to foster problem solving, field theorists argue in favor of discovery learning.

Bruner (1960) links specific transfer to the extension of habits or associations and general transfer to the transfer of principles and attitudes. For him, utility of the former is limited mainly to skills, while the latter lies at the heart of the educational process and it consists of learning initially not a skill but a general idea, which can then be used as a basis for recognizing subsequent problems as special cases of the idea originally mastered. He sees a direct link between general transfer and discovery learning—"The continuity of learning that is produced by the second type of transfer—transfer of principles is dependent upon mastery of the structure of the subject matter......(It involves, in addition) the development of an attitude towards learning and inquiry, toward guessing and hunches, toward the possibility of solving problems on one's own—To instill such attitude by teaching requires something more than the mere presentation of fundamental ideas—it would seem that an important ingredient (of such teaching) is a sense of excitement about discovery—discovery of regularities of previously unrecognized relations and similarities between ideas, with a resulting sense of self-confidence in one's abilities". One suggestion that emerges is that students must be given specific instruction in how to use their skills and information to solve problems and be exposed to a variety of problem-solving experiences if they are to be able to apply much of what they have learned in school. We cannot assume that simply because learning has taken place, students will be able to transfer their school
learning to practical situations or to testing situations are likely to language is a highly transferable skill and use of language is one identifiable skill that provides nonspecific transfer to a great range of situations.

In view of the foregoing discussion, it may be safely stated that teachers must teach for positive transfer. Since the learning of basic skills like reading, writing, computing and speaking will definitely transfer to other situations because they are necessary for survival in the modern world and because they are necessary for later work both in and out of school, the teaching of the same needs to be critically evaluated. Language is a highly transferable skill and use of language is one identifiable skill that provides non-specific transfer to a great range of situations. All learning depends on positive transfer of these basic language skills to new situations. Two basic principles have been outlined by Woolfolk (1987) for teaching for positive transfer. One is that material must be presented thoroughly. Thorough understanding involves incorporating the new information into existing schemata, elaborating it and organizing it as much as possible-in other words, encoding it for storage in long term memory in easily retrievable form. Making learning meaningful really implies teaching for transfer - teaching for permanent storage, deep processing and easy retrieval. And the other is that students will be more likely to transfer information to new situations if they have been actually involved in the learning process such as in discovery, discussion, independent library research, group experiments or just mental activity during lectures. Student engagement with the material is the essential point.

Also, greater transfer specifically of the lateral type is expected if the student actually formulates his own generalizations. In the context of learning, Taba (1963) states that actual
discovery occurs when the learner can transform his information, can see the relation of facts which he has, can understand the causes and can relate past knowledge. In effect, the learner has discovered when he can transfer his knowledge. The actual moment of discovery could be defined in terms of transfer and as such, discovery techniques and ease of transfer thus go hand in hand.

Some further insights into this relationship are found in Wittrock’s (1963) work who suggests that if one verbalises the discovery, transfer is enhanced because alternative responses which produce negative transfer are eliminated and alternative responses which produce positive transfer are included. There is current disagreement over this matter and it needs to be experimentally tested.

The implication that emerges, therefore, is that transfer of learning depends on the teaching technique used, the method behind the technique and on the stage of development of the learner. Since certain instructional strategies are likely to lead not only to better learning acquisition and better retention but also to better transfer of learning as compared to others strategies, it is thus relative efficacy of two instructional strategies, namely guided discovery and expository teaching, to which the present study addresses itself.

2.4 INSTRUCTIONAL STRATEGIES:

Before defining the term ‘instructional strategies’, teaching methods and teaching techniques have to be understood in order to see in what respects they are similar or/and different from each other. The term teaching methods is sometimes used so broadly that it becomes synonymous with the term ‘teaching’ and at other times, so narrowly as to represent such
specific skills or techniques as showing pictures. Teaching methods must refer to certain group of common behaviors within these two extremes. Hunkins (1980) remarks, "Teaching behaviors are not random behaviors, such methods have form and consistency. They have form in that they have definite steps or stages or sub-behaviors that are recurrent and applicable to various subject matters."

Teaching technique is also defined as technical skill. Early works with technical teaching skills addressed such techniques or skills as set induction, voice control, eye contact, feedback, reinforcement, repetition, examples, review and use of silence. In contrast with teaching techniques that focus on a single teaching skill, teaching strategies represent a complex approach to teaching which often contains a mixture of teaching methods, utilizing a number of techniques with each method (Henson, 1974).

Ebel (1969) defines a strategy as — "Patterns of teacher behavior that are recurrent, applicable to various subject matters, characteristic of more than one teacher and relevant to learning." This definition is very loose and reflects those concepts defined here as teaching methods. However, the term instructional strategy seems best suited for describing a precision approach to the more global operations.

Instructional Strategy is primarily concerned with the way in which content is presented in the instructional environment and thus includes the nature, scope and sequence of events which provide the educational experience. It must take into account the objectives that have been defined and the entering behavior of the learners since it is a plan for attaining learning objectives and is made up of techniques which will ensure that the learner does in fact reach the objective.
According to Romiszowski (1984), "Overall instructional strategies are the translation of a philosophical or theoretical position regarding instruction into a statement of the way in which instruction should be carried out in specific types of circumstances." For Gerlach and Ely (1972), a strategy is "the teacher's approach to using information, selecting resources and defining the role of students. It includes specific practices used to accomplish a teaching objective."

Instructional strategies are, thus, the general view-points and line of action one adopts in order to choose the instructional techniques. A strategy that advocates' active learner participation in the lesson will tend to minimize the use of lecture technique, in which the student is relatively passive and will promote the choice of 'more learner active' techniques such as group seminars, group project work, individual tutorials, self-instructional packages etc. A strategy that supports teacher-intensive class-sessions as opposed to little or no teacher contact would tend to favor directed seminars and tutorials as opposed to projects and packages.

According to Shavelson (1976), a teaching strategy is defined as 'a sequence of teaching acts that arise from a series of decisions teachers have to make' and to select a particular strategy, a teacher has to take into account the set of goals, the entering behaviour of the learner, the predicted outcome, constraints and utility aspects.

Romiszowski (1984) outlines four major decision areas that interact with the decision to adopt any particular strategy-(i) overall sequence and structure of the course/curriculum, for example spiral curriculum well suited to free exploratory discovery strategy and linear curriculum to expositive strategies; (ii) individual/small group/large group organization of the instructional
process and teacher led or mediated systems of delivery; (iii) output measures, output control and input control; and finally (iv) the type of test and control sub-systems. All these interact with the instructional process and influence the choice of an instructional strategy. For example, the mastery learning strategy is quite incompatible with the principles of Bruner's free discovery learning but quite compatible with Gagne's guided discovery approach. It is the presence of such interactions that makes it difficult, indeed undesirable, to adopt an overall strategy, either discovery or expositive, as a panacea to all instructional problems.

However, a course of instruction has a variety of aims and objectives and may be organized and sequenced in a linear, spiral, pyramidal or inquiry-based curriculum. As regards input control of the process, either the teacher or the learner or the mediated system or a combination of the three may exert control over inputs. The other important consideration in selecting a strategy to teach a particular course or unit is that individual learners respond differently to different instructional strategies (Corno and Snow, 1986) and practices found effective with one type of students are actually ineffective with others (Coker, Medley, and Soar, 1980). Moreover, aptitudes varying from academic abilities and background to the various kinds of interests and motivations learners bring to the learning task, also influence the effectiveness of a particular instructional strategy. Therefore, the selection and use of optimal strategies in teaching — i.e. a strategy that is most effective for reaching a particular goal in a given situation — demands knowledge of alternatives.

Among current theoretical viewpoints, two more or less opposed positions related to the process of learning and instruction can be identified. One way to view teaching strategies
is outlined by Fenton (1967) wherein both the discovery-expositive 
dimensions do not describe simple dichotomies but should be thought 
of as a continuum, along which various degrees of each type of learning exist.

A TEACHING CONTINUUM

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<th>Exposition</th>
<th>Directed discussion</th>
<th>Discovery</th>
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<td>(questions as cues)</td>
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</table>

No cues discovery is pure/autonomous discovery when no assistance, other than encouragement, is given by the teacher. Directed discussion may be equated with guided discovery where questions act as cues and when a child gets stuck, another approach to the problem is suggested for him to try. Exposition is reception learning which is highly directed, with maximal help from the teacher.

The discovery-expositive continuum is perhaps the most important group of strategies concerned with the actual process of instruction. A polarization is noticed between the supporters of discovery learning and those of expository teaching. The strongest open supporter of expository teaching is Ausubel (1963), himself a Cognitivist but the Behaviorist camp also largely favour this position. Discovery learning is supported by Piaget (1965), Bruner (1966), most of the Cognitive school of psychology and the humanists.

Modifying Bigge's (1976) and Landa's (1976) classification, Romiszowski (1984) has attempted to equate the viewpoints of theoreticians by constructing a continuum of reception and discovery strategies, ranging from totally free discovery to totally controlled rote learning, presented in table 2:1.

Therefore, many variations are possible on these two basic
strategies. Discovery learning as identified by Bruner (1966) is quite different from guided discovery of Gagne (1968) and Landa's (1976) RULEG and EG-RUL is still different. Besides, Wittrock (1963) provides a useful scheme of classification—Expository teaching wherein the teacher may give the principle and the problem-solution; guided discovery in which he may give the principle which applies but may not give the problem solution or he may not give the principle but may give the problem-solution; and unguided discovery wherein he may give neither the principle nor the problem-solution. It is observed that the chief characteristic in learning by discovery is the amount of guidance the teacher provides. So we see that beside the on-going debate over the relative effectiveness of discoverer/expository teaching strategies, the learning-by discovery controversy itself is embroiled in the question of the degree of guidance to be provided to the learner. The goals of discovery learning are generally agreed upon, but there is a variation in the means advocated to achieve these goals. Most advocates of discovery learning lay emphasis on the teacher not telling the students the principle / generalization / rule that they are supposed to learn, but what the teacher is to do when he is not telling the student is not always agreed on.

2.4.1 Discovery Learning-Pure and Guided: Discovery learning is not supported by a precise and rigorously experimental psychological theory but rather a grouping of ideas from Cognitive psychology, child development and study of creativity. Experimental investigation of problem solving and concept-attainment, research on intellectual development initiated by Piaget (1963, 1965) and others underlies their viewpoints. Some advocates of discovery, like Hendrix (1961), Taba (1963), Glaser (1966) claim that the discovery learning view of teaching is a historically rich tradition and its antecedents can be traced back to the writings of Rousseau, Montessori and Dewey. They claim that the inductive
method (which they associate with discovery) is a long standing procedure recognized in society for its excellence. On the other hand, psychologists like Bruner (1961) claim discovery learning to be an innovation that is sorely needed to replace rote learning and restricted thinking.

Table 2.1
A continuum of reception and discovery methods of instruction.

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free exploratory discovery</td>
<td>Bruner's position. Broad learning objectives are fixed; otherwise the learner is free to choose sub-goals, methods, etc.</td>
</tr>
<tr>
<td>Guided discovery</td>
<td>Gagne's model. Objectives for each learning step are fixed. The learner is free to explore methods, but with guidance and help at every stage.</td>
</tr>
<tr>
<td>Adaptive/diagnostic programmed discovery</td>
<td>Cybernetic approaches such as 'Dialogue CAI', Pask's conversational programming, and Landa's structure-diagnostic programmes.</td>
</tr>
<tr>
<td>Linear/intrinsic programmed discovery</td>
<td>Rigidly directed. (EG-RUL, INTRINSIC PROGRAMMES).</td>
</tr>
<tr>
<td>Meaningful reception learning (a) Inductive reasoning (from particular to general)</td>
<td>This is really EG-RUL, but the learner receives the argument; he does not have to discover the rule. This is the way that most mathematical discovery and problem-solving takes place.</td>
</tr>
<tr>
<td>Meaningful reception learning (b) Deductive reasoning (as favored by Ausubel)</td>
<td>As understanding of concepts is shown by the ability to apply them to examples. The RUL-EG model (Student receives rule and demonstrates understanding by application to suitable range of examples) is an appropriate model here. Can be programmed.</td>
</tr>
<tr>
<td>Rote reception learning (drill and practice)</td>
<td>Learning of facts, statements and operations without understanding the concepts involved. Memorization.</td>
</tr>
<tr>
<td>Impromptu reception learning</td>
<td>Facts and observations, originally unplanned, supplied by the teacher, other resources, other students.</td>
</tr>
</tbody>
</table>

Source: Romiszowski; Designing Instructional System, 1981.
Likewise, Suchman (1961) views inquiry/discovery as a new pedagogy in which the teacher must abandon his ‘traditionally directive mode’ and structure the environment so that the learner is led to exciting new discoveries. Travers (1973) coeives both these views as being valid in as much as discovery learning represents a new mode of relating the very old Humanist-Gestalt tradition in psychology to the practice of teaching.

Worthen (1968) describes discovery learning as that wherein carefully prepared curriculum materials are organized so that problems or instances are presented before principles or heuristic rules are mentioned. The teacher is not to act as the primary source of knowledge or to indicate anything about the generalizations to be discovered, before nearly all students discover these for themselves. If the students’ reach false generalizations, the teacher is to trap them by asking them to do examples in which the false generalizations could be seen to be false.

For Glaser (1966), the teacher in discovery learning presents material in an example-to-rule sequence and involves the students in a process of induction. He claims that the process of induction is what distinguishes discovery from expository teaching strategy wherein deduction is the rule. For others, the process of induction is not a sufficient criterion to determine that discovery learning has occurred. Hendrix (1961) argues that pupil verbalization of a rule cannot ensure the advent of discovery itself and wants the two to be separated. He believes that appropriate teaching for non-verbal awareness of new generalizations is very difficult to practice. The teacher must use carefully prepared materials and must reward students for looking for a ‘short-cut’ or obtaining an ‘insight’. The teacher must be sensitive to those non-verbal signs which indicate moments of discovery in individual pupils.
Bruner (1961) has given a rather different description of discovery learning since his emphasis is on isolating the psychological processes involved in the discovery process. Bruner's discovery learning is an instructional approach in which students learn from their own active explorations of concepts and principles. For this, they need to be encouraged to have experiences and conduct experiments that permit them to discover principles for themselves. Bruner demonstrated that pupils learn more effectively when they develop their own mediators. However, a common thread in discussions of the various approaches to discovery learning is Bruner's (1961) formulation—Students' curiosity and constructive abilities will be engaged if they are first presented with ambiguous material and then given the opportunity to organize it according to concepts which they themselves develop. For Suchman (1961), the experience of discovery involves the students' assimilation of perceived data into the existing frame work of a conceptual systems.

It may be pointed out that discovery learning can be used in the classroom in a variety of ways. Bruner (1966) recommends setting up group discussions by emphasizing contrast, stimulating guessing, encouraging participation and arousing awareness. Bigge (1976) urges teachers to switch subject matter. Suchman (1960) advocates inquiry training to teach pupils how to ask questions and discover. He has conducted extensive experiments on inquiry training using biology and physics films wherein events are presented that are 'at odds' and that require inquiry to resolve the discrepancy. The teachers' responses are limited to 'yes' or 'no' and the dialogue takes the form of informational, verificational and experimental questions asked by the students. This is an example of unguided discovery wherein the inquiry teacher limits his answers to 'yes' or 'no' or 'that depends'. Postman and Weingarten (1969), strong proponents of discovery learning in
To summarize, discovery learning refers to those teaching learning situations where the instructional objectives are achieved by the learner either without any guidance or with minimal, planned guidance from the teacher. The distinctive and prior learning task is to discover something with the essential condition that the teacher never presents the principal content of what is to be learned in the final form. Rather the learner is required to reorganize or transform it before incorporating it into his cognitive structure. The resources for finding the solutions are factual information and raw data which have not been organized in any particular fashion, e.g., textbooks, documents, statistical data, films or slides, tape recordings, etc. The teacher under this approach is primarily a facilitator of learning experiences and the learner is required to reorganize or transform the integrated combination in such a way as to create a desired and product or discover a missing means-ends relationship.

Bruner's Discovery learning, Gagne's Guided discovery and Ausubel's Expository Teaching are taken up for detailed discussion and analysis with a view to examining their relevance and applicability to the teaching of selected units of the prescribed syllabus of English during the present investigation.

**Bruner's Discovery Learning**: Bruner (1966), a cognitive psychologist who studied learning, has described one of the most prominent cognitive instructional models, namely discovery learning—to suggest how teaching
should be done. Since Bruner (1966, 1971) agrees that learning involves the active processing of information and that it is organized and constructed in a unique way by each individual; that knowledge about the world is not simply ‘poured into’ the individual like liquid into a glass, he discredits the notion of the behaviorists that the human being is simply a reactor to an environment, being shaped by it. He believes that the individual engages actively through perception, concept attainment and reasoning in creating or constructing knowledge and thus much learning occurs through discovery during exploration induced by curiosity.

For Bruner (1966), discovery is a matter of rearranging or transforming evidence. It is a type of thinking which occurs in such a manner that the individual learner goes ‘beyond’ the information so reassembled ‘to additional new insights or generalizations’. Thus new information is not necessary for discovery to occur since discovery learning doesn’t refer to finding out something never before known but to what one discovers for oneself. When a student is led to discover a generalization, he learns not only the generalization, he also learns from the process of discovery itself. The psychological processes involved are said to be similar to the processes involved in any problem-solving situation. So when discovery learning strategy is used, the student learns how to explore a situation for himself, how to go beyond the information given in a situation and how to behave in a scientific manner and think in an inductive style.

For Bruner, optimal sequencing is not the step-by-step sequencing that behaviorists prefer. He thinks that learners will learn and retain more if allowed to organize material according to their own interests rather than according to externally imposed structure. The idea, therefore, is for the student to put things together for himself, to be his own discoverer. Bruner (1966) states—"We teach a subject not to produce little living libraries
on that subject, but rather to get a student to think for himself, to consider matters as an historian does, to take part in the process of knowledge-getting. Knowing is a process, not a product'. For this, the teacher acts as a catalyst and not a dispenser of information. Teachers provide problem situations and stimulate students to discover the structure or essential information of the subject-matter for themselves. In discovery learning, students under the teacher's guidance, proceed along intellectual steps that require an integration of past knowledge and skills along with an attempt to discern and organize new knowledge and skills. Opportunity is thus increased for the interaction of life and learning, of knowledge and action, while at the same time, students are engaged at a maximum level of attention and activity.

Thus in Bruner's discovery learning, a teacher organizes the class so that the students learn through their own active involvement. The teacher offers students a problem, an issue, a question and encourages them to inquire into its nature and possible solution; he guides students' investigation and clarifies their positions and conclusions by soliciting hypotheses from them, gives only limited clues and deflects direct questions raised by them. The teacher leads them with additional questions into other possibilities of thought, students test their hypotheses, gather and analyze data, arrive at a statement that concludes, generalizes or solves the problem.

Inductive reasoning, i.e moving from details and examples to the formulation of a general principle, should form the basis of discovery learning as conceived by Bruner (1966). Inductive reasoning under discovery learning requires intuitive thinking on the part of learners which is the sudden solution of a problem or the recognition without proof of a truth or solution. These truths or solutions then become hypotheses that
are tested or proved by analytical thinking. Education traditionally tends to discourage intuitive thinking. Bruner (1960) suggests that it can be nurtured by encouraging students to make guesses based on incomplete evidence and then to confirm or disprove the guesses systematically. Other ways to encourage intuitive thinking are hypothesized by Bruner (1966) as being-teaching in the hypothetical mode; provision of varied experiences in a field; emphasis upon the structure or relatedness of knowledge; promotion of heuristic procedures in problem solving; encouragement of educated guessing; building of self-confidence in students so that they risk a guess which may be wrong; abandoning the system of rewarding ‘correct’ answers and not punishing guessing and other manifestations of intuitive thinking.

Bruner (1960) identified four concept-attainment strategies used in hypothesis-testing situations, which varied from impulsive guessing through increasingly efficient methods of processing information systematically and testing hypotheses about it. Bruner advocates stimulation of discovery learning by encouraging students to explore and learn on their own and by teaching them information-processing concepts and skills that can be applied to a wide variety of specific content. This involves using incongruity, curiosity, novelty and interest-provoking questions to motivate learners to approach topics with the intention to learn on their own, by processing the information and testing hypothesis.

Bruner (1966) discusses six problems in teaching by discovery so that learners will use material appropriately in a variety of situations. First is the problem of arranging learning so that children recognize that there are connections or relationships between the things they have learned so that they can go beyond the situation in which they have learned to other situations. The second problem is that of compatibility-how to
get learners to fit new material into their own systems of associations, categories and frames of reference so that it becomes their own. The third is the problem of activating the children so that they can experience their capacity to solve problems and be successful enough that they are rewarded for thinking. Fourth is seeing that children get practice in the use of information and problem solving. Fifth is the 'self-loop problem'--learners often do things but are not able to say to themselves what they have done and put it in a form which they can hold in mind. Finally, there is the problem of handling the information flow so that it can be used in problem solving, or of engineering discovery so that it is more routine and less a matter of inspiration. However, for the first two problems, he suggests helping learners to form new and meaningful concepts and connections and also rephrasing materials; for the third he emphasizes the idea of competence as being self-regarding and for the fourth, teaching in the hypothetical mode is favoured. By hypothetical mode, he means an approach wherein the student is aware of alternatives and can evaluate the relevance of information as it comes and is thus an active participant. To overcome the self-loop problem, he believes discussions of how we say things will be helpful and for the final problem, he stresses the importance of presenting material in contrastive form. "We believe that by getting the child to explore contrasts, he is more likely to organize his knowledge in a fashion that helps discovery in particular situations where discovery is needed" (Bruner, 1966).

Bruner (1961) himself has claimed discovery guarantees that what is learned has been learned effectively. When discovery has occurred, that which has been discovered is a very special kind of knowledge. This knowledge stays longer with the student, is more easily transferred to other situations and has a more
important place in the student's mind. He lists four major advantages of discovery learning as being-increase in intellectual potency, shift from extrinsic to intrinsic rewards, learning the heuristics of discovery and as an aid to memory processing. Since it is self-rewarding, it frees the learner from stimulus-control and allows him to utilize success and failure as informative feedback. Since the student incorporates information in a cognitive structure he has developed, learning acquired through discovery is considered to be more meaningful and valuable than learning imposed by external forces and it is thus not only retained in memory but is more easily retrievable. Since it occurs under conditions of intrinsic motivation, it arouses students' curiosity, motivating them to continue to work until they find answers.

Bruner's (1961) article 'The Act of Discovery' became the basis for a school of pedagogy emphasizing discovery as a goal in itself without regard to what is discovered. Bruner had intended to emphasize the importance of self-direction and intentionality in learning and thus in 1966, he published 'Some Elements of Discovery' in an attempt to remedy the misuse of the concept of discovery learning. He does not advocate the application of discovery learning to all learning but emphasizes the method of discovery learning.

Bruner (1966) acknowledges that discovery is neither the natural way nor the principal way one learns about one's environment since it is inefficient as a means of passing on the culture because the individual cannot be expected to rediscover all that is known. Nevertheless, it is claimed that discovery learning is the most powerful and effective kind of learning and must be used where what is being learned has major significance. For Bruner, Taba and others, each discipline contains certain very powerful and pervasive organizing concepts and principles. To learn a discipline effectively requires that
these concepts be firmly implanted in the minds of students, preferably from an early age. Discovery learning is par excellence for the learning of these major organizing concepts.

To sum up, in Bruner’s (1966) opinion students learn best when they themselves discover the structure of a subject by inductive means. If Bruner were to create a discovery unit on the relationship between heat and light, he might encourage his students to talk about matches, candles, campfires, light bulbs. Then he might wave around a flashlight and ask them to guess what part filament plays, why it glows etc. Students learn by carrying on a lively class discussion instead of by writing responses and moving knobs on a machine as in programmed learning.

Gagne’s Guided Discovery: A distinction is also made between discovery learning, in which the students largely work on their own and guided discovery, in which the teacher provides some direction through asking leading questions. Pure discovery is when no assistance, other than encouragement, is given by the teacher whereas in guided discovery a degree of aid is given. Referring to table 2.1, we find that in Gagne’s model of guided discovery, objectives for each learning step are fixed and the learner is free to explore methods, but with guidance and help at every stage.

The published writings of both Bruner and Gagne characterize two possible positions on the role of discovery in learning. While for Bruner, ‘knowing is a process, not a product’, for Gagne, knowledge is made up of content principles, not heuristic ones. Although both espouse the acquisition of knowledge as the major objective of education, their definitions of knowledge and knowing are so disparate that the educational objectives sought by each scarcely overlap. Even the term ‘learning by discovery’ has different connotations for each. For Gagne, learning
is the goal; how a behavior or capability is learned is a function of the task. It may be by discovery, by guided teaching, by practice, by drill or by review. The focus is on learning and discovery is but one way to learn something. However, for Bruner, it is learning by discovery. The method of learning is the significant aspect. He advocates the teaching of broad principles and problem solving through minimal teacher guidance and maximal opportunity for exploration on the part of the student. The processes of discovery and learning are often assimilated to each other. Thus it is that critics say the objective of discovery methods of teaching is discovery, not learning. Howsoever, this criticism is counteracted by argument that the act of discovery is taken to imply a particularly powerful kind of learning, so the objective is learning in this specialized sense.

For Gagne, a major force in guided learning approach, the learner is carefully guided, he may work with programmed material or a programmed teacher (one who follows a step-by-step guide) but the sequence is determined entirely by the programme; So instruction is a smoothly guided tour up a carefully constructed hierarchy of objectives. For Bruner, much less system order is necessary for the package. He insists on providing contrasts and incongruities so as to get the learner, because of his discomfort, to try to solve this disequilibrium by making some discovery (cognitive restructuring). This discovery may take the shape of a new synthesis or a new distinction. So for Bruner, instruction is a roller coaster ride of successive disequilibria and equilibria until the desired cognitive state is reached or discovered.

For Gagne, any discovery exercise has specific pre-set objectives and the teacher has only been successful if he has guided the learner to achieve them. But he gives only general
guidelines on how a teacher may attempt to do this. He emphasizes the importance of carefully sequencing instructional experiences through maximum guidance and stresses the importance of basic associations or facts in the service of the eventual mastering of principles and problem-solving. Gagne's emphasis is not on teaching general strategies or heuristics of discovery; he is much more concerned with the teaching of rules or intellectual skills that are relevant to particular instructional domains.

Gagne's major contribution has been the development of a taxonomy of learning by which the vast field of learning research can be organized and applied to the design of instruction. According to this approach, regardless of the subject matter or level of instruction, what can be taught can be classified into one of five domains of learning—verbal information, intellectual skills, cognitive strategies, attitude and motor skills. Though originally Gagne (1965) had proposed eight types of learning outcomes, later he modified and reorganized the eight parts into face domains. He identified four major types of intellectuals skills: Discriminations, concepts, rules, and higher-order rules (Gagne, 1974) Intellectual skills have been characterized as knowing 'how'—these skills make it possible for people to use symbols and communicate. Through symbols, we interact with the environment in directly, using mental manipulations and calculations to solve problems.

Gagne (Romiszowski, 1984) sees the acquisition of intellectual skills as the 'snapping into place' of a combination of simpler skills that have previously been learned. The hierarchical nature of these skills is emphasized. Thus two main stages of external learning conditions are seen to be necessary. First the relevant lower level skills must be retrieved from memory through the use of an appropriate strategy. Second, one must help the learner to put together the simpler skills into the more complex
one which he is supposed to be learning. The teacher should not do the putting together for him but should guide him to do it by use of appropriate hints or cues. Third, one should take care that the intellectual skill being taught is learned as a generalizable skill and not as a memorized item of information. For this, teacher should plan a variety of situations for the learner to practice the use of the skill.

For Gagne, the objectives of instruction are intellectual skills or capabilities that can be specified in operational terms, can be task analysed and then can be taught. He would subscribe to the position that only when objectives have been made operationally clear, psychology has been able to suggest ways of teaching. In the event of the objectives not being stated clearly, the psychologist can render little assistance. Thus objectives clearly stated in behavioral terms are the cornerstones of Gagne's position.

In guided discovery, the learners are carefully directed down a particular path along which they are called upon to discover regularities and solutions on their own. They are provided with cues in a carefully programmed manner but the actual statement of the principle, rule, problem solution is left up to them. As the learner responds to the questions posed by the teacher, we have a two-way system of communication, in which the learners make the discoveries and the teacher guides them in the right direction. This essentially is Gagne's guided discovery. The teacher needs to diagnose the learner's difficulties with the problem and supply appropriate hints, but not so strongly as to answer the question for the learner.

In the published studies, guided discovery treatments have done quite well at the level of immediate learning and lateral transfer. This is a via-media approach between the two extreme
positions of Bruner and Ausubel since the strategy provides specific directions for each student so that he knows exactly what is expected. Here the students are acquainted with the objectives and a statement of expected terminal behavior is also not out of place. The student is not told how to reach the terminal behavior but only what is expected of him. Since purely discovery or purely expository teaching cannot accommodate or provide all the learning conditions necessary for reaching particular instructional objectives, a via-media approach like guided discovery may often be, the most suitable instructional strategy. The basic premise on which it rests is that learning which occurs naturalistically tends to occur through self-motivated and guided-discovery, and since the learner is motivated and enjoying learning, it will be retained in long term memory and integrated with previous learning. To summarize, discovery learning refers to the amount of guidance a pupil is given in learning and the degree of guidance is one of the key factors determining the effectiveness of discovery learning. It is agreed that some success in the task assigned can help to keep up the pupils motivation in discovery learning, else he will lose interest. Therefore, the judicious use of guidance is very important. Too little guidance leads to boredom, too much robs the pupil of the joy of discovery.

2.4.2 Expository teaching: Expository teaching is based on the premise that people acquire knowledge primarily through reception. The teacher herein presents information or material to be learnt in the final form. This may be achieved through explanation or through practical demonstration. The learner is simply called upon to internalize or incorporate the presented material in his cognitive structure, i.e. make it available and functionally reproducible for future use. The learning tasks does not involve any independent discovery on the part of the learner. It is the situation in which the teacher gives both the principles
and the problem situations. It is often called deductive teaching because the teacher generally begins with a definition of the concepts or principles, illustrates them and unfolds their implications.

The sources of information generally used in expositive teaching are the textbook, other reference material and personal experience of the teacher. Even audio-visual material is sometimes used. The dominant role, however, is always that of the teacher who usually stands before a class to present information and the students are expected to process this information in the same manner as presented by the teacher. Under this strategy, lecture is most frequently used but motion-pictures, student reports, practical demonstrations and laboratory experiments are also used. Students are usually examined and evaluated on their ability to identify people, dates and formulae and to repeat the information originally transmitted.

Two basic expositive strategies, namely one-way system (direct teacher - input system) and two-way system (teacher-modification system) may be considered as two extremes of a continuum.

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<table>
<thead>
<tr>
<th>One way system</th>
<th>Two way system</th>
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<tbody>
<tr>
<td>(direct teacher input system)</td>
<td>(teacher-modification system)</td>
</tr>
<tr>
<td>Example: lecturing</td>
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</tbody>
</table>

In one-way system, (Broadwell, 1977) the teacher is completely responsible for the transfer of information. The learners have no say in the content or the manner of what is communicated and don't provide any effective feedback to the teacher. The presentation is pre-planned, expositive, usually content-oriented rather than objective-oriented and controlled by a predetermined time limit. Lecturing is the most common but not the sole technique of applying this system. In itself, it
is effective for most factual information and simple conceptual learning.

Two-way system (Broadwell, 1977) is in operation when the teacher asks for feedback that proves correct reception of the message. This feedback modifies the teacher’s presentation to ensure that the learners have understood. At the same time, learner’s incorrect responses are modified by the teacher. The method is wholly expositive since it is the teacher alone who inputs new information. The learner contributions serve to check reception and interpretation but do not add new content to the lesson.

**Ausubel’s Expository Teaching**: Ausubel (1963), though a cognitive psychologist, favors expository teaching and its correlative, reception learning. Ausubel’s approach is obviously cognitive rather than behavioristic but it places most of the burden for ensuring learning on the teacher. The teacher is more central and more important in his scheme of teaching than in that of Piaget and Bruner since he places less stress on active and self-motivated learning by the learners themselves. His view of learning stands in sharp contrast to the of Bruner. According to Ausubel (1963), many students need external motivation to do the cognitive work necessary to learn what is taught in school. Concepts, principles and ideas are presented to learners and received by them, not discovered by them and the more organized and focussed the presentation, the more effective will be the learning. Ausubel’s approach is teacher-planned, systematic instruction on meaningful information. Ausubel concerned himself mainly with meaningful verbal instruction. Although acknowledging the importance of discovery leading, he notes it is inefficient and even impossible under some circumstances. And further adds that didactic teaching is the simplest and most efficient method to produce learning and so sees it as the method of choice. Under this strategy, teacher presents the materials in a carefully organized, sequenced and somewhat finished
form, and so students receive the most usable material in the most efficient way.

Ausubel and Robinson (1969) focusses on the misconceptions and limitations of discovery learning. They vehemently oppose the contention that all discovery learning is meaningful and all reception learning is rote. Table 2.2 explains his position.

Four possible types of learning are possible on two independent dimensions. One dimension relates to the way information is presented to the learner via reception or discovery. The other dimension involves the manner in which information is incorporated by the learner into his existing cognitive structure. If he tries to relate the information presented to what he already knows, meaningful learning occurs and if he merely attempts to memorize it without incorporating it into his cognitive structure, then rote learning occurs. Thus the intent of the learner is a clue to distinguishing between rote and meaningful learning. So discovery as well as reception learning can lead to either rote or meaningful learning.
Table 2.2

Types of Learning included in Meaningful Learning Theory.

Stage II: Received information is incorporated by the learner using means that are:

<table>
<thead>
<tr>
<th>Meaningful</th>
<th>or</th>
<th>Rote</th>
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<tbody>
<tr>
<td>Meaningful reception learning: logically organized information is presented to the learner in final form; he then relates it to his existing knowledge (i.e. incorporates it into his cognitive structure).</td>
<td>Rote reception learning: information of any type is presented to the learner in final form; he then memorizes it.</td>
<td></td>
</tr>
<tr>
<td>Rote discovery learning: information to be learned is ascertained independently by the learner; he then relates it to his existing knowledge (i.e. incorporates it into his cognitive structure).</td>
<td></td>
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</table>


Ausubel (Woolfolk, 1987) has proposed expository teaching to encourage meaningful reception learning. In opposition to the view that meaningful generalizations can only be acquired as a product of problem solving activity, he argues that verbal reception learning can be genuinely meaningful without 'prior' discovery or problem-solving activity and is not necessarily rote.
in character. He suggests that the weaknesses attributed to the method of verbal instruction do not inhere in the method itself but are derived from either premature use of verbal techniques with cognitively immature pupils or from serious misapplications. In his opinion, at no stage of development, does the learner have to discover principles independently in order to be able to understand and use them meaningfully. In this respect, Ausubel differs from cognitive instructional theorists who imply that discovery learning is essential to produce meaningful learning and retention.

Ausubel refutes most of the advantages claimed by Bruner for discovery learning. He agrees that it is not the act of discovery but the structured textbooks, films, other materials as well as teacher’s questioning and guidance provided to the learner that leads to a more orderly integration and use of knowledge in discovery learning. He believes that the concern for structure or organization is not unique to discovery learning but is a high priority of expository teaching too. He also believes that problem solving ability is not transferred to other situations and intrinsic motivation is not exclusively linked to discovery learning.

Ausubel is not, however, averse to occasional use of discovery learning, particularly with school children in the concrete stage of cognitive development but believes that once children reach the formal level of cognitive development, they can learn more effectively though expository teaching. Ausubel agrees with Bruner that people learn by organizing new information into hierarchies or coding systems. He calls the general concept at the top of the system the subsumer because all other concepts are subsumed under it. He believes that learning should progress, not inductively as Bruner recommends, but deductively from the general to the specific or from the rule or principle to
examples. The deductive approach is sometimes called the rule method.

The two approaches, i.e. expository and discovery, though at the opposite poles of the teaching continuum, do have certain common elements. First, both require the active participation of the students in the learning process. Second, both emphasize ways of bringing students’ prior knowledge to bear on new learning. Third, both assume that knowledge continually changes once it is ‘inside’ the learner’s mind (Slavin, 1988) However it is seen that the first phase of discovery learning involves a process quite different from that of expository teaching wherein the learner must rearrange the given information and reorganize or transform the integrated combinations but after this phase is completed, the discovered content is internalized just as in reception learning/expository teaching (Ausubel, 1961).

Ausubel’s Expository teaching consists of three principal stages of lesson presentation, summarized in table 2.3.

**Phase One: Presentation of Advance Organizer** Ausubel (1960) developed a means called advance organizer to orient students to material they were about to learn and to help them recall related information that could be used to assist in incorporating the new information. The advance organizer relates the new ideas to information already in students’ minds and provides a broad organizational scheme for the more specific information to be presented. A study by Hartley and Davies (1976) has established that advance organizer increases students’ understanding of certain kinds of material.

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Principal Components of Ausubel's Expository Teaching

Teachers who use the expository teaching approach for presenting lessons start with advance organizers, then present lesson content, and finally encourage students to better understand the new information.

<table>
<thead>
<tr>
<th>Phase One: Presentation of Advance Organizer</th>
<th>Phase two: Presentation of Learning Task or Material</th>
</tr>
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<tbody>
<tr>
<td>- Clarify aims of the lesson</td>
<td>- Make organisation explicit</td>
</tr>
<tr>
<td>- Present organizer</td>
<td>- Make logical order of learning material explicit</td>
</tr>
<tr>
<td>- Identify defining attributes</td>
<td>- Maintain attention</td>
</tr>
<tr>
<td>- Give examples</td>
<td>- Present material</td>
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<tr>
<td>- Provide context</td>
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<tr>
<td>- Repeat</td>
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<tr>
<td>- Prompt awareness</td>
<td></td>
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<tr>
<td>of learners' knowledge</td>
<td></td>
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<td>and experience</td>
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</table>

Phase Three: Strengthening Cognitive Organisation

- Relate new information to advance organize
- Promote active reception learning
- Elicit critical approach to subject matter
- Clarify

However, other research studies have revealed that advance organizers are more useful for teaching content that has a well-organized structure that may not be automatically apparent to students and are not so useful in learning factual information that doesn't lend itself to a clear organization or subjects that consist of a large number of separate topics.
Phase Two: Presentation of learning task material. The new material is presented in the second phase of the lesson by means of lectures, discussions, films or student tasks. Ausubel stresses that student attention should be maintained and material should be clearly organized so that it corresponds to the structure laid out in the advance organizer. For this he suggests a process called progressive differentiation, which is a step-by-step progression from general concepts to specific information, illustrative examples, and contrasts between new and old concepts.

Phase Three: Strengthening Cognitive Organization: Here Ausubel wants the teacher to remind students of how each specific detail relates to the big picture and question them to ascertain whether they have understood the lesson and can relate it to their prior knowledge as well as to the organisation described in the advance organizer. Finally, students are to be allowed time and opportunity to ask questions that extend their understanding beyond the content of the lesson.

The advance organizer approach of Ausubel (1968) provides students with a set of concepts, formulated at a higher level of abstraction than the material itself, which helps link the new information with what the learner already knows.

Ausubel, therefore, suggests deductive teaching wherein general ideas precede specific facts and details, i.e. a topic is introduced with general concepts, specific examples are gradually included and the information is linked to what students already know. He advocates the frequent use of advance organizers throughout the lesson and since the first organizers help anchor information at the general level while later ones anchor more detailed material, each organizer should be more specific than the one before.
Ausubel's expository teaching model (Woolfolk, 1987) has four major characteristics: it calls for a great deal of interaction between teacher and students, since the student's ideas and responses are solicited throughout each lesson although initial presentation is always made by the teacher; it makes great use of examples which may include drawings, diagrams or pictures; it is deductive and is sequential.

Carroll (1964) suggests expository teaching is more efficient and takes less time than discovery learning and that (when combined with practice) it is very successful in teaching concepts and principles. It offers the student the best opportunity to obtain an organized view of the discipline he is studying because the teacher can organize the field much more effectively. Glaser (1966) claims that with RULEG as opposed to discovery learning, the student can recognize and apply a rule with proficiency since he adopts the experts' carefully chosen statement of a rule rather than using his own more fallible induction derived statement.

As far as high school students are concerned, Ausubel (1963) writes that they acquire most new concepts and learn most new propositions by directly grasping higher order relationships between abstractions. Through proper expository teaching, they can proceed directly to a level of abstract understanding that is qualitatively superior to the intuitive level in terms of generality, clarity, precision and explicitness. At this stage of development, it is pointless to enhance intuitive understanding by using discovery techniques (Ausubel 1963).

Concluding Remarks: To summarize, a classroom teacher has essentially to distinguish between the type of instructional strategy to be employed and the kind of learning process in which the students are to engage while learning, Figure 2.1
Illustrates that under any instructional strategy, learning can vary from being almost rote to being highly meaningful -- from reception learning where information is provided directly to the learner, to autonomous discovery learning, where the learner identifies and selects the information to be learned.

**Fig 2.1**

**Types Of Learning Possible Under Different Instructional Strategies (Adapted from Novak and Gowin, 1986).**

<table>
<thead>
<tr>
<th>Meaningful Learning</th>
<th>Well-designed audio tutorial instruction</th>
<th>Scientific research (new music or architecture)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarification of relationships between concepts</td>
<td>Lectures or most textbook presentations</td>
<td>Most routine research or intellectual production</td>
</tr>
<tr>
<td>School laboratory work</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Rote Learning</th>
<th>Applying formulae to solve problems</th>
<th>Trial and error, puzzle solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplication tables</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>RECEPTION LEARNING</th>
<th>GUIDED DISCOVERY LEARNING</th>
<th>AUTONOMOUS DISCOVERY</th>
</tr>
</thead>
</table>

However, there is no longer any doubt as to whether or not we should use the method of teaching by discovery, at least in science teaching but research reports point to the desirability of some of the teaching in every field of study being done through discovery method and such teaching should be spaced throughout the curriculum. Taking the case of English language teaching, part of the English syllabus may be well
handled by initial fast learning-necessary technicalities of verse form, of punctuation and of spelling while other parts may need learning which produces maximum relevance to the pupil in terms of retention and transfer characteristics, such as guided discovery. It may not be out of place here to quote McDonald (1976) who found that effective methods for teaching both Mathematics and English with younger students fit the principles of direct instruction or expository teaching but successful approaches for teaching English with the older students involved discussion, questioning, independent work, in-depth analysis and complex material. These are obviously very different from the drill and practice, teacher-led learning of direct instruction. The learning goals for English in the higher classes are more likely to involve abstract thinking, creativity and problem solving and thus, in Good’s (1983) opinion, teaching should become less direct as students mature and when the goals involve affective development, problem solving or creative thinking.

Comparing pure discovery, guided discovery and expository teaching, it should be remembered that regardless of the situation, there ought to be a balance between discovery learning or learning in depth, and expository learning or learning for scope. No course in languages, science or mathematics is complete without an integration of the two. Pure discovery is most applicable in situations when high motivation is desired, for transfer, for recall, when teaching about discovery perse and to promote non-verbal awareness. On the other hand, the expository technique would be most profitable when the student is at the abstract level of development, for quick initial learning and for specific matter aspects. Guided discovery which maintains some of the efficiency of expository learning along with the benefits of the pure discovery process, can be adapted to most situations. It is best suited for teaching the organisational
framework of a subject, when the learner is unsophisticated in a subject, when the learner appears to show no motivation, and for establishing the relationship between new and previous learning and for all the same circumstances as pure discovery and expository learning.

It seems appropriate to sum up the discussion on instructional strategies by analyzing instructional modes currently in use in various fields as also in the field of language arts teaching. In this context, Gage (1969) has identified four broad categories of modes of instruction - lecture, discussion, discovery and classroom discourse. Since the present study proposed to examine the effect of two instructional strategies - Guided discovery and Expository teaching - on acquisition, retention and transfer of training of higher level writing skills in English, Marcus's (1977) analysis of current instructional modes in terms of reasons for use, teacher role and student role in order to determine how one method differs from another was studied and the comparative picture that emerges is presented in table 2.4.
Table 2.4
Comparative Analysis Of Expository And Discovery Method.

<table>
<thead>
<tr>
<th>Mode of Instruction</th>
<th>Reasons for use</th>
<th>Role of teacher</th>
<th>Role of Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A. Expository teaching (lecture)</td>
<td>• Economy of teaching time: teacher-pupil ratio can be very large</td>
<td>• Talks</td>
<td>• Listens passively-no overt responses</td>
</tr>
<tr>
<td></td>
<td>• Flexibility can be adapted to audience subject matter, time, and equipment.</td>
<td>• Exercises close and continuous</td>
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<tr>
<td></td>
<td>• Less detailed planning on part of teacher.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Speed on communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Controlling content</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• B. Discovery Method (Inquiry or Induction)</td>
<td>• Improvement of intrinsic motivation of students.</td>
<td>• Withholds from students the concepts/principles to be learned</td>
<td>• Gathers data</td>
</tr>
<tr>
<td></td>
<td>• Improvement of learners's retrieval of information.</td>
<td>• Presents instances, examples, problems from which students can induce concepts</td>
<td>• Draws conclusions</td>
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</tbody>
</table>
In a nutshell, it may be said that Expository teaching leaves the student out of the most important learning activities i.e. engaging in the process of inquiry, generalizing and verifying. It only provides him the opportunity to apply. In discovery learning, the student who traditionally is the consumer of generalizations, is put in the role of constructor of generalizations. In view of the reasons and considerations outlined above, it was decided to vary the variable of instructional strategies in two ways-guided discovery and expository teaching. However neither Gagne's model of guided discovery nor Ausubel's advance organizer model of expository teaching as such were used. Rather adaptations of the two in view of the nature of subject matter and evaluation mode were employed in the present study.

2.5 INTELLIGENCE :

Intelligence is one class of intercorrelated behaviors that has become the most embattled of psychological concepts because of its important educational and social consequences. That there are large individual differences in mental ability is well accepted but there is an embarrassing profusion of incompatible theories
about the nature of intelligence. There are those who believe that intelligence is simply a label used to describe the skills measured by intelligence tests, i.e. Intelligence is what intelligence tests measure. But whether these, taken together, really equal intelligence is highly debatable. They believe that the subskills are real but intelligence may be a fictitious concept.

A primary reason why definitions and measurements of intelligence are so elusive is that it cannot be measured directly but mainly through overt manifestations of the functioning of the brain. Intelligence tests are seen as moderately good predictors of school achievement. Consequently, how writers of intelligence tests define the quality they seek to measure is of vital importance, since it determines the kind of questions they write. In the early 1900s, the mental measurement movement was greatly influenced by the postulate that intelligence consists of a general intellectual ability ("g") to respond effectively towards the environment. Spearman, one of the earliest authorities on intelligence, proposed a unitary, objectively defined general intelligence factor ("g") that lay behind various specific abilities ("S's") and together, these factors determined performance on mental tests. He assumed that individuals varied in both general intelligence and specific abilities. Through factor-analysis, he found that the tests that bore most heavily on his general intelligence factor were those that had to do with reasoning and judgment. So he defined this factor as "the capacity to educe relations and correlates"-- the ability to perceive relationships or connections between things. For fifty years, Spearman's "g" factor remained the only firm basis for the objective determination and measurement of intelligence. Later Burt (1955) a strong defender of the concept of general intelligence, also reviewed the evidence for a "g" and restated the idea, loathsome to many, that intelligence is innate. Wechsler (1958) who developed three of the most
frequently used individual intelligence tests, defined intelligence as "the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment".

**Thurstone : Specific abilities viewpoint :** The early works of Thurstone (1938) were an effort to bridge the gap between the general ability ("g") notion of Binet and the observation of others that people possess unique constellations of abilities and are thus not uniformly competent. He found group factors common to bunches of S's higher than "S's" but still subordinate to "g". Building on this base, he developed a multiple factor theory of intelligence. He eventually identified seven mental abilities underlying intellectual tasks -- verbal comprehension, word fluency, memory, reasoning, ability to visualize spatial relationships, numerical ability and perceptual speed. But tests of these 'separate' factors showed that ability in one area was correlated with ability in other areas. Even though people usually performed better on some tests than on others, in general those who obtained high scores on the verbal test tended to do well on tests of spatial relations, numerical ability etc. while low scores on verbal test tended to go along with low scores on other tests also. Despite Thurstone's efforts to the contrary, the test developed to measure primary mental abilities still seemed to measure a general factor (Anastasi, 1968). Neither 'g' nor 'IQ' were invalidated by Thurstone's work. In fact, General intelligence emerged from multiple factor analysis as a single second-order factor based on the intercorrelations among primary factors.

**Cattell : Fluid and Crystallized Intelligence :** Cattell (1963) found not one but two kinds of "g" -- One provides the brainpower for routine learned abilities such as vocabulary and the other for less teachable and more complex abilities like abstract reasoning. He also found that the two correlated positively with each other. Fluid general ability or 'gf' is a general relation-perceiving capacity, independent of sensory area.
It is not dependent on formal education and is sometimes considered the basic ability to solve new or unpracticed problems without formal training. Development of fluid abilities seems closely allied to the development of brain and nervous system and is influenced by experiences that directly effect this system such as early nutrition and disease (Horn and Donaldson, 1980). Injury to the system and deterioration in later life result in deterioration in fluid abilities (Havinghurst, 1981). Crystallized general ability or (gc) refers to those mental abilities valued by one's culture and not affected by ageing such as reading comprehension, general knowledge, vocabulary, balancing a cheque book, taking tests (Horn and Donaldson, 1980). It is a precipitate of experience, consisting of acquired knowledge and developed intellectual skills. Persons high in fluid ability and low in crystallized ability such as farmers or deckhands were noted by Cattell (1976) to excel very often in a game of chess, in solving a wire puzzle or even in gaining swift insights into men and motives. At the same time, their vocabularies were at a simple colloquial level, their acquaintance with and knowledge of history, algebra or geometry was negligible. On the other hand, persons with high crystallized intelligence were seen to have learned many intelligent responses to problem solutions. Nevertheless, Cattell (1976) points out that these persons could not have acquired these skills, unless they had the fluid ability to see them. His concept helped in understanding the changes in intelligence that take place with age and more or less discounted the earlier assumption that intelligence increased throughout childhood, peaked in adolescence or early adulthood and declined from then on. In fact it was found that with advancing age, crystallized abilities do not decrease and may in fact improve, provided the individual stays intellectually active, whereas fluid abilities may deteriorate due to deterioration in later life. Also, further research work (Jensen, 1969) helped to
establish that crystallized intelligence can have very high heritability and therefore would contain little cultural variance if the opportunities for learning and acculturation were highly similar for all individuals throughout the population.

Guilford: Structure of Intellect model: Guilford (1967) discounted the concept of a unitary general intellectual ability or of a few primary mental abilities in favour of a multiple factor theory of intelligence. He has attempted to identify the nature of specific intellectual abilities by generating models of intelligence that postulate numerous intellectual skills. Through the technique of factor analysis, Guilford (1967) and his students have identified 120 of the postulated 150 highly specialized mental abilities which are conceptualized to constitute intelligence, some of which are independent of others while some are correlated with others. He organized these discrete abilities into a kind of three-dimensional structure, in which all are of equal merit and there is no overriding unseen 'pure' intelligence. These abilities result from an interaction among the types of stimuli in the environment (content), the types of mental processes used to respond to the stimuli (operations), and the resulting response or the result of an operation upon the content (product). Therefore, the structure-of-intellect model postulates three basic categories or faces of intellect—five operations (cognition, memory, divergent production, convergent production, evaluation); five contents (visual, auditory, symbolic, semantic, behavioral); and six products (units, classes, relations, systems, transformations, implications). An ability, thus, is defined as a union of an operation, a content and a product and presumably each individual varies in competence in each of the 150 discrete abilities. Performing an intellectual task is essentially performing a mental operation with some specific content to achieve a product. For example, if a student is asked to give a title to a clever story, it requires a divergent production (there could be several possible answers) of semantic transformation. Likewise, listing the next number in the sequence 5, 10, 15, - - - -, requires a convergent production...
with symbolic content (numbers) to achieve a relationship product (each number is a multiple of 5).

The concept of abilities is most useful when related to outcomes of learning and broad subject matter fields. Guilford's model has broadened our view of intelligence by adding such factors as those related to social judgment and creativity/ divergent thinking. Also, by identifying many relatively distinct abilities, it lends credence to the notion that all human beings can hardly be placed from high to low on a single continuum of general intellectual ability. In fact, the same individual may be at quite different points on the various continua. Critics say that Guilford's model may be too complex to serve as a guide for predicting behavior in real situations or for planning instruction.

Another prominent modern proponent of multiple cognitive abilities is Gardner (1983). His theory of multiple intelligences postulates seven separate kinds of intelligence- linguistic or verbal; musical; spatial, logical-mathematical, bodily, knowledge of self and understanding of others. He observes that individuals often excel in one of these seven areas but may have no remarkable abilities in the other six. That these seven are separate abilities is based on the evidence that brain damage, caused by a stroke, interferes with functioning in one area like language but does not affect functioning in other areas.

Vernon: Hierarchically-organized abilities :- Vernon (1965) gives a hierarchical structure of factors or human abilities: a general factor, two major group factors (V.ed.-verbal education aptitude and k.m.- spatial mechanical aptitude.), seven minor group factors and an intermediate number of possible but unidentified specific factors. Vernon’s hierarchy is hypothetical rather than a reality just as is Guilford’s SOI model. Psychologists working in the field do not agree as to the precise nature of the hierarchy. Models such as Vernon’s make an attempt to
specify the relationships between specific factors and broad abilities because like Cattell (1963), he also believes that a synthesis must be reached between the 'g' proponents and the factor theorists. They believe that 'g' is a useful construct and that people possess unique constellations of abilities; so the relationship between 'g' and "s's" (specific abilities) should be clearly delineated.

Piaget : A Biological Approach / Developmental Viewpoint :- Piaget (1963, 1965) views intelligence as the ability to adapt mentally to new situations or to increasingly complex environment. He views the development of intelligence as part of the more general process of biological development, passing through age-related cognitive stages (sensorimotor 0-2 yrs; pre-operational 2-7yrs; concrete operational 7-11 yrs and formal operational 11 + yrs) with a scope of vide variations in different cultures or environments. Although development is a continuous process of structural change each stage is characterized by the formal logical structure most useful for describing the child's cognitive functioning during that time span. Each stage is successive, hierarchical and cumulative. Thus the rate of cognitive development is based on an interaction between the child's maturational state and the nature of the environment. The environment will have very little effect on the child, unless the child is biologically ready to respond to the environment.

Piaget (1965) postulates that human beings constantly try to make sense of the world and look for ways to adapt or adjust more satisfactorily to their environment. Adaptation is a basic tendency that human beings inherit. Two basic processes are involved in adaptation-assimilation (the process by which elements in the environment are incorporated into the child's cognitive structure, i.e. trying to understand something new by fitting it into what we already know); and accommodation (the process by which children modify their conception of the world as new experiences are incorporated and alter their responses to things). These two intellectual processes transform experiences
into a form the child can use in dealing with new situations and these processes seek a balance through the process of equilibration (Biehler, 1978). Thinking grows when the equilibrium of a person's world view is threatened and adaptation is used to restore this equilibrium. Equilibration is the search for this balance. Accommodation is a dynamic, learning and growth-producing process in which each adjustment represents a new and more profound ability to understand, assimilate or relate to the external world. To distinguish this dynamic activity from the more static achievement of equilibrium, Piaget has called it equilibration.

Therefore, we observe that Piaget has ignored practically the entire business of g, s, IQ and testing and instead has studied intelligence as a living, growing thing and has described its functions in the various stages of the mind's development. His notion of intelligence is very different from the view of intelligence as a collection of specific skills and abilities. For him, acts of intelligence consist of 'adaptation to new situations' and there are two aspects in any act of intelligence-the comprehension of the situation and the invention of a solution based on how one comprehends the situation. In other words, comprehension of reality precedes and largely determines how one adapts to it. A most important part of intelligence, therefore, is the ability to read reality, structure it and get meaning out of what is observable. Piaget views intelligence as being an inventive capacity since solutions, even wrong ones, are inventions of the intellect. His concept of intelligence as a system of logical structures has a far more obvious relationship to problem solving than the traditional view of intelligence. Piaget would allow learners freedom to assimilate and accommodate and to develop schemes at their own pace and would not want the teachers to speed up the cognitive development of
the child. Rather, he holds that the teacher's function is to
insure thorough integration of development within each stage.
However, Ashton (1978) and several other disagree with Piaget
and recently Vygotsky (1978) has given the concept of the
zone of proximal development, arguing that cognitive development
depends much more on other people.

Piaget (1963) believes that a student's mind is not a
passive receptacle into which information is to be poured but
that students, like all organisms, actively attempt to understand
the world. So a teacher must provide students with situations
that challenge their present cognitive schemes. Hunt (1961) has
called it 'the problem of the match' -- disequilibrium must
be kept just right to encourage growth. Students must be
neither bored by work that is too simple nor left behind by
teaching they cannot understand. Students cannot progress to
new structures of thinking by being told the answer; the only
way they can develop new frameworks is to 'invent' them.

Applying Piaget's insights to instruction means constant use
of concrete demonstrations and physical representations of ideas.
Learners should be allowed to experiment with materials and
discover information for themselves. Discovery learning is one
way in which Piaget's principles have been put into action in
classroom instruction (Slavin, 1988)

Bruner : An Environmental Approach : Bruner (1966) suggests that
intellectual development runs the course of three stages of cognitive
development, termed systems of representation by him. To put it simply,
he explains three ways of knowing something: through doing it, through
sensing it and through a symbolic means such as language. The three
modes of interacting with the environment emerge quite early in life
in the order given - enactive, ikonic and symbolic and become interrelated
throughout life. These modes serve as the means of representing
experiences internally as also of operating on one’s environment - acting on one’s environment (enactive representation); sensing the environment (ikonic representation) and interacting with the environment through language (symbolic representation).

Thus Bruner’s views on cognitive development are not a restatement of Piaget’s. He emphasizes the role of culture, education and specific environmental influences to a much greater extent. Bruner (1960) postulates that any intellectual experience can be honestly understood by a child at almost any time in a child’s development if the experience is commensurate with the child’s representational level of development. This view challenges the basic Piagetian view and has caused much controversy in educational circles.

Bruner’s description of the ikonic and symbolic stages of representation points to the desirability of stressing visual imagery and sensory experiences, when teaching younger pupils and that of calling attention to the structure of a field of study by emphasizing interrelationships when they become capable of symbolic representation. Bruner would like to do what he can to teach readiness and he prefers to do this through discovery learning. Bruner’s ideas have had a strong impact on discovery learning strategies, theories of instruction, the modern mathematics curriculum, and the role of language in cognitive development.

Therefore, we see that Bruner (1964) and Piaget (1963) were not much concerned about studying the static nature of intelligence at a point in time but were more interested in studying the systematic, dynamic evolution of intelligence over a period of time. Their research was aimed at theorizing how people come to know and become competent problem solvers through interactions with their environment over time.
Gagne: Cumulative learning model or a true, functional hierarchy :
Gagne (1968) has proposed a theory of mental development based on
the notion of cumulative learning, in which various skills form a transfer
hierarchy, with some skills being more basic than others in the sense
of providing positive transfer to the acquisition of more complex skills
in the hierarchy. The model thus views mental ability at any given cross
section in time as a product of cumulative learning. "Intellectual
development may be conceived as the building of increasingly complex
and interacting structures of learning capabilities. The entities which are
learned build upon each other in patterns of great complexity and thus
generate an ever-increasing intellectual competence - - - - -* (Gagne,
1968). He holds that any set of related learning activities which cumulate
into successively higher levels of achievement can be analyzed into their
constituent and pre-requisite intellectual skills. He, therefore, implies an
indefinite but a very large number of specific intellectual abilities or
skills and holds that one's intelligence is composed of the skills he has
mastered. Since Gagne's learning model makes explicit the processes
that characterize intelligence, it offers the possibility that these may be
changed through behavioral techniques to the advantage of many children
whose chances of succeeding in school would ordinarily be poor (Jensen,
1973). Critics point out that with respect to the acquisition of mathematics,
Gagne’s formulations may be valid but his model is not adequate as a
general theory of mental development.

Sternberg: Components View :- A new way of looking at intelligence
has emerged in recent years on the basis of research on cognitive
development and information processing. It describes the mental processes
that are involved in intelligent performance (i.e. the processes that people
use to solve problems in intelligence tests and in life) in terms of
components. A component is an elementary information process that
operates on internal representations of objects or symbols (Sternberg,
1985). Components are classified by the functions they serve
(metacomponents perform higher order planning, strategy selection and
monitoring; performance components execute the strategies selected; and knowledge-acquisition components serve to gain new knowledge) and by how general they are. Specific components are necessary for one kind of task but not for others. For example, inferring relationships between the words involved may be necessary to solve verbal analogies but not for doing arithmetic computations. On the other hand, general components may be necessary in almost every cognitive task. Metacomponents are an example of general components and these help to explain the persistent correlations among all types of mental tests. People who are effective in selecting good problem solving strategies or in monitoring progress and moving to a new approach when the first one fails are more likely to be successful on all types of tests. Thus metacomponents may be the modern-day version of Spearman's "g" (Woolfolk, 1987). Although highly controversial, components view of intelligence does suggest a way to relate mental abilities to one another and to the thinking processes underlying these abilities.

Concluding Remarks: It will, indeed, be a long time before we have a strictly scientific resolution of the issue-Whether a scheme involving primary abilities plus a de-emphasized 'g' is preferable to one involving an emphasized 'g' plus group factors? The evidence recorded by Alvord (1969) suggests that a measure of general intelligence becomes increasingly predictive of performance at each successively higher level in the learning hierarchy. Thus when persons are sorted into groups as high or low on the basis of some complex measures of ability (e.g. a test with a high 'g' loading), they are found to differ on nearly all other tests ranging along the complexity continuum but the differences between the groups decrease as tasks' complexity decreases. This indicates that there is a general ability factor which is manifest in nearly all test behavior that puts any mental demands on the subject whatsoever.

Moreover, some psychologists view intelligence as a very explicit concept (Butcher and Lomax, 1972; McNemar, 1964) and disagree with both the factor or specific abilities approach
of Guilford and the developmental approaches of Piaget and Bruner. McNemar (1964) believes that the criterion of social usefulness has to be used as a basis for judging whether it is wise to discard general intelligence. He argues that further progress in the study of the intellect is unlikely unless we expand the traditional stimulus-response model to include the socio-biological dimensions of both organism and process. The application of psychological ideas to educational context requires a certain breadth of view. Kamii (1974) wishes to push our consideration of intelligence beyond simple cognition. "Intelligence is not something that we can educate separately by pasting it onto the child. It is rooted in the biological origins of a whole organism and develops as a highly interdependent whole" (Kamii, 1974). Therefore, educational objectives should support and enhance qualities such as autonomy so that intelligence can develop as a coherent powerful whole. She believes that intelligence is intimately related to both cognitive and affective considerations. The very holistic conception is likely to have important implications for the formulation of educational objectives and classroom practices.

Besides the controversy over the basic nature of intelligence, another one that has raged in psychological circles is whether intelligence quotient differences are genetically or environmentally determined. While Jensen (1969) has suggested that heredity establishes the limits of a person's intelligence, others argue that intelligence is largely determined by experience (Hunt, 1961). The research evidence cited by both camps is still largely inconclusive and in attempting to synthesize the apparently contradictory evidence, Hunt (1976) offers the middle-road solution. He wants it recognized that intelligence is not a lump sum, to which heredity contributes so many IQ points and environment the rest. Rather, the genotype and environment don't add up,
they interact and the result is not a sum, but a product. In fact, Kagan (1976) goes even further and says that then genetic contribution to IQ is still unknown and intelligence can best be seen as simply a specialized style of problem solving valued by our particular society. Kagan (1976) also argues that since this skill is used as a rite of passage to power, it should not be assumed that those who temporarily possess power are biologically more fit for this role because their brains are better organized.

Despite the basic conceptual controversy over intelligence, there is consensus among psychologies on two points. First, in terms of measurement of intelligence, the Galton idea that intellectual ability manifests itself in simple discrimination functioning has been abandoned for the time being in favour of the Binet notion that it reflects itself in more complex functioning. Second, intelligence tests are seen by most as moderately good predictors of school achievement. That is why despite the various limitations of intelligence tests—i.e., IQ scores of individuals tested over the years rarely stay the same, low test scores may lead to unfortunate self-fulfilling prophecy reactions, test scores sometimes cause pupils to be improperly classified and educated— it is the only means of measuring intelligence. Experts agree that IQ testing should be used to diagnose strengths and weaknesses of individual pupils in order to establish the most effective learning environment.

Research has shown that equality of opportunity, same school facilities, curricula and instruction—does not lead to equality of achievement. It is increasingly being suggested that highly differentiated educational approaches for children with different patterns of mental ability might succeed in more nearly equalising performance in school, specially in the basic skills. So diversity rather than uniformity of methods, techniques and aims seem
to be the key in making education rewarding for children of different patterns of ability. Individualization of instruction is not a feasible alternative in the present set up of Indian schools. What can be done, nevertheless, is to adapt instruction in the light of aptitude-treatment interaction with a view to reducing differences in achievement. If no attempt is made to optimize the quality of each student’s classroom instruction, individual differences in terms of IQ, aptitudes and previous learning are reflected more in their achievement. It is doubtful if students of low general ability can be brought to the same level of school accomplishment as students of high general ability in the same overall period of schooling, but if the quality of instruction is made optimal, the teacher can succeed in carrying the majority of the students towards the preset objectives.

Since individuals differ in mental abilities and differences in intelligence/intellectual ability are strongly related to level of scholastic performance in schools, and since the ideal of universal education is being pursued by this country with earnestness, it necessarily follows that schools and society must provide a range and diversity of educational methods, programmes and goals just as wide as the range of human abilities. The reality of individual differences should not mean educational rewards for some and frustration for others. It is within this framework that the present study has been undertaken to examine if a particular teaching strategy is more suited to a particular level of intellectual ability, so far as writing skills in English are concerned.

It has been suggested by research workers in the field that individual differences in language development closely parallel the differences that exist in intellectual development and intelligence is often taken to be a common factor in various language behaviours, the researcher chose intelligence to serve as a
selection-type classification variable in the present study in order to examine and locate interactions of individual differences among learners with instructional treatments, if they exist.

2.6 COGNITIVE STYLES:

Cognitive style is a broad dimension of individual differences that extends across both perceptual and intellectual activities. Cognition covers various modes of knowing, perceiving, imagining, remembering, conceiving, judging and reasoning. The term style is used because what is at issue is the characteristic approach the individual brings with him to a wide range of situations. Since the approach encompasses both his perceptual and intellectual activities, it is called his 'cognitive style'.

Cognitive styles refer to the modes an individual employs in 'perceiving, organising and labeling various dimensions of the environment. Thus, it may be said cognitive styles appear to reflect consistencies in the manner or form of cognition, as distinct from the content of cognition or the level of cognitive skill displayed. Kagan (1964a) conceives cognitive styles as the preferred use of a specific class of conceptual responses, whereas for Shuell (1981), cognitive style refers to the "preferred ways that different individuals have for processing and organizing information and for responding to environmental stimuli."

Cognitive styles reflect aspects of personality as well as aspects of cognition. Thus although they function to control and regulate the course of information-processing and are typically measured as response consistencies on cognitive tasks, their operation may be in the service of underlying personality traits for such dynamic themes as anxiety over error, expectancy of success and failure, and vulnerability to distraction which are central to many of the measures utilized in their assessment.
It has been observed that certain individuals tend to respond very quickly in most situations (impulsive cognitive style); others are more reflective and slower to respond (reflective cognitive style), even though both types of individuals are equally knowledgeable about the task at hand. Cognitive styles thus suggest that individuals approach the same task in different ways but these variations don't reflect levels of intelligence or patterns of general abilities. They are often described as falling on the borderline between mental abilities and personality traits (Shuell, 1981); are styles of ‘thinking’ and thus influence and are, in turn, influenced by cognitive abilities (Brodzinsky, 1982).

Although defined as modes of information processing, cognitive styles are not simple habits in the technical sense of learning theory for they are not directly responsive to principles of acquisition and extinction. They develop slowly and don’t appear to be easily modified by specific tuition or training. Research reveals that cognitive styles exhibit stability and pervasiveness across diverse spheres of behaviour; that though they entail generalized habits of information processing, they are intimately interwoven with affective, temperamental and motivational structures as a part of the total personality. Thus it may be said that the manifestation of a core personality structure in cognition is cognitive style.

Characteristics of Cognitive Styles :- The essential characteristics of cognitive styles in general have been given by Witkin et al. (1977). According to them, cognitive styles are concerned with the form rather than the content of cognitive activity. (i) These refer to individual differences in how we perceive, think, solve problems, learn, relate to others etc.; (ii) are pervasive dimensions that cut across the boundaries traditionally used in compartmentalizing the human psyche and so help restore the psyche to its proper status as a holistic entity; (iii) are stable over time; it is not that they are unchangeable, some may be
rather easily altered. This stability makes stylistic dimensions particularly useful in long-range guidance and counseling. Additionally, with regard to value judgements, cognitive styles are bipolar and range from one extreme to the opposite extreme wherein each end of the dimension has different implications for cognitive functioning. Each pole, thus, has adaptive value under specified circumstances and may be judged positively in relation to those circumstances.

Therefore, conceptualized as information-processing habits that develop in harmony with underlying personality characteristics, cognitive styles appear in the form of stable preferences, attitudes or habitual strategies which characterize a person’s modes of perceiving, remembering, thinking and problem solving. As such, their influence extends to almost all human activities that implicate cognition, including social and interpersonal functioning.

Cognitive styles differ from intellectual abilities: The foregoing discussion makes it clear that Cognitive styles differ from intellectual abilities in a number of ways. Whereas ability dimensions refer to the content of cognition or the question of what (what kind of information is being processed by what operation in what form), cognitive styles bear on the question of ‘how’? — (on the manner in which behavior occurs). While the concept of ability implies the measurement of capacities in terms of maximal performance, that of cognitive styles implies the measurement of preferred modes of operation in terms of typical performance. Whereas abilities are generally regarded as being unipolar, cognitive styles are bipolar.

Another way in which they differ from intellectual abilities is in the values usually placed upon them. While high quantitative aptitude may be valued over low quantitative aptitude, we would hardly have the same general preference for impulsive as opposed to reflective cognitive dimension. Neither end of cognitive style dimension is uniformly more adaptive. Rather their adaptiveness
depends upon the nature of the situation and upon the cognitive requirements of the task at hand. This has important implications for education since it serves to establish that cognitive styles are usually not considered as outcome objectives of educational or training programmes except possibly for younger students. Rather cognitive styles are important to consider as input variables that might moderate the operation and effectiveness of educational/training programmes or interact with programme components to produce differential results. Each of the individual cognitive dimensions has been found to correlate with certain intellectual tasks and the ability to learn and perform in school. Of the many listed cognitive styles identified by researchers over the years, a few prominent ones that are used to prepare cognitive profiles of individuals are field dependence-independence (more recently termed analytical-global), reflectiveness versus impulsivity, levelling versus sharpening, tolerance versus intolerance, focus-nonfocus, broad-narrow and fixity-mobility. Out of these, field-dependence/independence cognitive style has been the most widely researched and used.

Witkin et al (1954) identified the field dependence-independence cognitive style and it has been found to be directly responsible for wide variations in the way individual pupils react to learning situations. People who are field-dependent tend to perceive a pattern as a whole. They find it difficult to focus on any one aspect of a situation or to analyse a pattern into different parts. Field-independent persons are more likely to perceive separate parts of a whole, and to be able to analyze a pattern according to its components (Wittrock, 1978).

Another important cognitive style on which students differ is impulsivity versus reflectivity. Impulsive individuals have a fast conceptual tempo; work and make decisions quickly, give quick responses, finish objective tests early concentrate more on speed.
and in the process make a few errors. On the other hand, reflective individuals tend to deliberate a lot, consider all the possible alternatives at length, are slow and careful to respond to test-items but are likely to make lesser number of errors since they tend to concentrate on accuracy rather than speed (Entwistle, 1981). Kagan (1964b) found that impulsiveness is a general trait that appears early in a person's life and is consistently revealed in a great variety of situations.

As with field-dependence, impulsive and reflective cognitive styles are not highly related to intelligence within the normal range. However, as children grow older, they tend to become more and more reflective, and for school-age children, being more reflective does seem to improve performance on certain school tasks (Messer, 1976). Also for reflective children the chances of failing in one of the early grades are much less than for impulsive children (Messer, 1976). Impulsive students can be taught to be reflective by means of self-instructional training (Meichenbaum, 1977) or by scanning strategies.

Awareness of these varying styles of conceptualization may help the teacher understand, to some extent, the wide individual differences in the way pupils react to different instructional approaches (Biehler, 1978). For example, an analytical or field independent person will try to induce the inherent structure in a situation or to impose his own structure on it, rather than have structure imposed from without. At the other end, a global or field-dependent person will prefer to have the structure provided, perhaps in the form of detailed instruction.

Field dependence-independence cognitive style: Research evidence accumulating on the field dependence-independence cognitive styles ever since the year 1952, when it was first identified by Witkin et al., (1954), suggests that a cognitive style approach may be profitably applied to a
variety of educational issues (Witkin et al, 1954/1972; Witkin, 1976). Work on cognitive styles of field dependence-independence has resulted in the formulation of various concepts and methods and these are increasingly being applied to research on problems of education. The construct has been related to intellectual functioning and to hemispheric functioning and these two variables have been related to each other. Research evidence reveals that individuals demonstrate pervasive self-consistency in cognitive functioning and so the division into the perceptual and intellectual is hardly of value in the study of cognitive styles. Measures of filed-dependence have been reported to be significantly related to total standard intelligence test scores and this significant relationship is carried largely by those portions of intelligence tests which require analytical functioning. Thus the relation is based on the expression of a particular style of field approach in both.

A detailed look on how work on field dependence-independence evolved will not be out of context here to serve as a basis for an analysis of its nature. Before Witkin et al (1954) became interested in the field, experimental literature had already succeeded in establishing significant relationships between the individuals attitudinal, motivational, or emotional characteristics and his/her performance on perceptual or cognitive tasks. Witkin et al (1954) approached the problem from a different angle. They identified the ability to resist the disruptive influence of conflicting contextual cues as an important variable in a long-term study of perceptual spatial orientation. The concept of field dependence emerged initially from their studies of perception of the upright in space. Studies of RAT (room-adjustment test), BAT (body-adjustment test), and RFT (rod-and-frame test) performance demonstrated striking individual differences in the extent to which location of the perceived upright is determined with reference to the axes of the prevailing visual field. Through these various tasks, they showed that individuals differed widely in their field
dependence or the extent to which their perception of the upright is influenced by the surrounding visual field.

Witkin et al (1954) could gather enough evidence to indicate that field-dependence (FD) is a relatively stable, consistent trait, having a certain amount of generality. Their tests demonstrated that an individual tends to be consistent in his perceptual functioning from test to test. Thus, the person who is unable to maintain the ‘separateness’ of his body from the surrounding field in the BAT cannot also determine the position of the rod independently of the tilted frame in RFT. A little later, they found significant correlations between these orientation tests and EFT (Embedded figures test) which measures field dependence in a purely visual paper and pencil situation. This test features the ability to perceive an item independently of its context and doesn’t involve body position. With the accumulation of research data, field dependence soon came to be regarded as the perceptual component of a broader personality dimension designated as global versus articulated cognitive style or psychological differentiation (Witkin, Dyk, Faterson, Goodenough and Karp, 1962). Evidence indicates that this cognitive style exhibits considerable stability through childhood and early adulthood and is related to a number of personality variables such as leadership (Weissenberg and Gruenfeld 1966) and social conformity (Witkin et al, 1974). Field dependence-independence refers to a consistent mode of approaching the environment in analytical as against global terms. It entails a tendency to experience items as discrete from their backgrounds, and reflects ability to overcome the influence of an embedding context.

Some clear developmental trends are visible in cognitive styles. As children grow older, they generally become more field-independent, at least until the middle of their teens. Then development levels off until later adult life, when there is a
tendency to become more field dependent. Even with these changes, over the years people remain fairly stable in comparison with others their age. So a person who tends to be field-dependent as a child may become more field independent with age but may still be less field-independent than peers who have also changed with age. People differ in the extent to which their perception is analytical. The field-independent person is able to break up the total field and attend to the relevant items while withholding attention from irrelevant items. They thus tend to perceive figures as discrete from their backgrounds. They are generally more facile on tasks requiring differentiation and analysis, whether in identifying the presence of logical errors or in understanding the point of a joke. This analytical penchant leads as well to a high degree of differentiation of the self from its context. Field-dependent persons have trouble breaking information down into units and recombining the parts into new patterns. So the task of organizing information from many different sources can be difficult for students who have a field-dependent cognitive style. Such individuals cannot withhold attention from the context in which the relevant figure is embedded.

Accumulating research data points out that field dependence-independence extends into psychological domains beyond cognition (Witkin, 1976). Such individuals differ from each other in important personal characteristics and in inter-personal relations. Field dependent individuals are more influenced by the attitude of an authority figure or peer group but the field independent individuals are less responsive to the human content of the environment.

Evidence of differences in characteristics falling in the domain of social behavior between field-dependent and field-independent individuals is impressive. Field-dependent (global)
individuals tend to identify more with a group, are susceptible to external influence and markedly affected by isolation from other people. Thus they tend to be more oriented towards people and social relationships, are better at recalling such social information as conversations and relationships, work best in groups and prefer such subjects as history and literature while field-independent individuals are more likely to do well with numbers, science and problem solving tasks (Shuell, 1981). Taken collectively, the social characteristics that distinguish persons, with contrasting styles suggest that relatively field-dependent persons are likely to be attentive to and make use of prevailing social frames of reference.

Since field-dependent persons are seen to be relatively sensitive to social cues and interested in what others say or do, it is hardly surprising that they should be generally better liked; perceived as being warm, tactful, considerate, socially outgoing and affectionate. These social qualities taken together seem likely to contribute to greater skill in getting along with people.

On the other hand, field-independent individuals tend to have a more impersonal orientation, 'not sensitive to social undercurrents', 'cold and distant with others', 'unaware of their social stimulus value' and individualistic. There is additional evidence that along with their impersonal orientation field-independent persons are more likely to be interested in the abstract and theoretical (Stidham, 1967).

That field-dependent/independent persons differ in social and impersonal orientations is further found in the tendency of field-dependent students to favor educational-vocational areas in which involvement with others is a central feature and in which subject matter of the discipline features human content, and the tendency of field-independent students to favor areas that are more solitary
in their work requirements and more abstract in their substantive content. Teachers also have their own cognitive styles that affect their approaches to teaching. Field-dependent teachers often have a more interpersonal style in teaching and may be less critical of wrong answers. Field-independent teachers may prefer to organize the classroom and materials themselves, with less input from students and may be more focused on wrong answers. Thus these social domain characteristics of field-dependence/independence can be linked up with classroom situations so as to produce differences in achievement. Research evidence has more or less established match-mismatch in cognitive-styles as a factor in teacher-student and other kinds of social Interactions also but whether it makes for better student learning is still an issue.

To summarize, field-independence is a manifestation in the perceptual sphere of a broad dimension of personal functioning which extends into the sphere of social behavior and of personality as well (Witkin and others, 1954; Witkin, 1965) In other words, there is a broad dimension of cognitive functioning the field dependence-independence dimension that runs through the perceptual and intellectual domains, as well as domains commonly conceived of as ‘personality. Experts are of the considered view that cognitive characteristics for both must be considered in making predictions and interpreting findings on how cognitive style figures in various aspects of the educational process since these styles show themselves in perception, they are readily accessible to observation and assessment by controlled laboratory techniques. Because scores from any test of field-dependence/independence form a continuous distribution, these labels reflect a tendency in varying degrees of strength, towards one mode of perception or the other. There is no implication that there exist two distinct types of human beings. Nor is
there any implication that field-dependents are better or worse than field-independents; rather each type may be judged positively in relation to certain circumstances.

This is clearly evident in the case of field dependence-independence dimension, where the cluster of competence in cognitive articulation plus an impersonal orientation at one pole and the cluster of a social-orientation and social-skills plus less competence in articulation at the other pole, may each be seen as specially suited to meet the requirements of particular tasks. Although teachers cannot determine all the variations in students' cognitive styles, they should be aware that students approach problems and process information in different ways. Woolfolk (1987) observes that some may need help in learning to pick out important features and to ignore irrelevant details. This does not mean that they are less intelligent but simply that they tend to perceive patterns as wholes and have trouble analyzing. They may seem lost in less structured situations and need clear, step-by-step instructions. They may work best in social situations and be less motivated by individual contracts or projects. Other students may be great at organizing but less sensitive to the feelings of others and not as effective in social situations. Learning characteristics of field-dependent and field-independent individuals are summarized in table 2.5.

One valuable use of knowledge about the effects of students' cognitive styles, studied individually or in interaction with instructional strategies, may be to provide guidelines on how to adapt teaching strategies to match the learning needs of dissimilar students. Witkin et al (1977) observe--"Teachers' adaptation will be a realizable goal if we are able to identify particular teaching strategies which teachers may use, either spontaneously or with training, when teaching students with different cognitive styles".
<table>
<thead>
<tr>
<th>Field-Dependent</th>
<th>Field-Independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are better at learning material with social content</td>
<td>May need help in focusing attention on material with social content</td>
</tr>
<tr>
<td>Have better memory for social information</td>
<td>May have to be taught how to use context in understanding social information</td>
</tr>
<tr>
<td>Require externally defined structure, goals, and reinforcement</td>
<td>Tend to have self-defined goals and reinforcement</td>
</tr>
<tr>
<td>Are more affected by criticism</td>
<td>Are less affected by criticism</td>
</tr>
<tr>
<td>Have greater difficulty learning unstructured material</td>
<td>Can impose their own structure on unstructured situations</td>
</tr>
<tr>
<td>May need to be taught to use memory aids</td>
<td>Can analyze a situation and reorganize it</td>
</tr>
<tr>
<td>Tend to accept the organization given and be unable to reorganize</td>
<td>Are more likely to be able to solve problems without explicit instructions and guidance</td>
</tr>
<tr>
<td>May need more explicit instruction on how to solve problems</td>
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</tbody>
</table>

Adapted from 'Field dependent and Field independent cognitive styles and their educational implications', Witkin et al., 1977.

The question- 'How to adapt teaching to the needs of individual students?' has been studied and debated for years and some of the attempts to adapt instruction to individual interests, aptitudes and styles have been honors courses, vocational
courses, experience in performing arts, cooperative work study programs, independent study, programmed learning, team teaching etc. Psychologists doing research on aptitude-treatment interaction have established that student differences do interact with the teaching method and that whatever the limitations or merits of each approach, no single method can be equally successful with all individuals in a class. This does not, however, call for the introduction of individualized teaching with different methods designed for each one alone but does bring out the necessity and urgency of developing flexible instructional strategies that can reasonably fit the diverse requirements of different individuals in a classroom—individuals having field-dependence or field independence cognitive style or those having high or low general mental ability.

If different pupils are to make the intellectual journey from a state of no knowledge in a subject to the mastery of fundamentals, they could do so by taking quite different instructional routes. Taking the same route might lead to great differences in progress among them and even to inordinate frustration and final defeat for some. Thorough investigation of aptitude-treatment interactions’ potential for improving education and maximizing learning is a most important endeavour for educational researchers and psychologists.

The message that rings out clearly for teachers is that all differences in class performance that are seen are not due to differences in ability or efforts. Rather, they may be due, in part, to the individuals’ preferred way of processing new information and to blind spots in one’s approaches to new tasks or problems. Thus differences in cognitive style may offer as valid an explanation of differential achievement levels as those in mental ability. For these forceful reasons, the independent variable of cognitive style, along with that of mental ability
was chosen by the researcher to examine if adaptation of teaching strategies to pupils' cognitive styles results in maximal learning or not.

2.7 STATEMENT OF THE PROBLEM:

The proposed study has been entitled "The Efficacy of Guided Discovery and Expository Teaching strategies on acquisition, retention and transfer of writing skills in English among students at the +2 stage in relation to Intelligence and cognitive style".

2.8 OBJECTIVES OF THE STUDY.

1) To develop instructional material in accordance with the procedural requirements of two instructional strategies, namely Guided Discovery and Expository Teaching.

2) To construct and standardize a test of higher-level writing-skills in English for measuring learning outcomes, in respect of immediate and delayed recall.

3) To construct a transfer of learning test.

4) To study the differential efficacy of two instructional strategies, i.e. Guided Discovery and Expository Teaching, on a) acquisition, b) retention, and c) transfer of higher level writing skills in English.

5) To examine the effect of intelligence on acquisition, retention and transfer of higher level writing skills in English.

6) To study the effect of cognitive style, i.e. field independence/dependence on acquisition, retention and transfer of higher level writing skills in English.
7) To study the effect on acquisition, retention and transfer of higher level writing skills in English due to the interaction of instructional strategies and intelligence.

8) To study the effect on acquisition, retention and transfer of higher level writing skills in English due to the interaction of instructional strategies and cognitive style.

9) To study the effect on acquisition, retention and transfer of higher level writing skills in English due to the interaction of intelligence and cognitive style.

10) To study the effect of second-order interactions, i.e. instructional strategies X intelligence X cognitive style, on acquisition, retention and transfer of higher-level writing skills in English.

2.9 DELIMITATIONS OF THE STUDY:

The effect of the two selected instructional strategies, namely guided discovery and expository teaching was examined on only higher level writing skills in English.

In view of the constraints of the experimental study, the sample was limited to students studying at the +2 stage in only one representative Senior Secondary School of Union Territory of Chandigarh.

The effect of the chosen instructional strategies was seen in relation to only intelligence and cognitive style of the learners.
2.10 Description of terms: A brief description of the terms used in the present study is given below.

ACQ— Acquisition as measured by test of writing skills in English administered immediately on completion of treatment period.

ACQ—T Acquisition test total- the score obtained on Part A & Part B of the test combined.

ACQ—A Acquisition part score A- the score obtained on only Part A of the test.

ACQ—B Acquisition part score B- the score obtained on only Part B of the test.

RET— Retention as measured by test of writing skills in English administered two weeks after the completion of treatment period.

RET—T Retention test total- the score obtained on Part A & Part B of the test of writing skills in English administered two weeks after completion of treatment period.

RET—A Retention part score A- the score obtained on only Part A of the test of writing skills in English administered two weeks after completion of treatment period.

RET—B Retention part score B- the score obtained on only Part B of the test of writing skills in English administered two weeks after completion of treatment period.

Transfer-of-learning score as measured by transfer-of-learning test administered five months after the completion of treatment period.

Intelligence as measured by Standard progressive matrices

HI—High Intelligence

AI—Average Intelligence

LI—Low Intelligence

Cognitive Style as measured by Group Embedded Figures Test.

FI—Field Independent Cognitive Style

FD—Field dependent Cognitive Style.