CHAPTER II

THEORETICAL VIEW POINTS ABOUT PREDICTORS

Theoretical view-points about the predictors under consideration are presented in details so as to get the complete understanding of these variables and the rationale of relationship of these variables with the development of scientific creativity among the students.

2.1 INTELLIGENCE:

Butcher (1968) identifies five main causes for the different concepts of intelligence:

(1) The research into original, 'creative' or 'divergent thinking' was made the basis for contrasting it with the 'analytic' or convergent kind of thinking studied in the past and assessed by conventional kinds of intelligence tests. The former was known as creativity and the latter as intelligence.

(2) Swiss psychologist Piaget (1950) introduced a novel approach to study intelligence. By observing children's process of thinking from the detached viewpoint of a biologist, Piaget discovered many previously unsuspected basic differences between the concepts of children at various stages of development, and between those of children and of adults. Accordingly nature and functioning of intelligence was believed to be changing quite radically from one age to another. Former intelligence, as displayed and exercised by adults, works in a different manner.
and make use of different kinds of concept from concrete intelligence (typical or mild-childhood) and is still more different from sensori-motor intelligence, which is all that is available to young infant.

(3) The computer revolution has made intelligence to denote little more than the complex of performances which we happen to respect but do not understand (Minsky, 1963).

(4) The liberalised neo-behaviourism has attempted to describe and explain even the most complex and abstract human thinking in terms of simpler mechanisms, whether these operate by chains of stimulus-response connections, by feedback loops or by other kinds of elements. As such many experimental psychologists and cyberneticists argue that 'intelligence' is a cloak for our ignorance of the mechanics of thinking and little else.

(5) The most influential factor in changing attitudes to the study of human intelligence has been the growth of educational sociology. This view has emphasised environmental influences to the neglect of hereditary factors and the common features and mutual influence within social groups.

Thus, it has been seen that intelligence is an example of a multi-definable concept. The following observations on the nature of intelligence made by various eminent authorities bring into sharp relief the force of our present contention.
Binet (1916) defined intelligence as the ability, "to judge well, to comprehend well, to reason well, practical sense, initiative, the faculty of adapting oneself to circumstances."

Intelligence, as given by Terman (1921) is, "The ability to carry on abstract thinking."

Burt (1937) defined intelligence as, 'Innate general cognitive ability.'

In Wechsler (1943) words, "Intelligence cannot be separated from the rest of the personality." According to him, "Intelligence is the global capacity of an individual to act purposefully, to think rationally and to deal effectively with his environment."

According to Piaget (1950) "...behaviour becomes more intelligent as the pathways between the subject and the objects on which it acts cease to be simple and become progressively more complex."

As given by Raven (1958), "In order to act intelligently in any situation, a person needs both the necessary information and the capacity to form comparisons and reason by analogy.

Thus, there are two extreme views between which 'intelligence' has been conceptualized - the open view and the narrow operational view. The open view is related with the popular or common sense concept, whereas the operational view allows for a scientific precision and loss of some of the rich
Vernon (1960) classified description of intelligence as biological, psychological and operational. Freeman (1962) divided them into those emphasizing (i) power of adaptation to the environment, (ii) capacity for learning, and (iii) ability for abstract thinking.

Thus intelligence is confused with learning, thinking, problem solving, concept formation, attainment and achievement. It is none of these but it affects them all in positive way, that is, it improves performance. The concept has caused considerable controversy in recent years and there are two main reasons for this: firstly, intelligence is thought to be connected with achievement and is, therefore, important in our society and educational system; and secondly, some people are thought to be more intelligent than others. Such an apparently, unequally, distributed yet desirable attribute is naturally of interest to people concerned with the individual development.

Considered in a historical perspective, it may be useful to summarize the concept of intelligence developed during the last eighty years or so into four groups:

(i) Intelligence conceived as product. Such a conception is to be associated with the pioneers in the field such as, Galton (1870), Binet (1905) and Burt (1937). The latter defined intelligence as "innate general capacity". One of the implications of such a definition was that, intelligence as defined, differs from intelligence as measured by tests.
(ii) Intelligence conceived as possession. The view of intelligence is represented by Spearman (1927), Thurston (1938) and Guilford (1956). Thus, Spearman observed that every test score combines general ability, 'g' which is common and consistent across all the tasks an individual performs and a specific ability 'S', which is specific to the test. According to Thurston (1938) intelligence implies seven primary mental abilities - memory (M), number (N), perceptual speed (P), reasoning (R), space (S), verbal (V), and word fluency (W). Guilford constructed a model of intellect based on principles and suggested that there are 120 possible independent abilities.

(iii) Intelligence conceived as process. The advocates of such a view of intelligence are Ryle (1949), Piaget (1977) and Wretheimer (1945). For Ryle, intelligence is a dispositional concept and not an attribute in the same sense as 'tall' or 'Indian' or 'born in 1930'. He suggested that while speaking of intelligence, it would be better to talk of 'a general tendency in an individual to perform a wide variety of tasks intelligently' bearing in mind that some tasks may serve much better than others as indicators of this disposition.

According to Piaget (1977) intelligence involves 'essentially a system of living and acting operations, that is, a state of balance or equilibrium achieved by the person when he is able to deal adequately with the data before him.'
For Wretheimer (1945) intelligence is arrived at by the direct apprehension of the structure of a problem and it may be defined as, 'the ability to respond in present situations on the basis of cognet anticipation of possible consequences that ensue. One's intelligence, so defined, consists of the number and quality of one's insights differentiations, generalization and structurizations of one's life space. Within this frame of reference, successful behaviour rightfully may be intelligent only when a person might have done otherwise and his actions were premised upon his envisioning what he/she was doing and why'. (Bigge, 1976).

(iv) Intelligence conceived as a judgement. In terms of this view, intelligence implies a kind of judgement about one's performance. Such a notion of intelligence has been recommended by Jensen (1969) and Hudson (1971). The former assumes that intelligence is heritable whereas the latter provides a scheme of dividing people into groups of 'convergers' and 'divergers.' Hebb's distinction between 'intelligence A and Intelligence B' or Cattell's 'Fluid and Crystallised Intelligence', provide a picture of intelligence in terms of some kind of judgement. Thus, one kind of intelligence is 'thought of as genetic potentiality, or the basic, given qualities of the individual's central nervous system, and the other kind as mainly the result of experience, learning and environmental factors. However, most experts are of the opinion that all tests of intelligence measure an indissoluble mixture of Intelligence A and Intelligence B (or of fluid and crystallized intelligence).
and that any differences are ones of degree rather than of kind, and that it is impossible to assess genetic potential uncontaminated by the effects of experience.

As far as theories of intelligence are concerned, Spearman (1927) identified three kinds of theories of ability—the monarchic, the oligarchic and the anarchic. The monarchic view would imply truly 'one factor' theory, with general intelligence supreme, and equally important in every cognitive task; the oligarchic conception would mean that there are several large ability factors of roughly equal influence; and the anarchic view would make every task depend upon its own specific ability.

Thus, Spearman's (1927) two factor theory may be considered as the refined version of the monarchic type, with the condition that general intelligence enters into different tasks in different degrees. It may also be further noted that British psychologists like Spearman and Burt have supported the monarchic view of intelligence, whereas, American psychologists like Kelley, Thurston and Guilford have laid stress on the oligarchic or anarchic view.

According to Spearman's (1927) theory of intelligence, the structure of ability consists of two factors—general factor called 'g' and the specific factor called 'S'. He linked 'g' to general mental energy, equivalent to physical energy and therefore dominant. It implies that such a factor is
innate and unchangeable. The 'S' factor is energized by 'g' and is capable of modification under different environmental conditions such as, formal education. The degree to which tests differ in their saturation of 'g' is quite substantial, being very high in the case of verbal reasoning compared with say music or mechanical ability.

The theory of intelligence as presented by Thurston (1938) is oligarchic in nature and is described as Multiple Factor Theory. He introduced a new principle, which he called 'Simple Structure', such a principle was developed from an intuitive belief that, in a large and representative set of mental tasks, ability will be involved that greatly facilitate some of the tasks but have no effect on others.

Thurston conducted his first research using 56 different tests ranging from 2 to 20 minutes in length. These tests were administered on 240 students and through the technique of factorial analysis, he identified seven main factors with two more provisionally interpretable. The seven factors were:

- **S** - Spatial ability
- **P** - Perceptual Speed
- **N** - Numerical ability
- **V** - Verbal meaning
- **M** - Memory
- **W** - World fluency
- **I** or **R** - Inductive reasoning
In further studies with young children, not all of these factors were found. A new factor called 'motor factor' was identified and the memory factor was dropped. In the final versions of tests used in studies, three age groups were set up and the following set of factors was measured.

- Age 5-7: V, P, S quantitative, motor
- Age 7-11: V, P, S, R, N
- Age 11-17: V, S, R, N, W

Thurstone used the word 'Primary mental abilities' but the same was found to be misleading because the factors are in no way psychologically basic or are they physiologically established.

Vernon's (1950) Hierarchical theory of intelligence has raised a note of caution against taking the structure too literally; for example, minor group factors have not always been found to be direct descendents of the two broad group factors: Verbal-educational (V:ed) and Spatial-mechanical (K:m). Science ability appears to cut across this dichotomy. According to this theory, the structure of human ability may be thought to follow the hierarchy, as given in the figure.

![Figure 2.1: Figure showing the Hierarchical structure of Human Ability (Vernon, 1950).](image-url)
The most popular approach to describe the structure of ability is represented by Guilford's (1967) model of Structure of Intellect. He classified possible kinds of ability under three heads. In terms of this model, abilities may vary according to (a) the basic psychological processes involved, which are cognition, memory, evaluation, divergent product and convergent production; (b) the kind of material or content, such as symbolic (e.g. letters, numbers and words, when meaning as such is not considered), or semantic (meaningful material, particularly verbal); (c) the forms that information takes in the course of being processed, such as classes, systems, relations or transformations. Thus, the possible processes or operations are five, the kinds of content four, and the kinds of product six. Since these are independent cross-classification, this system yields a large number of possible different abilities i.e. $5 \times 4 \times 6 = 120$. The model illustrated by the cube in following figure is three dimensional and comprises 120 cells representing independent abilities.

![Fig. 2.2 Structure of Intellect (Guilford, 1967)](image-url)
The operations, products and contents as represented by this model and as described by Guilford are:

**OPERATIONS:** The types of operation performed are five kinds of mental processes.

- **Cognition (C)**: Discovery, rediscovery or recognition of information.
- **Memory (M)**: Recalling information—retention.
- **Divergent Production (D)**: Searching for possible solutions and varieties of thinking—broadening out and opening up.
- **Convergent Production (N)**: Single correct answer as in conventional thinking.
- **Evaluation (E)**: Making decisions about the adequacy of information.

**PRODUCTS:**

The resultant form into which information is processed consists of six products of the above operations.

- **Units (U)**: Varying from a simple product
- **Classes (C)**
- **Relations (R)**
- **Systems (S)**
- **Transformations (T)**
- **Implications (I)**: To a complex product.

**CONTENTS:**

This refers to the material on which the mental operations are performed. There are four kinds of contents in
which mental processes operate.

Figural F Concrete material perceived through the senses, spatial and linear relationships.

Symbolic S Letters, digits and conventional signs.

Semantic M Meaning of words and ideas.

Behavioural B Non verbal understanding of human behaviour and interaction or "social intelligence".

However, Cattell's (1971) theory of intelligence maintained that intelligence is neither completely monarchic nor anarchic in nature. In a way, Cattell suggested a compromise between the 'one factor' and multiple factor' theorists on the structure of abilities. He considered 'general intelligence' to be important but believed that this is best reached and assessed as a second-order factor via Thurston's primary mental abilities. He made a distinction between two kinds of general intelligence-fluid and crystallised. The former is abbreviated as 'gf' and the latter as 'gc'. The crystallised general ability (gc) is defined as indicated by those cognitive performances in which habits of skilled judgement have become crystallised from the application of some prior, more fundamental general ability to these fields. The fluid general ability (gf) appears more in tests requiring adaptation to new situations whereas crystallised skills are of no particular advantage.
2.2 PERSONALITY:

A recurrent characteristic of chapters on personality that have appeared in the 'Annual Review' of Psychology in the past 15 years has been a tone of "viewing with alarm" (Sechrest, 1976; Phares and Lamiell, 1977 and Loevinger and Knoll, 1983). Carlson (1984) has cogently suggested that not only has the person been lost in personality research but also society has been dropped out of social psychology. The great research in the field of personality led to the various definitions of personality. But there is lack of agreement in the definitions of personality, because the human personality is a complex phenomenon. Super (1949) rightly remarks, "the field of personality is one of the most popular, challenging, important and confused in contemporary psychology. The main obstacle to the classification of the concept of personality is the lack of agreement about a definition of personality."

According to the biophysical view, personality is what a man is within the individual. In this light, Morton Prince (1929) has aptly remarked that, "Personality is the sum total of all the biological innate dispositions, impulses, tendencies, desires and instincts of the individual and the dispositions and tendencies acquired by experiences."

According to the philosophical view, personality is ideal of perfection and is self-realization.

Freud (1957) has given the three constituents of personality as:
Id-Id is immoral and illogical. It is related to physical pleasure.

Ego-Ego is the real self. It is the sum total of consciousness will power and intelligence.

Super-ego Super ego is the ideal or moral self. It controls the desires of the individual. Its function is to warn ego about its defects and wrong actions.

In the words of Freud, if there is a balance between id and super ego then there will be proper adjustment resulting in a good personality, but if there is improper balance between id and super ego, that is, there is weak ego, then it will lead to maladjustment.

Sociologists define personality in terms of social stimulus value, that is, how an individual affects other persons with whom he comes in contact, whether he is impressive or repulsive, he has dominating or submissive personality. From this viewpoint, the personality becomes identical to reputation and impression generally in terms of physical appearance, clothing and conversation. This idea about the personality put the individual in a social background. For them, individual is a reflection of society. In other words "personality is the integration of all the traits that determine his role and status in the society." Dashiell (1929) seems to be more adequate as his sociological viewpoint define personality as, "An individual's personality is his system of
reactions and reaction possibilities in total as viewed by fellow members of society. It is the sum total of behaviour trends manifested in his social adjustment." Thus, the definition describes personality as a system of reactions and behaviour and takes into consideration not only the individual but also those who surround him. Similarly Murphy (1947) defines "Personality is structured organism-environment field, each aspect of which stands in dynamic relation to each other aspect. There is organization within the organism and organization within the environment, but it is the cross organization of the two that is investigated in personality research.

Highly influenced by psycho-analytical view of Freud Murray (1938) gave the concept of personality. The term which is most closely associated with Murray's name is 'need' and in most of his practical experimental work, he focussed his attention on this concept. Also Adorno et al. (1950) while describing personality in terms of need say, "The forces of personality are primary needs which vary from one individual to another in their quality, their intensity, their modes of gratification and the objects of their attachment and which interact with other needs in harmonious or conflicting pattern."

Allport (1927) after examining so definitions of personality suggested that, "personality is the dynamic organization within the individual of those psycho-physical systems that determine his unique adjustment to his environment." This definition emphasize the adjustive process in the
development of an individual personality. According to this definition an individual's inherent needs, urges or drives serve as motivation of behaviour towards satisfied goals. This is quite an adequate definition and explain the personality quite clearly and correctly. The word 'dynamic' in this definition represents that personality is undergoing a constant change, but is still organised. It constitutes two types of system - psycho (mental) and physical, the two interacting with internal and external environment. The unique adjustment of the individual to his environment means every individual has his own way and style of adjustment and every individual employ different methods to have good adjustment with the environment. Likewise, Guilford (1959) defines personality in this way, "an individual's personality is his unique pattern of traits ... A trait is any distinguishable, relatively enduring way in which one individual differs from another. These modalities of traits are represented by the figure as ;

FIG. 2.3 MODALITIES OF PERSONALITY TRAITS (GUILFORD, 1959).
Stagner (1948) is more concerned about the persons' inner system and defined personality as an inner system of beliefs, expectancies, desires and values. So, personality is the total quality of an individual's behaviour as it is shown in his habit of thinking, attitudes, interests, his manners of acting and personal philosophy of life.

The Indian viewpoint explains personality in terms of various layers or sheaths. According to this view, there are 5 layers which constitute personality. These are the physical self, the vital air, the mental self, the intellect and the blissful.

Cattell (1956) equates the personality with the individual aspect of behaviour. He defines personality "... is that which permits a prediction of what a person will do in a given situation.... Personality is concerned with all the behaviour of an individual, both overt and under the skin.

Eysenck (1960) opines personality in the following words, "Personality is more or less stable and enduring organization of a person's character temperament, intellect and physique which determine his unique adjustment to the environment". He gave four sectors of personality: (i) Cognitive sector (intelligence), (ii) Conative sector (Character), (iii) an affective sector (temperament), and (iv) Somatic sector (constitution).

After presenting various definitions of personality,
however, for the purpose of present study, personality has been taken as defined by Cattell and Eber (1967). That is, which permits a prediction of what a person will do in a given situation and is concerned with all the behaviour of the individual, both overt and under the skin, and scores obtained on Cattell and Eber (1967) 16 Personality Factor Questionnaire (Form A) are the measures of personality.

Regarding The Theories of Personality, There have been given so many theories by various psychologists, but here we are concerned with Freud's viewpoint Jung's theory, Adler's theory and Erikson's theory only.

Freud's (1957) Psychoanalytic Theory believes that personality is made up of three major systems the id, the ego and the super ego.

The id is the original system of the personality. It consists of everything that is inherited psychologically. It is instinctual in nature. Also it is a reservoir of psychic energy. It operates through pleasure principle. This means that for the reduction of tension it chooses a path which is most pleasurable to the individual.

The ego fulfils the need of the individual to transact with the reality of the world. The ego obeys the reality principle. The ego operates by means of the secondary process. The secondary process is realistic thinking. In order to perform its role efficiently the ego has control over all the
cognitive and intellectual functions. The principal role of the ego is to mediate between the demands of the 'id' and super ego.

The super ego is the moral arm of the personality. It represents the traditional values and ideals of the society. It develops through the influence of the parents who interpret the society of the child. It strives for the perfection rather than pleasure. In a very general way the super ego is thought to be the social component of the personality. The ego is described as the psychological component, while the id is regarded as biological component.

In the Freudian theory, the concept of the instincts helps in the understanding of the dynamics of personality. The instincts are described as inborn and constituting the sum total of psychic energy available to the personality. The instincts, according to Freud, can be classified under two headings - the life instincts and the death instincts. The life instinct perform their function through the form of energy which is called as libido. The dynamics of personality consists of the way in which the psychic energy is distributed and used by the id, ego and super ego.

The investment of energy is in action or image by the id which will gratify an instinct is called an instinctual object-choice or object-cathexes. Thus, Cathexes is the driving force of the personality. Some of the energy ego uses to restrain the id to act impulsively or irrationally. These restraining forces are known as anti-cathexes in contradiction
to driving force or Cathexes. The interplay of the driving force Cathexes and restraining forces, anti-cathexes describes the dynamics of personality.

Regarding the development of the personality, Freud felt that first few years of the life of the child are decisive for the formulation of personality. From birth to one year of the life of the child, the mouth is the principal region of the dynamic activity. This stage is known as Oral stage. After the oral stages comes the Anal stage. At this stage there develop Cathexes and anti-cathexes around the eliminative functions. This stage lasts till second year. It is succeeded by the Phallic stage. After this stage child enters into a prolonged latency period. The adolescence period reactivates the earlier three stages which are also described as the pregenital stages. In case of adolescents these stages are successfully displaced and sublimated by the ego and the person passes into the final stage of maturity, the genital stage.

Jung's (1923) theory considers that the individual personality is the product and container of its ancestral history. The cumulative experiences of the past generations extending in the remote past have shaped the modern man into his present form.

Jung believes that the total personality or the psychic consists of the ego, the personal unconscious and its complexes, the collective unconscious and its archetypes, the person's, the anima and animus and the shadow. In addition to these interdependent systems there are attitudes of introversion and
extroversion and the functions of thinking, feeling, sensing and intuiting. Finally, there is self which is the centre of the whole personality.

According to Jung, the ego is the conscious mind. It is made up of conscious perceptions, memories, thoughts and feelings. The personal unconscious is a region adjoining the ego. It consists of the repressed or forgotten experiences. A complex is an organized group or constellation of feelings, thoughts, perceptions and memories which exist in the personal unconscious. The collective unconscious is the storehouse of the latent memory traces inherited from the man's ancestral past. The archetypes are the structural components of the collective unconscious. The person is a mask which is adopted by the person in response to the demands of social convention and tradition to his own archetypal needs. The anima and animus are described by Jung on the basis of his belief that man is essentially a bisexual animal. The feminine archetype in man is called the anima, the masculine archetype in woman is called animus. The shadow archetype consists of the animal instincts which man inherited in his evolution from lower forms of life. The shadow to begin with typifies the animal side of man's nature. The self is the midpoint of the personality around which all the other systems are constellated. It holds those systems together and provides the personality with unity, equilibrium and stability.

Jung believes that man is constantly progressing or
attempting to progress from a less complete stage of development to a more complete one. The goal of development is self-realization. Self-realization, to him, means the fullest, most complete differentiation and harmonious blending of all aspects of man's total personality.

Adler's (1924) Individualistic Theory gave a social psychological viewpoint in propagating his theory of personality. He considered man as inherently social in nature. Adler presented the concept of the creative self. For himself is a highly personalized subjective system which interprets and makes meaningful the experiences of the organism. It is unlike Freud's ego which consists of a psychological processes serving the ends of inborn instincts.

In the opinion of Adler, each individual is a unique configuration of motives, traits, interests and values. He believed that every act performed by the person bears the stamp of his own distinctive style of life.

The role of sex is minimum, according to Adler. Man is described as primarily a social and not a sexual creature. His motivations have social origins and are not merely the psychological interests. Every person strives to develop a unique style of life in which sexual drive plays a minor role. The way in which the man satisfies his sexual needs is determined by his style of life and not vice versa. Adler considered consciousness as the centre of the personality man is a conscious being who is ordinarily aware of the reasons
for his behaviour. He is self conscious. Man knows about his inferiorities and is conscious of the goals for which he strives.

Erikson's (1967) theory is based on Epigenetic principle. According to this principle during fetal development certain organs of the body appear at certain specified times and eventually "combine" to form a child. Erikson says that, anything that grows has a ground plan and out of the ground plan the parts arise, each part having its time of special ascendency, until all the parts have arisen to form a functioning whole."

The personality of the individual is formed through a series of interrelated stages. The ego progresses through these stages. Erikson visualizes personality development as a series of dichotomies of desirable qualities and dangers in the development of personality it is not necessary that only positive qualities emerge. The dangerous traits may also be there.

2.3 COGNITIVE STYLES:

A greater research interest in the area of cognition has been found in the last few decades. The things we do in our heads - mental activities or thinking are referred as cognitive processes. Mahoney (1987) stated, "there are numerous indications that psychology is undergoing some sort of revolution in the sense that cognitive processes have become a popular topic." The trend towards the interest in this area,
that is, cognition can be well understood because of the attention paid to cognitive styles in publications as those of Kagan (1976), Landfield (1977), Messic and Messick and associates (1976). In essence, cognitive style refers to the way in which individuals organize their experiences.

Cognition:

According to the Dictionary of Psychology (Drever, 1952) there are several meanings of cognition like knowing, judging, perceiving, conceiving, remembering, imagining and reasoning etc. Cognition is considered as the part of conscious perceiving, learning and thinking by many psychologists.

Every individual organizes all in the different manner what he sees, remembers and thinks about. According to Kagan et al. (1960) Cognition is, "the organization of a stimulus configuration in order to arrive at a basis of similarity among a group of stimuli, and the assignment of a symbolic label to the organized pattern of similar stimuli."

It was suggested by Wann et al. (1962) that conceptual response is elicited by a process of seeing relationships, categorizing, discriminating and generalizing about those things which the child sees, hears and feels in his environment.

As far as theoretical approach to cognition is concerned, there are various theories. The Stimulus and Response Theory was one of the earliest approaches stemmed from the behaviourist tradition (Watson, 1930).
Rather than discussing cognition or thinking in terms of mental processes (which are not accessible to direct study), behaviourists emphasized the basic concepts of stimulus and response. According to this approach knowledge and skills are the results of connecting particular stimuli with overt response or actions, that is, whenever a stimulus occurs; it provokes the response with which it is associated.

The Motor Theory was the one version of stimulus response theory in which all behaviour was equated with the muscular or glandular activity. Most human thoughts were considered to involve subvocal activity; that is, thinking was viewed as talking to oneself. Muscular activity could be an incidental byproduct of thinking, or an overflow resulting from activities in brain that occur during thinking. The brain being so active during thinking that signals 'spill over' to the muscles through the motor pathways. Images and procedural knowledge types of cognitive activities are very difficult, if not impossible, to verbalize and to incorporate into a motor theory. Finally, learning and thinking occur even when the body has been paralyzed by a drug, preventing any recordable muscular activity. Thus, motor theory cannot account for many things, we know about cognition.

Mediational Theory was proposed by Maltzman (1955) and Kendler (1962) as an alternative to motor theory. This theory suggests that important stimuli and responses could occur in the head without motor components. Mediational events or
thoughts provide a connecting link between the environment and the way one respond to it. Messrick (1976) defines in terms of consistent individual differences and maintains that cognitive structure mediate between environmental input and the organisms output. He adds that cognitive structures organize behaviour as well as input.

**Gestalt Theory was originated in Germany** after the turn of the century by Gestalt Psychologists, like Kohler (1947) Lewin (1951) and was contemporary with behaviourism in U.S.A. Gestalt psychologists were concerned primarily with perception, but applied Gestalt theory to nearly all significant psychological problem. For them, thinking and problem solving are matters of 'seeing' in the right way. Thus, their concerns about the perceptual processes strongly influenced their idea of cognitive processes. Ohnmacht and Mc.Morris (1971) define cognitive styles as those dimensions that characterize a person's manner of perceiving, thinking and problem solving.

**Hypothesis Theory**: views the organism as an active thinker. Various psychologists (Bruner, Goodnow and Austin, 1956) are associated within theory. In learning a task or solving a problem, the individual is seen as forming and testing hypothesis or ideas about what is happening and how to respond. Hypothesis theory suggests that we perform complex tasks such as problem solving by thinking out in advance various possible courses of action. We test these hypotheses systematically until the correct one is found.
After that, **Information Processing Theory** was framed as under the early influence of behaviourism, such mental concepts as memory and reasoning were considered unscientific and not proper fields for psychological study. Newell and Simon (1967) worked in this direction. Bieri (1971) too noted that a process of information, transformation is a basic assumption of the cognitive theorist. He told that individuals learn "strategies" programmes or other transformation operations to translate objective stimuli into meaningful dimensions. These strategies were termed as "cognitive structure" by Bieri.

**Cognitive Styles**: Jeff, Gordon and Ferguson (1974) defined cognitive style as an in-built plan or programme to select specific types of data for processing or to perform specific mental operations on informations processed.

In referring the term cognitive style denote consistencies in the individual modes of functioning in a variety of behavioral situations. Coop and Sigel (1971) seem to equate cognitive style with behaviour rather than mediating process. This definition is similar to the earlier use of the term style by Allport (1937), to explain (describe) consistencies in behaviour; and the earlier concept of silent organization, used by Gestalists to describe cognitive structures that are not tied to specific content, but rather than guide behaviour (Scherrer, 1954). The concept of schemate was utilised by Tolman (1926), who used related construct. The concepts of differentiation and hierarchical organization by Lewin (1935) are also important.
Harvey (1963) defines cognitive styles as the way an individual filters and processes stimuli so that the environment takes on psychological meaning and it is representative of the meditation. As such cognitive representations modify the one to one relationship between stimulus and response. If it were not for these cognitive representations, stimuli would be irrelevant for the individual or the individual would respond to stimulation in a robot like fashion. Schilling (1981) conceptualize cognitive styles as the characteristic preference that individuals have for different types of information. It refers to the modes an individual employs in perceiving, organizing and labelling various dimensions of the environment.

"The cognitive styles dictates the cues the individual will use but not necessarily the level on which the intelligence functions. It is the preferred use of a specific class of conceptual responses." (Kogan et al., 1960).

"Cognitive styles may entail generalized habits of information processing, to be sure, but they develop in congenial ways around underlying personality trends and are thus intimately interwoven with objective, temperamental motivational structures as a part of the whole personality thereby providing one aspect of matrix.

Common to all theory and research on cognitive style is an emphasis on the structure rather than the content of thought (SuedFeld, 1971). These structures refer to how
cognition is organized; content refer to what knowledge is available. In the first month of life, individual behaviour styles can be delineated (Birch et al., 1962) in terms of activity level, threshold of responsiveness, rhythmicity of functioning, adaptability, intensity, approach withdrawal, mood, desirability and persistence.

Broverman and Lazarus (1958) have suggested that the cognitive style manifest itself in two ways, as an directive influence on behaviour or as an ability to resist disruption under interference conditions. The cognitive style may be 'perceptual-motor' dominant or 'conceptual' dominant. Although cognitive styles are viewed as habitual modes or information processing, they are not simple habits in the technical sense of learning theory because they are not directly responsive to the principles of acquisition and extinction. Cognitive styles develop slowly and do not appear to be easily modified by specific tuition or training (Kagan and Kogan, 1971; and Kogan, 1971). Across diverse spheres of behaviour, the stability and pervasiveness of cognitive styles suggest deeper roots in personality structure than might at first glance, be implied the concept of characteristics modes of cognition, as it were, that determines the nature or form of adaptive traits, defensive mechanisms and pathological symptoms (Shapiro, 1965). In this view, a core personality structure is manifested in the various levels and domains of psychological functioning - intellectual, affective, motivational, defensive - and its manifestation in cognition is cognitive style. Thus, Adorno et al. (1950) have investigated the authoritarian personality. Gardner and his
colleagues (Gardner, Holtzman, Klein, Linton and Spence, 1959; Gardner, Jackson and Messick, 1960) have explored the patterning of "cognitive controls which help the individual organize and mediate his transactions with the environment."

**Types of Cognitive Styles:**

Rokeach and his co-workers (1960) have concentrated research attention upon the behavioural correlates of individual with 'dogmatic' (close-mindedness) and non-dogmatic (open-mindedness) cognitive style. Messick (1976) lists 19 such traits in his recent review of reported cognitive style variable S. Some of the important cognitive styles are (i) equivalence range, which is operationally related to sorting or classifying tasks. (ii) Levelling Vs. Sharpening concerns reliable individual variations in memory. (iii) Focussing Vs. Scanning, which shows individual differences in the variations in vividness of experience and the span awareness. (iv) Conceptual styles concerned with categorizing behaviour. The style of conceptualization also has something to do with classification. The person who is high on the style trait of conceptual articulation, also named as "Conceptual discrimination is said to prefer sharpened classes, but also on the whole to show preference for relations. Where there are options, with the alternative label of integrative complexity, a style of conceptual integration involve seeing how categories or dimensions of information are related in multiple and different ways. (v) Cognitive complexity Vs. Simplicity is the multidimensional and discriminating way. (vi) Reflection Vs. Impulsivity involves individual consistencies in the speed and
adequacy with regard to hypothesis formulation and information processing. (vii) Convergent Vs Divergent represents the degree of an individual's relative reliance upon convergent thinking as contrasted to divergent thinking. (viii) Risk taking represents one's willingness to take chances and to venture responses. (ix) Constricted Vs. Flexible control is susceptibility to distraction and cognitive interference. (x) Strong Vs. Weak automization refers to an individual's relative ability to perform simple repetitive tasks compared to his general level of ability. (xi) Conceptual Vs. Perceptual motor dominance is with reference to novel or difficult tasks. (xii) Of all the cognitive styles, by far the most investigated has been Witkin's field independence vs. field dependence.

Field Dependent and Field Independent Cognitive Style:

A great focus has been paid to the area of field dependent and field independent approach of cognitive style. The rationale for such focus follows from the accumulation of works surrounding the concept. Vernon (1973) writes, "it is likely that more empirical work has been carried out on field dependence-independence by his colleagues (1954, 1962), and other psychologists, then on all the other cognitive styles put together (p.136). Besides, certain features of construct render it more useful.

The first and the foremost is the theoretical framework of psychological differentiation under the aegis of which the concept is evolved and developed. Moreover, this approach
to cognitive style is not content-loaded, its structural properties extend it to broader areas of human behaviour and various subsets of human population.

Field-independence versus Field-dependence refers to a consistent mode of approaching the environment in analytical terms. The concept of field dependent and field independent cognitive style has undergone several historical developments. The interplay of empirical work and theoretical formulation has changed its conceptual nature. In its recent version, field independence and field dependence are bipolar concepts, and field independence refers to the extent of autonomy of external referents.

Originally the concept of field independence was derived from the laboratory studies of perceiving the upright (Witkin, Lewis, Hertzman, Machover, Meissner and Wapner, from 1954 to 1972). The consistent manner of establishing the upright contributed to the notion of field-dependence and field-independence as individual difference constructs. Field-dependent people are regarded as the individuals inclined to use the field. Whereas field-independent people were considered as individuals tending to use body for perception of the upright.

The concept was now formulated as an "articulated field approach" at one end, and a "global approach" at the other end.

In this area of personality, research has been the systematic work done by Witkin and his associates (Witkin et al. 1954, 1962), in their studies of individuals having both
the field dependent and the field independent cognitive style. In 1940, Witkin started his work on the personality dimension and observed in 1950; that how an individual orients himself in space. He demonstrated that perceptual performance of an individual is related to highly diverse area of cognitive life in a consistent manner. Differentiation at work was proposed by Witkin and others (1962). But this idea was borrowed from the work of Werner (1957), who stated that development involves an increased indifferentiation and hierarchial integration, Primitive or early behaviour is described as the global and diffuse type which is lacking articulation between the different areas of activity. But as the development proceeds to higher levels, functions become differentiated and the parts become discernible from the amorphous whole. These become the articulated units. Then Werner (1957) described that the direction of development was found in every psychological phenomenon; perceiving, thinking, learning, feeling and language behaviour. Similarly, this principle was applied in area of cognition by Witkin (1962) to the hypothesis that field independent persons have achieved a higher level of differentiation than field dependent persons, as identified by RFT (Rod Frame Test) and EFT (Embedded Figure Test), the performance of these tests, RFT and EFT requires differentiation of behaviour. So, it is necessary that individual must learn and perceive his environment in discrete manner in order to separate the part from the whole configuration or the one item from the configuration. The field independent person is able to break the field and can attend to the various relevant forms and
items existing in the field along withdrawing his attention from the irrelevant forms. Whereas, the field dependent or relatively undifferentiated person is not able to withhold his attention from the titles form surrounding the rod and the complex designs containing simple figures in it.

Field independent person or the analytical individuals can be able to perform the tasks which require differentiation, in identifying the presence of logical errors and in understanding the various jokes and puzzles more quickly. But, on the other hand the field dependent individuals also called global type of individuals tend to identify a group exhibiting social orientation and they are more afraid of external influences and are markedly affected by the isolation from other people (Witkin, Dyk, Faterson, Goodenough and Karp, 1962; Witkin, Oltman and others, 1971). The persons who are field dependent, they differ largely from the field independent individuals in important personal characteristics. In case of attitude formation, field dependent persons are especially prone to be guided by the positions attributed to an authority figure or peer group. (Bell, 1964; Deever, 1968; Linton and Groham, 1959). The field independent persons are quite less attentive to human content of environment (Konstadt and Forman, 1965; Nevill, 1971; Ruble and Nakamura, 1972). The field independent persons literally spend less time in looking at the faces of those with whom they are interacting as compared to the field dependent persons. The fact is, of course, a major source of information about what others are feeling and thinking.
The field dependent persons also tend to be better at remembering faces (Crutchfield, Woodworth and Albrecht, 1958; Messick and Damarin, 1964). They also reflect superiority over field independent persons in attending to verbal message that are more social in content (Eagle, Fitzgribbons and Goldberger, 1966; Eagle, Goldberger and Breitman, 1969; Fitzgribbons and Goldberger, 1971; Goldberger and Bendich, 1972).

In many studies of family experiences of children who turn out to be relatively field dependent or field independent was demonstrated that the kind of relationship between the growing child and his mother is influential in determining the cognitive styles of the children (Seder, 1957; Witkin and others, 1962; Dyk and Witkin, 1962; and Dyk, 1969). Field dependency or the field independent plays an identifiable role in selection of electives and especially in the vocational preferences. More field independent studies favour those activities in which analytical skills are called for, whereas field dependent students avoid such domains. Field independent people are likely to learn more than the field dependent people under conditions of intrinsic motivation.

There have been given the various characteristics of the articulated and global cognitive styles. These can be summed up as:

(1) The cognitive styles are concerned with the form rather than the content of cognitive activity. These are based on the individual differences in how one perceives, thinks, solves problems, learns, relates to others.
Cognitive styles are pervasive dimensions. They cut across the boundaries traditionally and help to restore the human psyche to its proper status.

Cognitive styles are stable over time. This does not mean that they are unchangeable.

Cognitive styles are bipolar with regard to value judgement.

2.4 ENVIRONMENTAL CATALYSTS:

Environment has become a matter of great interest and concern not only for the environmentalists and ecologists but also the psychologists who study emotional reactions in human beings in relation to the changing environmental conditions.

Environment means all that is found around the individual. Environment stands for all those circumstances, which are asserting their influence on the individual since conception to death. Our innate abilities are also modified by the circumstances. Consciously or unconsciously environment moulds the behaviour and the personality of the child. In generally, the main aspects of environment are:

Physical environment - includes food, temperature, climate, home and school building etc.

Intellectual or Mental environment - includes books around the child, libraries, laboratories, radio, museum, intellectual tastes and interests of the parents, recreation rooms and associations.
Social environment - means parents, members of family, relatives, playmates, friends, neighbours, teachers and the society at large.

Emotional environment - it consists of emotional nature of parents, friends, relatives and teachers etc.

Anastasis' view (1958) of environment is more complex. She views environmental influences of two types: Organic and Behavioural factors. Behavioural factors are those which directly influence the behavioural outcomes and organic factors are those produce influence on behavioural outcomes indirectly by contributing directly to the human organisms. "The environment is everything that affects the individual except his genes" - Boring, Longfield and Weld (1961).

As given by Webster's Dictionary (1966), Environment is, the surrounding conditions, influence or forces that influence or modify: as the whole complex of climatic, edaphic and biotic factors that act upon as organism or an ecological community and ultimately determine its form and survival.

Baum et al. (1982) have the different aspects of environment, which give the different and unique explanation of the environment as:

- In case of adaptation: physical qualities, interpersonal interaction, information etc.
- Opportunity structures: temporal and spatial structures of land uses, services, facilities.
Socio-cultural forces: Socially/culturally defined settings and systems.

Historical: Constraining/enabling residue of human interaction with the other paradigm.

According to Colinvaux (1982), "The term environment includes the observable physical, biological, historical and social milieu and in which man lives. Thus, environment is a set of relationship between man and nature."

Graphically, it may be represented by three arms of a triangle labelled as physical, biological and sociological components interacting with each other and influencing the non-material attributes of man such as ethics, aesthetic and techniques.

In the views of Withall (1979), "environment encompasses the emotional tone which is concomitant of interpersonal interaction. It is a general factor which appears to be present in interactions occurring between individuals in face groups."

The environment is composed of visible and invisible elements. A Brazilian scientist's definition of environment is worth quoting, that the environment is not only the sum of all the material things that make up the mosaic of the countryside of landscape and constantly interact with each other. It is much more than this. It also includes the economic structures and outlook and habits of people in different parts of world. The environment, as a whole, therefore, includes not only physical or material factors but economic and cultural ones as well. An accurate analysis of environment must always...
consider the total impact of man and his culture on all and every aspect of human life. Viewed in this perspective, the environment includes biological, physiological, economic and cultural aspects, all linked in the same constantly changing ecological fabric.

Catalysts:

As defined by Webster's Dictionary (1966), 'Catalyst is a substance that brings about catalysis and that may or may not actually take part in the process.

So, the catalyst is an agent which generally make the process speedy in nature. Chemically, the catalysts are classified as: (1), Activator: fastens the reaction, and (2) Inhibitor; which retards the growth and speed of reaction. Similarly, the catalysts which are present in environment can activate as well as regard the process of growth, behaviour and learning of an individual.

"Environmental catalysts" is a complex term to define. Since it is new introduction in the field of research and psychology so it is difficult to present a huge amount of theoretical content on this term.

Environmental catalysts like the factors of environment consists of the emotional, physical and intellectual climate that is set up by the teachers, parents and students, which affect the teaching and learning process. So, these are the
factors present in the environment, which affect the quality and quantity of learning done by the students. These factors can be home, school, society, personal attributes, socio-economic status and psychological environment.

Ahluwalia (1970) used the term as the nature and extent of change in the professional attitude of pupil teachers which is perhaps catalysed by the teacher educational programme (In a study of Teacher trainees).

For the purpose of present study, this term is explained by the nature, growth and extent of change in the scientifically creative abilities of students which is perhaps catalysed by the home, school environment, personal attributes, SES and psychological environment.