CHAPTER ONE

INTRODUCTION
CHAPTER ONE
INTRODUCTION
CHAPTER ONE

INTRODUCTION

1.1 ACADEMIC

ACHIEVEMENT:

ITS NATURE

Academic achievement is, in general, referred to the degree or level of success or proficiency attained in some specific area, concerning scholastic or academic work. Academic or educational age, accomplishment quotient or achievement quotient are the most commonly used means to interpret the level of academic achievement of pupils in general or in specific given subject matter.

According to Christian (1980) the word performance generally indicates the learning outcome of the students. As a result of learning through different subjects, the learning outcome changes the behaviour pattern of the students. Learning affects three major areas of students: (i) Cognitive, (ii) affective and (iii) Psychomotor. According to him learning does not reach the same level in all three domains at a time, students may be at higher or lower level in any domain.

(i) Cognitive area is primarily concerned with the intellectual growth of the individual. Growth in the area includes the acquisition of basic intellectual skills, such as reading, ability to add and subtract, as well as learning of facts, concepts and generalizations.
According to Sharma and Aggarwal (1980) cognitive style may be conceived of as a term that refers to stable individual performances in mode of perceptual categorisation of external environment. According to them cognitive tasks tend to measure a personal preference on the part of different individual in the manner in which they choose to perceive and categorise their environment. Broverman (1960) conceptualises cognitive style as expressions of different response probabilities or response strengths in certain types or classes of behaviour.

Bloom (1956) contends that cognitive domain includes all those objectives which deal with the recall or recognition of knowledge and development of intellectual abilities and skills. The taxonomy of educational objectives in the cognitive domain contains six major classes; Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation.

Affective area deals with a student's self concept, personal growth and emotional development goals, such as "Ability to work with peers", "Consideration of the elderly" or "Willingness to listen to other people's ideas", all fall within this domain.

The psychomotor domain is primarily concerned with development of muscular skill and coordination.

Mehta (1969) explained that the word "performance" is a wider term which includes both the academic and the co-curricular performance of an individual. Achievement is the learning outcome of a student. A level of achievement is the learning outcome of a student. A level of achievement in the academic field of a student is included in the performance of the individual. The present study deals with only the academic performance of the students.

Good (1959) in the Dictionary of Education referred to academic achievement as "the knowledge attained or skill developed in the school subjects, usually designated by test scores or marks assigned by the teacher." Trow (1956) defines academic achievement as "the attained ability or degree of competence in school tasks, usually measured by standardized
Achievement has been defined by Crow and Crow (1907) as, "The extent to which learning is profiting from instruction in a given area of learning." Thus academic achievement is the competence the students show in the school subjects in which they have received instruction.

1.2 ACADEMIC ACHIEVEMENT
TEST: ITS NATURE

A test of academic achievement is one designed to measure knowledge, understanding or skill in a specified subject or group of subjects. Most academic achievement tests are devoted largely to the measurement of the amount of information acquired or the skills and techniques developed after a period of instruction. According to Lindeman (1967) academic achievement tests are mainly of three types:

1. Teacher made test.
2. Standardized achievement test.

1.2.1. TEACHER MADE TEST

According to Lindeman (1967) "Teacher made tests are constructed to measure the achievement of specific instructional objectives relating to particular units of work." Such tests are usually of the paper-and-pencil variety and are composed of one of the two kinds of test items viz. essay and objective. Essay items get their name from the manner in which the students respond, wherein he is required to produce a written response ranging in length from a few sentences to several pages. Essay items are particularly useful for measuring the ability to organise information and communicate it clearly and effectively. Objective type tests consist of various objective items and are scored objectively. Objective items are of several different
varieties such as short answer, completion, true false, multiple choice and matching type. They require that the students either supply a word or a phrase in answer to a question or choose the correct response from amongst the alternatives provided. These items get their names from the objective manner in which they are scored. Objective items are useful for determining whether the student has knowledge of certain facts and principles, whether he understands the significance or importance of these facts or principles, and whether he can apply them to the solution of unique problems.

1.2.2. STANDARDIZED ACHIEVEMENT TEST

"A standardized achievement test is one designed to assess overall achievement in one or more subject areas or skills at various points during the child's school experience and is administered, scored and interpreted under standard conditions," Lindeman (1967). These tests are composed of the same kinds of items as are the teacher-made tests, but their purpose is essentially different. They are not designed to measure the achievement of immediate and specific instructional objectives. Their purpose instead is to assess overall achievement of the children in one or more subject areas or skills. The term 'Standardized' refers to the fact that these tests are designed to be administered, scored and interpreted under standard conditions. Because of this feature they are useful for making comparisons between pupils and between groups even when the tests have been administered at different times and in different places. Standardized tests have norms which are obtained by administering the tests to a very large group called a norming sample. Although the composition of the norming sample depends to some extent upon the purposes of the test, it generally includes representatives from various cultural, religious and ethnic groups, from rural, urban, and sub-urban communities, and from a wide range of geographic regions in the nation. The norms indicate the average performance on the test for children at various
age and grade levels. In a sense, they represent a kind of "national" average with which individuals or groups within a given school or class may be compared.

Under the present investigation, with the aim of comparison between students or groups, percentile norms were prepared and a set of directions for conducting the test to ensure the universality, were worked out.

1.2.3. PERFORMANCE TESTS

"Performance Tests are tests which are designed to measure the ability of an individual to perform the tasks involved", Lindeman (1967). These tests measure such abilities as to perform laboratory operations in chemistry, typing speed and accuracy in a typing course, creation of a watercolor in art and performance on a musical instrument etc. These all represent abilities that can be evaluated only on the basis of observing the individual while performing the task. The techniques for conducting the performance tests differ markedly from one area to another.

1.2.4. ACADEMIC ACHIEVEMENT TESTS: 1830 HISTORY

In the nineteenth century and the early twentieth century, testing in schools at first consisted of oral tests and then gradually essay tests were developed. During 1920s standardized achievement tests for schools were developed rapidly. Testing gained momentum during 1930s and 1940s when the stress shifted from memory of facts to reasoning about factual information and emphasis was given more to power-items than to speed-items.

During 1950s and onwards a large number of standardized achievement tests were developed in America & other countries which were intended to measure the individual's
actual learning in academic subjects. Norms were also made to compare a student's score with those of a defined group of students. Evaluation and adjustment series (1950); Essential High School Content Battery (1951); IOWA-Test of Educational Development (1952); Standard Achievement Test (1953); IOWA-Test of Basic Skills (1956) (Sc. Research Association); California Achievement Tests (1957); Sequential Test of Educational Progress (1958); SRA Achievement Series (1959); Stanford Test of Academic Skills (STAS) (1973); Metropolitan Achievement Tests (1959, 1970); Stanford Achievement Test Series (1973) and many others were developed and standardized to measure the academic achievement of pupils in more than one subject, viz. Languages, Sciences, Social Studies and Mathematics.

These and other equally sound batteries of tests have much in common regarding objectives, standardization population, reliability and concept of validation. On the whole they are technically well constructed. Their reliabilities are high, mostly in the range of 0.80 to 0.92. Validities of the achievement tests are given in terms of content and construct.

Tests in Mathematics were also developed and standardized in India and other countries. Since it is a basic and universal area of instruction, the subject of Mathematics has also been widely studied. An achievement test in Mathematics is designed to measure the specified objectives of the teaching of that subject at each of the grade levels. Objective tests in Mathematics are of two major types i.e. achievement tests and diagnostic Tests. The achievement type test, obviously, is intended to measure the amount and level of each testee's learning in Mathematics. Individual Pupil Monitoring Systems (Mathematics-Test for Grades 1-8); Algebra Test by Sharma and Aggarwal (1980) and Number Concept Test for grades 1-5 (age group 5 to 10 years) by Deo and Verma (1977) were developed and standardized to measure the achievement of pupils in Mathematics. These tests vary considerably in quality with regard to their content and technique of standardization. The reliability coefficient varied from 0.80 to 0.96.
The tests developed and standardized in foreign countries have been widely and indiscriminately used. Various researchers in India have also made use of these tests in some cases, even without proper adaptation. This does not suit the Indian situation as the tests have been standardized on a population which is different from Indian children and also the contents of the tests are different. In India there is no standardized test that covers the syllabus of Mathematics of Class V of Kendriya Vidyalayas. Keeping this in view and stimulated by the necessity of using the test in the present study, the investigator thought it worthwhile to develop a test in Mathematics for class V children.

In this context the present study aimed at developing and standardizing the achievement test in Mathematics for Class V Children (age 9 to 10 years) on the pattern of the above mentioned standardized tests.

1.3. Variables

1.3.1. Intelligence has been defined as, "The innate ability to solve problems. The innate ability is that which is present in a person from birth and not acquired through self study or as a result of classroom instructions," Garvy(1965). According to Jerial and Sharma(1980), "intelligence is an ability which involves the generation of logical imperatives."

In the Dictionary of Education Good(1959) contends that intelligence is nothing but the ability to learn and to criticise what is learnt.

In most general sense intelligence means the ability to learn from experience and to deal with new situations and also the ability to deal effectively with task involving abstractions.

According to Terman(1921), "Intelligence is the capacity to carry on abstract thinking." Binet(1905) said that, "the essential characteristics of intelligence is the ability
to judge well, to comprehend well and to reason well." Peterson (1925) contends that, "intelligence is a mechanical means for adjustment and control." Wechsler (1974) maintains that, "intelligence is the global capacity of the individual to act and to deal effectively with his environment."

Thorndike (1920) contends that there are three main types of intelligence; viz; (i) intelligence for words and abstract ideas; (ii) motor intelligence or skills with use of hands and (iii) social intelligence or ability to get on well with others. It has also been termed as behavioural intelligence by some others.

It is the first type of intelligence, i.e., the intelligence for words and abstract ideas, which was the concern of the present study.

Plato (428-348 B.C.) was the first to begin the discussion on intelligence with his tripartite division of the "noos", which covered the concept of soul, mind, spirit and thinking as well as that of mental ability. Every one, he said, has an appetitive part to aim or impulsive side to his nature. In addition, there is another element of thought or reasoning and there is another element between them, which takes order from the reasoning side and curbs the excesses of the impulsive side. Plato also offered some further remarks on the balance of environment and heredity in personal abilities that are strikingly modern. In the "Republic", he makes it quite plain that he thinks human differences stem principally from inheritance. Plato also recognised the modern concept of "regression towards the mean" in relation to intelligence in his book "Republic".

The theory of intelligence took another step forward with Aristotle (384-322 B.C.) who extracted cognition from perception. His idea of mental functions separated the nutritive, the perceptive, the motive and the intelligence. According to him the intelligence orders outside objects, just as the senses perceive them. Intelligence is therefore, passive and unlike the other parts of the mind, is not shared by plants or animals.
The thinkers of the Roman period made little further contribution to this line of reasoning, although they seem to have had more practical understanding of individual differences of intellect than is evident in Greek writings.

A different view of human intellectual abilities was taken by Baron(1905) in his work "De l'esprit des lois". He suggested that the physical environment was of great importance in determining the characteristics of people and that these differences were due to bodily differences. Heat, he says expands the ends of the nerve fibers, making people from hot climate sensitive, but lazy and timid and those from cold climate are tough and active.

Galton (1869) believed that intelligence was inherited. He also thought that intelligence was related to some physical characteristic and could thus be precisely measured. Galton and others embarked upon countless laboratory tests, measuring head sizes, brain weights and even the reaction time to flashing lights or a tap on the knee cap. But no physiological test, then devised, could distinguish between the brightest students and a mental defective one.

Galton also believed that intellectual functions can best be measured through tests of reaction time and sensory discrimination.

It became obvious that for measuring mental abilities, a mental test was the right tool. Binet(1905) drew up the first intelligence scale. It included thirty items which relied on an amount of general knowledge, and also measured reasoning and judgment. Scores were given in terms of mental age. The scores on the test related closely to children's success at school.

The nature and structures of human abilities have exercised the minds of psychologists for over a century and of philosophers long before then. One approach is to view abilities as relatively unchanging characteristics of the individual. Spearman(1904) outlined his two-factor
theory of intelligence. A general ability factor called 'g' was considered as fixed; specific ability factors called 's' were open to environmental influence. A general intellectual ability which enabled individuals to perform well on all kinds of problems, was referred by him by the letter 'g'. Thurstone (1938) refined the statistics and testing further and produced a model with seven primary abilities. This was the first attempt to provide a profile of ability. But the "primary abilities" were found to overlap and his tests were no more accurate predictors than any others.

Intelligence tests today accept that although there might be a sort of general intelligence 'g' which affects a person's score on any kind of test, different people have different aptitudes such as reasoning ability, visual-spatial ability, verbal ability and numerical ability. A person who is good at visual-spatial tasks will tend to excel in problems such as solving mazes, completing pictures etc. This is special aptitude, but in addition his general ability will make him reasonably good at other kinds of problem as well.

The work of Burt (1940) in England largely contributed to the notion of a hierarchical structure of abilities. According to him, a single general ability factor is related to a variety of lesser factors, and these in turn subsume more specific ability factors.

Cattell (1965) broadened the scope of traditional intelligence tests. He set problems which did not require the testee to arrive at an answer which the psychologist had already decided was the right one. In addition to the familiar deductive and inductive reasoning tests, Cattell, included questions to which there was no correct answer, but which sought to test the ability to answer in a novel way.
Guilford (1967) put forward a more complicated model of the intellect. The basic features of this model are: the type of content (e.g. words, number); the mental operation performed (e.g. deductive reasoning); and the nature of the end-product of the mental operations (e.g. a conclusion). Guilford has described 120 distinguishable abilities, by combining these types of features in every possible way.

Piaget (1932) rejects the types of theories outlined above, where mental activities can be lined up and ordered into static models or patterns. His view of intellectual activity is based on the biological principle of balance i.e. the child has to keep in balance the demands of the environment and his own ways of the thinking about it. He is an active participant in building his own intelligence, constantly constructing his reality rather than merely detecting information. According to him actual manipulation of one's environment is a necessary precondition to any form of symbolic thinking.

It was in 1950s that Piaget's major work in infancy, "the origin of Intelligence in Children", was translated into English in America. Since then, Piaget's theories of intellectual development have revolutionized psychology in America.

According to Piaget "intelligence is adaptation". He said that human mind and nervous system are tools which man uses to adapt to the world around him. This adaptation involves a delicate balance between two processes which Piaget calls assimilation and accommodation. Assimilation, according to him, occurs when a child relates something new in his environment to his past experiences and existing view of the world. For example, a very young child may point to a "cat" into his concept of "dog" - a furry animal with four legs and a tail. Accommodation occurs when new circumstances in a child's environment force him to revise his view of the world to accommodate these new circumstances. If, for example, a child who believes in Santa Claus watches his parents put the gifts under the Christmas tree, he must accommodate himself to
this new information and revise his concept of the way Christmas presents are delivered. Intelligence, Piaget feels, is this ability to adapt to the environment.

The adaptive tool, the mind, evolves through a series of stages as it matures from infancy to adulthood. Piaget differentiates four major states of intelligence, the sensori-motor stage, the preoperational stage, the concrete operational stage, and the stage of formal operations.

The sensori-motor stage lasts from birth to about the age of eighteen months. During this stage, according to Piaget, a child is unable to think of an object unless he is perceiving it at the same time. In other words, if a baby reaches for a toy and the toy is then covered up, the baby stops reaching for it. As this stage progresses, the child's thinking becomes more complex, and he begins to experiment in new situations. He develops a sense of permanence of objects and will begin to look under the cover for the toy.

The preoperational stage begins when the child learns to use words to represent objects, and lasts until the child is about seven years old. During this stage the child is extremely egocentric and finds it difficult to take another person's point of view. There is also a tendency to treat objects as symbols of other things. For example, a preoperational-stage child might push a bar of soap around the bathtub as if it were a boat, or climb inside a cardboard cartoon as if it were a fort.

A child in the preoperational stage also tends to judge physical characteristics entirely by appearances. He does not understand that liquids and solids can change shape without changing volume. In the concrete operational stage from age seven to eleven, a child understands conservation of quantity and relationships between objects. He begins to understand relational terms such as bigger or smaller, lighter or darker etc. The final stage, the stage of formal operations, runs from about age eleven to about age fifteen and is a prelude to adult reasoning. An adolescent in this stage can think in abstract terms and can consider
hypothesised situations. He is also able to speculate about the future consequences of his own actions and the actions of others. According to Piaget, if a child does not have enough experience in one of the stages his development in the following stages might be handicapped. On the other hand, enriching a child's experience in one of the stages should aid his development in the following stages.

At the Harvard Institute of Cognitive Studies, Bruner (1963) and his associates conducted research that in many ways parallels Piaget's studies.

The first level, which corresponds in some degree to the sensori-motor stage and in some degree to the preoperational stage in Piaget's model, Bruner calls it "affective (emotional) reasoning." At this level an individual tends to repeat an act because the experiences associated with it feel good, or to avoid an act because the experiences associated with it feel bad. Bruner's second level of reasoning is "functional." To some degree this level corresponds to the stage of concrete operations in Piaget's model. For a child in this stage, a chair is to sit in and a stair is to climb. Bruner's final stage of adult level of reasoning, like Piaget's, is "formal", or symbolic stage.

Bruner suggests that a child's awareness can be increased by teaching him appropriate concepts early in life. He asserts that a child can be taught any idea at any age as long as he is taught in his own vocabulary. Bruner, like Piaget, sees early enrichment as the key to greater adult awareness.

At the Harvard Institute of Cognitive Studies, Kagan (1968) has made some interesting observations about the relationship between perception and the quality of the environment. According to him if stimuli stand out sharply from a calm background, as in any middle-class homes, perception of the stimuli is more likely. If, however, stimuli are immersed in competing and disagreeable noisy stimuli which is
frequently the case in many slum houses, perception (and development) may be "turned off".

Freeman (1962) defined intelligence in three ways as follows:-

- Intelligence is the adaptation or adjustment of the individual to his total environment.
- Intelligence is the ability to learn.
- Intelligence is the ability to learn on abstract thinking.

According to Kuhn (1963) human understanding proceeds by stages much like Piaget's, in which a great deal of experience at any one level is required to develop the "code" for operating at the next level. Kuhn believes that one react to a situation not on the basis of current information alone, but on the basis of the interaction between current information and prior information stored in the brain. Current sensory signals act as cues, triggering related ideas in the brain.

A distinction is also made by Hebb (1969) between intelligence 'A' and intelligence 'B'. According to him intelligence 'A' is innate potential or unborn capacity for development. Intelligence 'B' is the functioning and the ongoing development of the brain, the average level of performance or comprehension which the child or adult shows. Hebb suggests that intelligence 'B' is more accessible to measurement than intelligence 'A'.

Jensen (1969), Eysenck (1967) and others have sought for new physiological tests which correlated with mental test scores. Two major methods of measuring IQ biologically have been identified. The first and most important kind of analysis concerns with physical activity in the human brain which is associated with intelligence. The 'brain waves' which scientists can detect follow a fairly common pattern when an individual reacts to a sudden stimulus such as a loud noise or a flash of light. The evoked potential in the brain cells at first jumps rapidly, then tapers off over the course of a
second or less. But the jump and tapering are not steady, and are made up of a series of jerky movements. Ertl (1968) showed that the speed of these jerky movements was related to intelligence. Individuals who score high on intelligence test showed faster waves than duller people. Whereas the brain waves of very intelligent people are quick to respond to the stimulus and are rapid, those of the very dull people are smoother and slower.

Eysenck (1971) found that IQ was related to the electrical activity in the brain. In fact, these psychologists found that the amplitude, that is to say the height or depth of the waves, as well as the frequency or rapidity of the waves, did correlate with IQ. The correlation is weak at 0.6, but it is definitely positive. The Fig 1.1 gives an approximate illustration of the relationship between brain waves and the IQ.

Fig 1.1
ILLUSTRATION OF THE RELATIONSHIP BETWEEN BRAIN WAVES AND IQ
Another way of measuring intelligence biologically makes use of the electrical conductivity of a person's skin. A statistically significant correlation was found between skin conductivity and intelligence as measured on mental tests. This strongly suggests once again that intelligence does have a biological element.

1.3.2. Theory of achievement motivation was developed by McClelland (1953) at the Harvard University, and Atkinson at the university of Michigan. Some psychologists consider that all human behaviour is intended to reduce tension and reach a state of psychological and physiological equilibrium (balance). But McClelland (1952) concluded that motives, rather than being essentially tension states, are also drives towards action based on expectation. There is a great need to create a 'need' in a child to learn. He has to be motivated for learning. "Achievement motivation is the desire to do better, to achieve unique accomplishment, to compete with standard of excellence and to involve one self with long term achievement goals?" McClelland (1953)."

The achievement motive develops out of the expectations based on various experiences that individual had with the common problems of life, from learning to walk to learning a profession. The achievement motivation can be identified on the basis of individuals expectation of success, provided he is personally involved.

"Achievement motivation (n-Ach) is the desire to excel some standard of behaviour; it is an effect in connection with evaluated performance, in which competition with standard of excellence is paramount," McClelland (1965). In 'Achieving society', he says that, "in any given community, the future of it depends upon the present level of achievement motivation of the pupils," McClelland (1961). McClelland found that 83% of entrepreneurs were high in achievement motivation and the growth rate of their companies, which were led by these entrepreneurs with high achievement motivation, was almost 200% higher.
Achievement motivation is a construct designed to explain inter and intra individual differences in the orientation, intensity and consistency of achievement behaviour in terms of content. It may be characterised as the tendency to maintain and increase individual proficiency in all areas in which the standard of quality is taken as binding." (Heckhausen, 1967).

Achievement motivation is an important social drive. McClelland (1964) defines it as, "Performance in terms of standard of excellence or simply a drive to success.

"Motivation" is an all encompassing term including such concepts as need, drive, purpose, goal, ideals and so on. The term "Motive" to be more specific, refers to some condition or state of affairs within the child which gives rise to activity directed towards goal", Gary (1965). Motivation can be considered synonym to aspiration. These two are positively correlated. Achievement is synonymous with accomplishment, proficiency in performance, social acknowledgement of one's skill, one's proficiency in a given area of learning, depth of one's knowledge. These are the indicators or the extent of one's achievement.

Achievement motivation is defined by Murray (1964), as "a social motive to master, manipulate or organise physical objects, human beings or ideas."

Lynn (1969) developed a questionnaire of achievement motivation which has been found correlated with the projective measure of achievement motivation.

Aronson (1956) developed Graphic Expression Test to measure achievement motivation in young children who could not write the connected stories of TAT type because of the language difficulty.

French (1935), defined achievement need as "need for the attainment of a standard of excellence."

According to Atkinson and Reitman (1956), "A motive is a latent disposition to strive for a particular goal- state or aim, e.g. achievement, affiliation, power." The
strength of a particular motive is assessed by thematic apperception test under neutral condition. According to them, the term motivation can then be used to designate the aroused state of the person that exists when a motive has been engaged by the appropriate expectancy, i.e. an expectancy that performance of some act is instrumental to attainment of the goal of that motive. If more than one of an individual's motives are engaged by expectancies, the total motivation for performance of that act will be the sum of the contributions made by the particular motives which have been engaged. An overdetermined act on i.e., one which will serve to satisfy more than one motive, is likely to be relatively strong.

A positive relationship between a particular motive (e.g., n-ach) and performance can be maximized by engaging that motive and no others in performance and can be minimized either (a) by failing to engage that motive at all or (b) by systematically engaging other motives in performance as well. In the latter case, the person who is weak in the motive the experimenter may have measured may be strong in other unmeasured (ulterior) motives that are engaged in performance of the same act.

According to Atkinson (1958) the various related terms defined by him are given below:

- The term, incentive, has been used to refer to some potential reward or goal that can be manipulated by the experimenter, viz. the amount of food, the amount of money, the difficulty of the task as an index of achievement-incentive, etc.

- The term, motive, has been used to refer to the disposition within the person to strive to approach a certain class of positive incentives (goals) or to avoid a certain class of negative incentives (threats).

- The term "expectancy" has been used to refer to a particular kind of cognitive association aroused in the person by situational cues. In
the expectancy learning theory, an expectancy is designated S-R-S. The initial S refers to the situational cue which arouses a chain of associations involving an act, the R, and the consequence of the act, the final S.

- Given an objectively-defined incentive for a group of subjects, e.g. a glass of water, the subjective value or utility of that incentive for a particular individual depends upon the strength of his motive, e.g., thirst. The utility of a positive incentive is a positive function of the strength of the motive to approach. The disutility of a negative incentive is a positive function of the strength of the motive to avoid.

- The arousal of motivation to approach, i.e., to perform the act, is equivalent to the expected positive utility of the consequences.

- The arousal of motivation to avoid, i.e., not to perform the act, is equivalent to the expected negative utility of the consequences.

- The resultant motivation, which is expressed directly in performance, is a summation of motivation to avoid, and the motivation to approach. In decision theory this summation is referred to as the over all expected utility of the consequences.

French (1955) and others have shown that motivation scores vary with conditions under which the test is given. The kind of instructions preceding the test, are known to affect the test scores. These instructions are basically of three kinds. Achievement-oriented instructions which produce cues aimed at increasing the score; relaxed instructions which tend to de-emphasize the arousal of the motive; and neutral instructions that are aimed at obtaining a measure of the normal level of
motivation a subject brings to a situation. Instructions used in this study were of the neutral type. The impact the school situation had upon the scores is unknown, but it is believed that in effect this factor was controlled since all subjects were tested in the same situation. A neutral condition is one in which no experimental attempt is made either to arouse the motive or to create an especially relaxed state prior to administering the test.

According to Atkinson (1957) the principle of motivation states that, "the strength of motivation to perform some act is assumed to be a multiplicative function of the strength of the motive, the expectancy that the act will have as a consequence/the attainment of an incentive and the value of the incentive: Motivation = f (Motive x Expectancy x Incentive)."

According to Murray (1938), "A motive, or need, is a disposition to strive for a particular kind of goal-state or aim, e.g. achievement, affiliation, power." The aim of a particular motive is a particular kind of effect to be brought about through some kind of action. The aim of a motive defines the kind of satisfaction that is sought, e.g. pride in accomplishment, a positive affective relationship with another person, a sense of being in control of the means of influencing the behaviour of other persons. The attainment of a goal-state is accompanied by feelings of satisfaction, and non-attainment of a desired goal-state is accompanied by feelings of dissatisfaction.

The term motive (or need) has been used to refer to dispositions to strive for rather general goal-states, kinds of satisfaction, or effect. These dispositions have their origin in childhood experience and are relatively stable and enduring after childhood. They are carried about from situation to situation by the adult and constitute the core of what is called personality. This discussion has suggested that these dispositions be thought of as latent, with respect to overt adaptive behaviour, until the cues of a situation arouse the appropriate expectancy of goal-attainment through performance of some act. The cognitive expectancies cued-off in particular situations are also acquired. But it is assumed
that specific expectancies of attaining this or that goal through performance of this or that act in a particular situation are normally acquired later than motives. The expectancies can be acquired through verbal training, as well as through actual experience, and that the more situationally-defined expectancies are more amenable to change than the more general motive dispositions.

Atkinson (1958) has made a distinction in terminology. He contends that "whereas the term motive refers to the more general and relatively stable disposition, the term motivation refers to a person's temporarily aroused state, produced when the cues of a situation elicit an expectancy of goal-attainment which engages the motive."

The distinction intended between motive as disposition and motivation as aroused state is presented schematically in figure 1.2 below by Atkinson.

**Fig 1.2**

THE INTERACTION OF THE MOTIVES OF AN INDIVIDUAL WITH THE SITUATION IN THE DETERMINATION OF THE MOMENTARY STRENGTH OF MOTIVATION TO PERFORM SOME ACT (AFTER ATKINSON, 1958)
In recent years, Pareek (1974) has presented a three-level model of work-motivation which can be considered as a further extension and a special case of Pareek's (1966) general theory. In this model of work motivation, Pareek (1974) takes into consideration the importance of social interaction and the value of the group to which the individual belongs. This model can be called middle range theories.

As another illustration of a middle range theory, mention may be made of the conceptual scheme of achievement behaviour proposed by Mukherjee (1974). This is essentially a causal model in which the effects of three intervening variables, namely, achievement motive, belief about locus of control and achievement values, on achievement behaviour are specified in relation to parent child interaction and achievement cue in the environment, as shown in Fig. 1.3.

![Diagram illustrating the causal pattern involved in the occurrence of achievement behaviour](image)

**Fig. 1.3**

DIAGRAM ILLUSTRATING THE CAUSAL PATTERN INVOLVED IN THE OCCURRENCE OF ACHIEVEMENT BEHAVIOUR (AFTER MUKHERJEE, 1974).

The above model proposed by Mukherjee (1974) attempted to clarify the difference between the two constructs of
achievement value and achievement motivation. While achievement value is conceptualised as a habitual mode of expressing one's concern over competition with a standard of excellence by attaching importance to hard work, innovation etc, the concept of achievement motive generally refers to an acquired disposition to strive for the satisfaction derived from success in competition with some standard of excellence. Achievement motivation is defined as "a temporary state of arousal produced by those cues of the environment which elicit the expectancy of satisfying the individual's achievement motive," (Nukherjee, 1974).

The model as depicted in Fig. 1.3 is based on the postulate that socio-cultural condition and the personality of the parents will determine the quality and quantity of parent child interaction. This interaction serves as a major component of socialisation and will influence the degree to which the child will attach importance to achievement value and this in turn will determine his achievement behaviour. "The important point of this model is that achievement behaviours are not necessarily produced by a single cause or factor or even by a cluster of factors all of which are on the same level of analysis, but are likely to appear whenever learning of achievement orientation is complete during the process of socialisation along with the learning of achievement goals," (Nukherjee, 1974).

The model also implies that although achievement motive creates a readiness for competing with a standard of excellence, suitable achievement cues, stimuli associated with the present or previous achievement need arousing antecedent conditions, are essential for the arousal of achievement motivation which in turn influences achievement behaviours. In the case of achievement value, such stimulation from the external environment is not a necessary condition. "Thus while the probability of an achievement motivated person's attaining a high standard of excellence, can be substantially lowered, at least theoretically, by removing external stimuli capable of evoking need for achievement, achievement values may lead to achievement behaviour more or less independently of achievement cues," (Nukherjee, 1974).
The conceptual scheme as illustrated in fig. 1.3 also implies that in general, achievement value (V-Ach) will not be related to achievement motive, as has been found empirically (Mukherjee, 1972; Pandharipande, 1972), because of the intervening role of the individual's belief about the locus of reinforcement and also because of the environmental (structural) factors determining the presence of the achievement cues. The individual with high value achievement may express his strong belief about hard work, about the importance of having a long record of personal accomplishment and still may not have a very strong achievement motivation as such. This type of conceptualisation passes the controversial role of arousal condition as an intervening variable in the study on the relationship between value achievement and performance, since irrespective of arousal conditions, satisfactory prediction can be made regarding the level of performance in a challenging task from the knowledge of one's strength of achievement value when relevant ability factors are controlled.

A conceptual model of achievement motivation has been advanced by Mehta (1972) in order to understand how achievement motive may develop out of growing expectations on the part of high school students belonging to disadvantaged sections of the society. The diagram shown below in fig. 1.4 shows the various possible building blocks of the model.

![Diagram](image)

**Fig 1.4.**
A Conceptual Model of Achievement Motivation
(After Mehta, 1972)
For this model shown in Fig. 1.4, Mehta proposed a broader conceptual definition of achievement motivation in terms of a kind of "dissatisfaction with the present state of affairs and an urge to improve the life conditions of oneself," (Mehta, 1970). By taking this as a working definition the greater achievement motivation scores shown by children of the disadvantaged sections of the society as compared to those who come from well-to-do families, e.g., tribal pupils as compared to non-tribal pupils of Assam (Gokulanathan and Mehta, 1972), the Munda and Oraon tribal high school students as compared to Delhi high school boys (Mehta, 1969), could be possibly interpreted as an expression of rising expectations in life on the part of the former group. The growing expectations, if supplemented by social conditions which foster new values and attitudes, is likely to give rise in the adolescent an urge to improve.

Mehta (1974) has also proposed a conceptual scheme for motivating students and teachers through the classroom motivation development curriculum. As shown in Fig. 1.5 below:

![Diagram](attachment:image.png)

**Fig. 1.5.**

A CONCEPTUAL SCHEME OF ENHANCING CLASSROOM MOTIVATION (AFTER MEHTA, 1974).

The model clearly suggests that the new pattern of interaction between the teacher and the taught tends to satisfy two psychological needs of both. "They come closer to each
other in a friendly relationship. This gratifies their need for affiliation. The social need give a new structure to the class room group. It becomes more cohesive (Mehta, 1974).

The class-room climate resulting from such cohesiveness promotes positive self image on the part of both the teacher and his pupils. "The improvement of the self image would enable the teacher to try for better standards. The change in his image would lead him to expect more from his pupils, pay more attention to them, give them more help, which in turn would help the pupils to do better. Similarly, the strengthening of the pupil's achievement motivation and self image would lead him to try for better performance. The interaction of these two i.e. the teacher's desire to do better and his enhanced expectation of his pupils on one hand and the pupils desire to do better and their self expectation is likely to improve school performance", (Mehta, 1974).

1.3.3.
SOCIO-ECONOMIC
STATUS:
ITS CONCEPT

According to Stephen(1956), "Socio-economic status consists of a cluster of factors which includes occupation, income and cultural features of home." Davis(1968) regards status as, "an identity within a situation."

Siersted(1957) defines status as, "a position in a society or a group." Hollingshead(1953) developed a scheme to determine the social status of a person. His index of social position utilizes three factors; namely (i) occupation, (ii) education and (iii) ecological area of residence. Each factor is scaled and assigned a weight determined by a standard regression equation.

The increasing importance, these days, of the knowledge of the social back ground of the individual shows the need for measuring socio-economic-status of an individual. Several attempts have been made to estimate the socio-economic status of the people. According to Kuppuswami(1962), the attempts are based on three assumptions:
Most of the indices have been developed in the United States of America for application primarily to the contemporary urban industrial class structure of that country where a good deal of research regarding stratification has been made in the past.

Many variables have been identified in relation to social prestige. We know that in this country social prestige is attached to the amount of the income as well as the source of income. In an office or a factory a man earning twenty-five rupees or fifty rupees more than another feels that his prestige is higher. The source of income is also a very important factor. The man who gets an income from the property he has inherited feels that he has higher prestige than a person who has acquired his own property. A third source of prestige is on the basis of whether a person is paid daily "wage", weekly "wage" or monthly "salary". The difference between the two words "wage" and "salary" is indicative of this.

Similarly prestige is associated with occupation. The cooly, the ditch digger and the barber have very low status. Even the plumber and carpenter who are skilled workmen are having a low social prestige. On the other hand the physician, the engineer, the lawyer have high social prestige.

The lower the education one has, the lower the prestige. The person who finished his technical education as a carpenter or electrician does not command as much prestige as a person who has had the qualification of M.A. or the B.E.

In every society, titles, membership of some voluntary organisations, type of house in which a person lives, the area in which the house is situated, the ownership of electric fans, radio etc, all add to the social prestige.
There have been several attempts to develop scales to measure prestige. Long ago Tonnies (1928) tried to build up a scale on the basis of income. Others used standard of living. Occupation was also used as a basis. Cattell (1942) found that social prestige had .97 correlation with income, .87 with years of education and .85 with birth restriction. He also divided the various occupations into ten groups and assigned them the following five classes: Upper (7%), Upper Middle (25%), Middle (36%), Lower Middle (25%) and Lower (7%). Cantril (1943) found the following distribution on the basis of social class identification: Upper 4.3%, Upper Middle 10.5%, Middle 65%, Lower Middle 11.4% and lower 7.1%. Sims (1952) first used 23 items like education of parents, occupation of parents, possession of telephone, books, etc. He later modified and gave a list of 42 occupations and the subject was asked to respond to each occupation. Warner and his associates (1949) used four variables of occupation, source of income, type of housing and neighbourhood. Hollingshead (1958) used three indications, viz., residential address, occupation, and education.

According to Kuppuswami (1962) the three important variables that contribute to the socio-economic-status in urban area are education, occupation and income. He selected these variables for his scale which was used in the present study.

1.4. THE PROBLEM
ITS JUSTIFICATION

The present problem under study is “Study of academic achievement of students in Mathematics in relation to their intelligence, Achievement Motivation and Socio-economic-status.”

A careful examination of the related studies mentioned in chapter two of this investigation revealed some important shortcomings which are:

- Majority of these studies have been conducted long ago, the results of which may not be of much use now; only a few studies have been conducted in the late seventies. Also most of the studies have used school marks as a criterion for academic achievement. This is not completely
dependable since school marks are usually obtained on the basis of teacher made tests which lack generalisability. Further such tests are rather subjective, which yield varying scores when examined by different examiners. In the present study, therefore, it was decided to use a test for measuring the achievement in Mathematics, which was constructed and standardized by the investigator himself which consisted of objective type items and had a high reliability coefficient of 0.97, in order to eliminate the short comings of teacher made tests.

Almost in all the studies, (Chapt. Two) undertaken in the past by the researchers, the samples were taken from High School or higher level of students in order to find out the relationship between the academic achievement on one hand and the other variables of intelligence, achievement motivation and socio-economic-status on the other. Very few studies have been taken up at the level of primary education, which is an important segment of our educational endeavour. This segment has so far not been given its due attention. Also there is a dearth of studies in Mathematics.

The studies in the past have shown contradictory results. Even the positive relationship between these variables has been found in varying degrees from a very low positive to a very high and significant relationship.

In this context, an attempt was made in the present study to find out the impact of intelligence, achievement motivation and socio-economic-status of the students of class V, on their academic achievement in Mathematics.
The main objectives of the study were:
1. To develop a test in Mathematics, for class V, and standardize it.
2. To study the impact of intelligence at various levels on the achievement of students in Mathematics.
3. To analyze the effect of different levels of achievement motivation on the achievement of students in Mathematics.
4. To find out the effect of socio-economic-status at different levels on the achievement of students in Mathematics.
5. To study the interaction effects of the variables of intelligence, achievement motivation and socio-economic-status on the achievement of students in Mathematics.

In order to study the achievement of students of class V in Mathematics in relation to their intelligence, (n-ACH) achievement motivation and socio-economic-status the following hypotheses were formulated:
1. The achievement of students in Mathematics varies directly with intelligence. The higher the intelligence the better the achievement.
2. There is a significant difference in the achievement of the students in Mathematics at different levels of achievement motivation.
3. Pupils of different socio-economic-status differ significantly from each other in their achievement in Mathematics. Children from high
1.7 DELIMITATIONS OF THE STUDY

The scope of the present study has been delimited in respect of the sample used, the variables, the tools employed to measure the variables, the content selected, the statistical techniques used for analysis. The detail of the sample used is given below:

- The area of the study was restricted to the following Vidyalayas—Kendriya Vidyalayas at Kalwara, Barmala, Chandigarh, Chandisandir, Mint Pinjore, Jalandhar, Siala, Subathu, Suresh and two other Vidyalayas at Ludhiana viz. Kundan Vidy Mandir and Guru Nanak Public school.

- The sample was selected from the students of class V of age group 9 to 10 years of the above Vidyalayas.

- The study was restricted to 1000 students, in the first stage, to develop and standardize a test of achievement in Mathematics. The sample was restricted to 270 students for final analysis for all the 27 groups.
Survey of related literature is important before starting any research work. This has been taken up in the next chapter. This chapter contains the description of the various related studies of past researchers regarding the studies which showed relationship between academic achievement and intelligence, academic achievement and achievement motivation and academic achievement and socio-economic status.