CHAPTER ONE

INTRODUCTION
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1.1. The Present Study

The present study entitled, "An exploratory study of creativity and its relationship with intelligence and achievement in school subjects at higher secondary stage", was intended to explore the possibilities of describing creativity in the context of variables involved in the study, namely, intelligence—nonverbal and verbal, achievement; and other subsidiary variables, such as, sex, residence and age as reflected by grade levels at the higher secondary stage. The empirical evidence determining the theoretical construct of creativity is yet going through the process of exploration. In India, the research on the subject so far attempted is only at its very rudimentary level and therefore, this field needs a thorough investigation to enable us to make the best use of creative talent which is of crucial importance for a developing country.

It was thought desirable first to review the available research evidence on creativity in order to arrive at the conceptual framework which is necessary for formulating the workable hypotheses for being tested in this investigation. The following paragraphs are devoted to the reviewing of the relevant research literature in the field.
1.2. Neglect of Creative Talent

In the absence of adequate and accurate knowledge of creativity, the goals of education in terms of increased capabilities, personal expression, greater inventiveness and blossoming of gifted leaders cannot be fully realized. Flescher (1963) believes that the cultivation of creative potentialities has, heretofore, been largely neglected by educators. Getzels and Jackson (1962) in their monumental study revealed that even in the present times there is a tendency among teachers to prefer high IQ students against the high creative students. Similar observations were earlier made by Torrance (1969) in a study of peer groups in which highly intelligent students were found to be significantly better on the best friends criterion than the highly creative students.

It was observed in the Report of Education Commission (1964-66, p.91) that the quantitative expansion in secondary education has mercilessly dwarfed the quality of education and that the schools have failed to enroll a large proportion of talented students who could not study further on account of social or economic handicaps. India has problems typical of a developing country, and the poverty and illiteracy of parents in a great majority of Indian homes have been a source of providing the deprivatory environment in which the native talent of children does not find an outlet and proper manifestation. Besides, a great
deal of talent never enters Indian schools and many of them who take up schooling are not identified because of an indifferent attitude of the members of community as also of the members of educational institutions towards pupils.

Convinced of the utility of talent for bringing about rapid industrialisation in the country, the Ministry of Education, Government of India, has recently started a scheme 'Search for Science Talent' by conducting examinations or through intelligence tests. It appears that persons at the helm of affairs have not shown an awareness of the fact that creativity is not reflected merely by high IQ. In this direction, Getzels and Jackson (1962) demonstrated that 70 percent of the creative students are missed if only top 20 percent students are selected on the basis of IQ. On the other hand, they pointed out that the mean achievement scores of high IQ students and high creative students are statistically comparable and thus, achievement as the criterion for selection of creative talent also becomes inoperative. Although the efforts of Ministry of Education, Government of India, towards search for science talent are praiseworthy and commendable, the mode of selection needs careful modifications and use of valid tools in order to identify and develop the creative talent with a view to compete in the world. By commissioning the qualitative manpower, Taylor (1964) remarked, that the Americans, Russians,
Germans, etc. could lead the world on different fronts with a limited manpower as against India and Pakistan having natural resources and enormous manpower. It can be correctly explained by Conant's (1969) remarks that second-rate men often do more harm than good on a first-rate problem and that the ten second-rate men are no substitute for one first-rate man in science. Torrance (1962), Torrance and his staff (1964), and Barron (1969) have expressed almost identical views regarding the neglect of creative talent among children by teachers, psychologists, counsellors and even parents who look upon creative thinking in schools as threatening and dangerous. Rather, it should have been taken as a powerful force for lifting man to higher levels of intellectual functioning, human dignity and achievement.

From a still different point of view regarding neglect of research in creativity, Huskinson (1931) observed that the scientific journals had hardly any mention of creative thinking up to 1931; and according to Taylor (1964) only a trickle of research articles on creativity had appeared in them in the six or seven decades before 1960. Although creativity has been a topic of interest throughout man's history, remarked Taylor (1964), until very recently the scientific method has not been employed to study it to any great extent. Guilford in Fredriksen and Gulliksen (1964) opined, that a rough picture of increasing interest in creativity could be obtained by comparing the rate of
publications on the subject during the past decade with the rate of publication during earlier decades. Stein and Heinze (1960) summarized the research investigations on creativity on the basis of which it can be inferred that the curve of frequencies since 1870's showed an exponential growth with no sign of negative acceleration. The trend manifests that there is a growing realization among the modern researchers to conduct studies in the realm of creativity.

If inertia in educational institutions has to be disrupted, the unfavourable attitudes of teachers, psychologists, counsellors and parents have to be changed and greater emphasis will have to be laid upon the understanding of creativity. It would, therefore, be worthwhile to analyse the problems of creativity scientifically and unfold its hidden strength by conducting systematic research investigations with a view to make the 'opening sentence' of the Report of Education Commission (1964-66), "The destiny of India is now being shaped in her classrooms", a reality.

1.3. What Is Creativity?

Perhaps in the absence of any agreement about the definition of creativity, it is not feasible to expect similarity in research designs of various researchers as also in their conclusions. Vinscke (1952), Ghiselin (1963)
and Zimmerman (1964) expressed more or less similar views pertaining to the difficulty in arriving at a universally accepted definition of creativity and felt that different meanings to the term creativity could be assigned by different workers in the field. Wolf conducted a survey involving 212 teachers in sixty-five elementary schools, a mention of which was made by Torrance (1964). The survey was related to the analysis of responses to a question, "what does the concept of creativity mean to you?" It was found out that (a) 50 percent of the teachers reported creativity as a personality characteristic, (b) 25 percent of them related the concept to product, and (c) 20 percent identified the concept with the process. As against Wolf's formulation of three elements of creativity in terms of ideas, work habits and opportunity, Rhodes (in Torrance 1964) envisaged creativity through the approaches of 'person', 'process', 'press' and 'products'. He defined creativity as, '... a noun naming the phenomenon in which a person communicates a new concept - which is the product. He felt that the mental process was implicit in the definition and it would be impossible to conceive of a person living or operating in a vacuum, so the term 'press' is also implicit in it. Hebb (1949) expressed creative thinking as a function of relative strength of conscious and unconscious processes, while Vinsacke (1952) identified the same with an integrated harmony between external world of reality and individual's
internalized needs. DeHaan and Havighurst (1961) reported the efforts of Wilson who tried to bring to foens the diversity in the meaning of creativity process as below:

1. The outflow of individual or group through which a product is structured.
2. An action of the mind that produces a new idea or insight.
3. The mental process of manipulating the environment which results in the production of new ideas, patterns or relationships.
4. The capacity to produce through thought or imagination, the capacity for original work.
5. The emergence in action of a novel rational product, growing out of the uniqueness of the individual on the one hand and the materials, events, people or circumstances of his life on the other.
6. The mental process that involves the rearrangement of past experience with possibly some distortion, into new patterns to better satisfy some expressed or implied need.
7. The process which results in a novel work that is accepted as tenable or useful or satisfying by a group at some point in time.
8. The creative process is any process by which something new is produced - an idea or an object.
including a new form or arrangement of old elements. The new creation must contribute to the solution of some problem.

Good and Markel (1959) described creativity as a quality thought to be composed of broad continuum upon which all members of the population may be placed in different degrees. He tentatively described the factors of creativity as associational and ideational fluency, originality, adaptive and spontaneous flexibility, and ability to make logical evaluation. Guilford (1966 b) in his model of 'structure of intellect' observed that creativity involved the interplay of all factors of divergent thinking on the one hand and the factors of seeing problems and evaluation on the other. DeHaan and Havighurst (1961) on the basis of Guilford's factorial studies observed that creativity included seven factors, namely, (a) sensitivity to problems, (b) associational fluency, (c) ideational fluency, (d) spontaneous flexibility, (e) adaptive flexibility, (f) originality, and (g) redefinition. Piers et al. (1960) remarked that creativity could be taken as the capacity of the individual to avoid usual, routine and conventional ways of thinking and of doing things, and to produce a quantity of ideas and/or original, novel and useful products. They further observed that creative thinking is purposeful and goal directed, involves the formation of new patterns or combination of information derived from
past experiences, and transplanting of old relationship to new situations or the generation of new relationship.

Lehois (1963) submitted, "Creativity may be viewed as a complex human attribute that is manifested as a cognitive empirical process from which an original product emerges (the process unfolds within all individuals but most intensively within those who possess a creative personality)." Gordon (1961) and Koestler (1964) unlike Lehois (1963) have taken creativity as a unitary trait. Chiselin (1963) reported the existence of verbal factor of creativity and speculated that an analogous nonverbal factor of creativity might also exist. Sultan (1968), Anderson (1964) and Taylor (1964) thought of the possibilities of different factors being involved in the concept of creativity.

As conclude, creativity involves an action of the mind directed to manipulate the environment with a view to produce new ideas, patterns or relationships. It is the capacity for original work involving the restructuring of past experiences intended towards new useful creations. In the light of diversity of views, it is clear that the recent trend is to accept creativity as a multidimensional ability which is a complex universal human attribute manifested by the cognitive empirical process and is differentially distributed among different people. Influenced by the definitions of Good and Markel (1958), Guilford (1956 b) and Torrance et al. (1964); the operational
definition of creativity was formulated by the investigator for the purpose of the present investigation as below:
Creativity is a multidimensional (verbal and nonverbal) attribute differentially distributed among people and includes chiefly the factors of seeing problems, fluency, flexibility, originality, inquisitiveness and persistency. It may be pointed out at this stage that creative thinking is accepted to be marked by the action of mind purposefully directed to manipulate the environment with a view to create new ideas and establish novel patterns and relationships.

1.3.1. Levels and Types of Creativity

Creativity operates at different levels in different persons. Marksberry (1963) commented, "It is believed that there are continuous gradations of creativity extending from the spontaneous drawings of children to high level types illustrated in the production of such creations as space satellite". Ghiselin (1963) has distinguished between two levels of creativity (a) creative action of higher sort which alters "the universe of meaning itself by introducing into it some new elements of meaning or some new order of significance", and (b) creative action of lower sort which gives, "... further development to an established body of meaning through initiating some advance in its use". Lehois (1963) differentiated between macrocosmic and microcosmic creativity. According to him, in the former, man is simply growing and developing as a human being while in the latter
he is engaged in a particular act of creation, such as, painting. He further classified creativity in terms of three levels of intensity, namely, (a) spontaneous - expressive level which is the initial level of creativity, (b) technical - inventive level of intermediate level; and (c) integrative - emergenative level which results into highly original products (widely applicable and useful). Still more levels of creativity have been suggested by Taylor in Torrance et al. (1964). He mentioned the following levels: (a) expressive creativity, (b) productive creativity, (c) inventive creativity, (d) innovative creativity, and (e) emergenative creativity. Taylor remarked that many people have this fifth category, that is, 'emergenative level' of creativity in mind when they talk about it.

Besides the levels of creativity, many other factors, such as, content media, environmental factors, and personality, seem to influence the creative product. DeHaan and Havighurst (1961) described three fields of creative activity, namely, (a) affective creativity in which emotions, senses and feelings of the persons act as media, (b) functional or problem-solving creativity which involves situations concerning the solution of mechanical and social problems, and (c) abstract creativity related to concepts, definitions, abstractions and generalizations. Guilford (1956 b) opined that divergent thinking could be classified as figural,
symbolic, semantic and behavioural depending upon the type of contents involved. Based upon the criterion of products, he further classified divergent thinking into six types, namely, (a) units, (b) classes, (c) relations, (d) systems, (e) transformations and (f) implications.

The creative process thus, seems to acquire both vertical and horizontal dimensions. The former has relevance with the levels of creativity while the latter refers to the types of creativity.

1.3.2. Stages of Creativity

Like the thinking process, creative process too may be explained in terms of different stages. Helmholtz and Poincare (Quoted by Vinacke 1962) pointed out that creative thinking process can be divided into four well defined distinct steps, to which, Wallas (1926) used the popular terminology of (a) preparation stage, (b) incubation stage, (c) illumination stage, and (d) verification stage. Patrick (1935, 1937 and 1938) made efforts to verify empirically the justification of these stages under experimental conditions. Rossman (1931) presented a scheme of creative thinking process which very nearly corresponded to Dewey's (1933) five steps of reflective thinking process. Wartheimer (1945) was sceptical about accepting the sequences of well defined, universal, clearly recognizable, successive and distinct phases of creative thinking. He conceived of
creativity in more holistic terms - a total pattern of behaviour, in which various processes overlap and interweave between the occurrence of original stimulus and the formation of final product. This approach describes creative thinking in terms of dynamic and interplaying activities with a chain of inspiration and incubations rather than sharply defined discrete stages.

1.4. Measurement of Creativity

The measurement of creativity poses complex problems for the concerned researcher. According to Guilford (1960), the difficulties are mainly related to (a) establishing the practical criterion, (b) frequent fluctuations in creative performance, (c) types of items and their contents, and (d) complexity and subjectivity involved in the scoring problems. Getzels and Jackson (1962) and Cropley (1966) also pointed out the difficulty in scoring. Starkweather (1964) made a mention of other difficulties, such as, (a) securing the creative subjects, (b) obtaining the cooperation of especially the younger children, and (c) evaluating young children's responses.

Insipite of various complications involved in the measurement of creativity, efforts have been made to measure it by employing different types of media and methods of investigation depending upon specific situations. Taylor and Holland (1962) submitted the classification of prevalent
measures: firstly, traditional measures, such as, school grades, accumulation of knowledge and intelligence tests, and secondly multivariable approach covering the cognitive factors recognized through the factor analytical studies of Thurstone (1952), Guilford et al. (1951, 1952) and Wilson et al. The second category also involves non-intellectual measures, such as, motivational, biographical, sociometric and other personality characteristics. The third measure is single test approach followed by Stein (1956), Springbett, Dirl and Clarke (1957), Owens, Schumacker and Clark (1957), Taylor (1958), Roe (1958, 1959), Mullins (1959), Cattell (1959), Ellison (1960), Taylor, Smith, Ghiselin and Ellison (1961), Holland and Austin (1961), and Smith, Albright, Glennon and Owens (1961).

A variety of tools such as checklist, the word association test, interest and temperament inventories, personality inventories, self-ratings, supervisors' ratings, peer-nominations or rankings, and problem-solving test have largely been used to measure creativity. The creative behaviour has also been predicted and assessed by taking into account the factors of home and school environment. The assessment of creativity by employing different tools and techniques in any combination poses a danger of over-generalization. Thorndike (1963) remarked, "The present tests are offered to the public only as research tools and this is certainly as it should be". He further maintained
that different subtests showed quite low intercorrelations and thus the researchers would be wrong to pool the subtests in a common total with a common name either in the treatment of results or in thinking about the field.

In the light of the research evidence and the discussion submitted in the preceding paragraphs regarding meaning of creativity, levels and types of creativity, stages of creativity, and the measurement of creativity, it is obvious that the research on the subject demands considerable attention and needs further explorations and explanations so as to furnish a much more stable theoretical model and to develop workable tools to measure creativity. The present investigation, being of exploratory nature makes it obligatory for the investigator to review related researches and arrive at certain hypotheses with regard to creativity and intelligence, creativity and achievement, creativity and sex, creativity and residential background, and creativity and age, as these are the variables involved in this study.

1.5. Creativity and Intelligence

Are creativity and intelligence two separate constructs? In the presence of conflicting research evidence, the answer to this question does not seem to be categorically distinct. Guilford (1960), Getzels and Jackson (1962), and McNemar (1964), raised doubts about the possibility of expecting a high
correlation between creativity and intelligence. The doubts were confirmed by the findings of the studies by Getzels and Jackson (1962) in which positive but low correlations ranging from .332 to .373 were reported between the measures of creativity and intelligence.

As far back as 1898, Dearborn found low correlations between the measures of productive imagination and intelligence. Colvin and Meyer (1906) and Chessel (1916) observed discrepancies in logical power and original responses on the one hand and intelligence on the other. Simpson (1922) recommended measures to supplement the information of creativity with general intelligence in order to have more comprehensive evaluation of an individual's worth. Andrews (1930) reported the correlations of .15, .02, and .03 between intelligence scores and three imagination test scores earned by the preschool children. Welch (1946) found a correlation of .27 between originality and the Wonderlic intelligence test. Likewise, Meer and Stein (1955), Andrews (1962), Phatak (1962), Ripple and May (1962), Torrance (1962), Allenhaus (1964), Richards, Cline and Needham (1964), Seitz (1964), Wodtke (1964), Cropley (1965), Hudson (1966) and Madaus (1967) had also reported low correlations between different measures of creativity and intelligence. Flescher (1963) reported negative low correlations between some measures of creativity and measures of intelligence. Probing
further beyond the realm of correlational studies, Guilford et al. (1951, 1952), Wilson et al. (1954) and Cropley (1966) empirically demonstrated through factor analytical approach, the existence of distinct factors of creativity and intelligence.

In contrast to the low correlations between creativity and intelligence measures, Ketcham and Kheiralla (1962) found out fifty four out of the sixty four correlations between the scores on WISC, Stanford-Binet and the PMA Tests on the one hand with scores on a battery of creativity tests on the other to be significant beyond .05 level.

Taylor (1964), Vernon (1964), and Yamamoto (1965) were of the view that creativity and intelligence become independent of each other only when some critical level of IQ has been exceeded. Barron (1969) reported that a specific minimum IQ was probably necessary for certain intrinsically creative activities in order to engage in the activity at all, but beyond that minimum IQ which often was surprisingly low, creativity had little correlation with scores on IQ tests. Taylor and Holland (1962) reported that positive but low correlations (.20 to .40) were found between creativity and intelligence in large number of investigations and no correlation was found at higher ability level. Torrance (1967) has summarized all the available evidence on the question of the relationship of creativity to intelligence by tabulating 178 correlation coefficients reported in the literature. This
tabulation showed the median correlation to be .20. Dacey and Madaus (1971) studied the relationship at three levels of IQ in three diverse populations and found the highest of the nine correlations to be equal to .57. Meer and Stein (1955) concluded that opportunity held constant, IQ beyond a percentile of ninety-five is not significant for creative work. Barron (1961) on the basis of a summary of many studies concluded that beyond a threshold IQ of 120, any increment in intelligence is unimportant for creativity. He attached greater importance to motivational factors beyond the threshold situation.

Hasan and Butcher (1966) presented an altogether different situation in which a correlation as high as .74 was reported between creativity and intelligence for Scottish children. Likewise, Ginsberg and Whitmore (1968) found a correlation of .60 for an Australian sample. Dacey, Madaus and Allen (1969) attributed the phenomenon of high correlation to the interaction effect between the method factor related to both the measures rather than to a higher relationship between the two. Wallach and Kogan (1965) on the basis of their own tests derived the scores of uniqueness and those of originality and fluency similar to those by Guilford (1951, 1952) and by Torrance (1962). They concluded that creativity possessed an internal consistency but was independent of intelligence. Ward (1967) with the help of oblique rotation supported Wallach and Kogan's (1965) point
of view, and in addition maintained that creativity itself possessed multifactor structure. Madaus and Allen (1969) employed the varimax rotation and supported the views expressed by Wallach and Kogan (1965).

As against these studies, Thorndike (1963) and Marsh (1964) separately factorized the correlation matrix reported by Getzels and Jackson (1962) and failed to obtain a separate factor of creativity. Similarly, Burt (1964) and McNemar (1964) doubted the existence of a construct of creativity completely independent of intelligence.

The diverse evidence presented by various correlational and factor analytical studies as cited above makes it clear that there is no unanimity regarding the relationship between creativity and intelligence. It is, therefore, essential to probe further into this vital problem by conducting empirical studies in different cultural set-ups, especially under Indian conditions which are of importance to the present investigator.

1.6. Creativity and Achievement

The relationship of creativity and achievement has been studied by employing mainly the following two approaches: (a) interactional approach - comparing the achievement of groups formed on the basis of creativity and intelligence, and (b) correlational approach reporting the relationship between the measures of creativity and achievement.
1.6.1. Interactional Studies

The achievement of highly creative and highly intelligent students was studied by Getsels and Jackson (1962) by sorting (a) the highly creative group comprising top 20 percent on the measure of creativity but falling below top 20 percent on intelligence measures, and (b) the highly intelligent group representing top 20 percent on intelligence but below top 20 percent on creativity measures. These two experimental groups were found to be significantly better in test achievement than the total parental sample to which they belonged. The findings reported by them further speak of not significant difference between the mean achievement levels of the highly creative group and highly intelligent group. An interesting feature of the results is further revealed by the observations that there were slightly higher correlations between certain measures of creativity and achievement than those between intelligence and achievement. Torrance (1960) replicated the same research design followed by Getsels and Jackson (1962) with eight different samples, and thereby supported their findings in six of the eight samples. Yamamoto (1960) also reported similar results and maintained that despite a difference of twenty-six points in the mean IQ of highly intelligent and highly creative group, there was no statistically significant difference in the achievement of the two groups as measured by the Gates Reading Test and the Iowa Achievement Battery. Rambo (1964) found highly
creative students similar to the low creative students in their grade-point average and academic achievement as measured by standardized achievement test and academic aptitude test.

Rambo (1964), and Altenhaus (1964) modified the above cited research designs and worked with double-talented group of highly creative and highly intelligent subjects and demonstrated that the achievement of this group was better than the achievement of single-talented group of high intelligent or high creative subjects.

1.6.2. Correlational Studies

Cline *et al.* (1963) conducted correlational studies and demonstrated that the relationship between creativity and achievement was as high as between IQ and achievement. Yamamoto (1960), and Neufeld (1964) found that the relationship between creativity and achievement remains significant even after partialling out the effect of intelligence. Cline, Richard and Needham (1963) followed the design of Fisher-Doolittle's multiple correlation and found that the creativity tests have considerable predictive value for achievement of both boys and girls. They further pointed out that along with IQ measures creativity tests also accounted for a substantial amount of variance in achievement. Above mentioned findings, especially in a situation where measures of creativity and intelligence are not highly related, lead to infer that intelligence and
creativity seem to contribute independent variances in the criterion variable of achievement. This inference is of conceptual nature and may be shaped into a hypothesis which will make it obligatory to review the phenomenon of oversachievement and undersachievement with implications in the field of teaching-learning situation, evaluation approaches, systems of scholarship, admissions, classifications and promotions.

In contrast to the above studies reporting high correlation between measures of creativity and achievement, there are instances in the research literature where low correlations have also been demonstrated between creativity and achievement. Taylor (1963 b), Phetek (1962) and Taylor and Holland (1962) reported very low correlations between the two variables under consideration. Flescher (1963) studied the relationship between the academic success and IQ and also between academic success and creativity. In the former the coefficient of correlation was reported to be significant, while in the latter it was not significant. Likewise, Taylor and Holland (1962) suggested, "If grades are ever to become valid predictors of creativity, a significant portion of school activities may have to be changed to demand creative performance and behaviour". Michael (1964) referred to Zimmerman's challenging hypothesis, "There is the presence of inverse relationship between sophistication or broad mastery of knowledge on the one hand and incidence of truly creative output on the other".
In view of the research findings related to creativity and achievement as cited above, it may be inferred that the problem remains unsolved in the light of the conflicting views expressed by the researchers.

1.7. Creativity and Sex

The exploration of relationship between creativity and sex becomes a prime concern in view of some surveys in which the contribution of women towards creative acts was reported to be very low as compared to men. Cattell (1903) listed thirty-two women out of 1000 prominent persons. Ellis (1904) in his study of British Genius could locate just fifty-five women having genius out of a total of 1030 persons. Castle (1913) identified only 368 famous women down through the ages. Tyler (1962) referred to the three probable causes of this discrepancy between the potentialities and actual contribution of women, namely, (a) cultural and social factors within and outside the school, (b) differences in the rate of maturing, and (c) differences in attitudes and personality traits.

Related to fluency, Bereiter (1960) obtained differential factor pattern for urban boys and girls of IX class. Klausmeier et al. (1962) reported significant differences in boys and girls for divergent thinking abilities at the IX grade level. In a comparative study of convergent and divergent thinking Klausmeier and Wiersma (1964) reported that girls scored lower than boys on convergent but higher on divergent thinking
tests. Hill (1966) also reported sex differences on some of the measures of creativity.

As against these studies Phatak (1962) found no sex differences in creativity but suggested a need to replicate the study with a more systematic and comprehensive sample. Piers et al. (1960) stated that creativity tests do not discriminate markedly except for brick fluency in favour of girls. Quoting Torrance, Yamamoto (1960) reported, "There was a consistent tendency among the groups for girls to excel boys on creativity score through grades IV to VI even when mean IQ's were almost equal (boys = 152, girls = 153.5). Yamamoto (1960) found a similar situation with high intelligent group, high creative group, and total sample - where boys had slightly higher mean IQ's than that of girls. In these groups too, girls showed higher mean creativity score than boys. He further stated that this was not true in case of double-talented group of high creativity - high intelligence. Basik (1964) found that females were outranking males in their creative ability in a sample drawn from four colleges of Agriculture, Education, Engineering, and Applied and Fine Arts. The females were definitely superior to males on four out of the six tests of creativity. Neufeld (1964) also found the females to be significantly better on word fluency, ideational fluency, expressional fluency and average creativity index. The review of the related literature suggests
the need to explore into the nature of sex differences in creativity.

1.8. Creativity and Residence

It seems plausible to conjecture that the residential background may provide favourable or unfavourable conditions for the development of creative talent. The rural people probably face more challenging and natural environment and are, thus, closer to the stimulating and realistic situation. Marksberry (1963) observed that rural situation provides a face to face contact with nature which is a constant stimulus to some kind of originality and inventiveness. But contrary to this, rural environment also presents a monotony of activities and occupations as well as dearth of new information and knowledge. The resultant effect of challenging and realistic environment on the one hand, and monotony, dearth of information and opportunity on the other, has yet to be explored in specific and experimental situations.

The environmental set-up of urban people comprises altogether different elements. Marksberry (1962) quoted Dewey according to whom large scale machine production and urbanization of population tend to produce homogeneous mental diet and restricts mental independence. Urbanization amounts to automation which according to Fromm (1941) is a risk for democracy, because it makes individuals incapable of thinking and making free choices. Thistlethwaite (1959, 1959 a, b)
indicated that clearly differentiated patterns of students' cultures and faculty cultures were associated with productivity (in terms of doctorates) in the arts, humanities, and social sciences. Knapp and Goodrich (1962) and Kleusmeier and Wiersma (1964) reported that children in a large city did as well as their small town counterparts on convergent thinking but less well on divergent thinking. According to them, the finding is intriguingly reminiscent of the old claim that most scientists came from rural areas.

Tyler (1969) suggested that the following probable factors may be worthwhile for explaining differential levels of creativity among rural and urban populations: (a) selective migration; (b) content of tests in favor of a particular environment - rural or urban; and (c) educational facilities or handicaps. The natural surroundings and cultural environments may have a bearing on the development of creativity and could thus explain differential distribution of creative talent.

Since there is no clearcut evidence on this problem, the investigator thought it necessary to probe into this question.

1.9. Development of Creativity (Creativity and Age)

Certain genuine difficulties in the direction of studying the developmental trends of creativity came in the way of researchers. The tests of creativity did not enjoy a status
similar to the other psychological tests, such as, intelligence and aptitude tests, therefore, establishing the creative growth curve could easily fall a victim to adverse criticism. Guilford (1950) referred to another difficulty in this work. He was of the opinion that the tests of creativity would demonstrate a considerable error variance due to frequent fluctuations of creative behaviour. No evidence comparable to Terman and Oden's (1947) famous research project on genetic studies of genius is available in the research literature about creativity furnishing results through longitudinal studies.

Nevertheless, efforts have been made to investigate the developmental trends of creativity as measured by different tools at different grade levels. Andrews (1930) reported that the total imaginative scores were highest at the age of four and four and a half years, with a sudden drop at about the age of five. Grippen (1933) gave contradictory results on the basis of which he concluded that creative imagination rarely functions in childhood below the age of five years. On the other hand, Marks (1936) demonstrated that imaginative behaviour showed increase with age throughout the preschool period. Vernon (1948) denied the existence of constructive imagination during the elementary school years. Kirkpatrick (1900), Simpson (1922) and Mearns (1941) observed fluctuating patterns in creative thinking curve. Colvin and Meyer (1906), Lally and LeBrant (1951) and Wilt (1959) noticed decline of
creative thinking, while Barken (1960) observed rising but uneven tendencies in the creative growth curve. Torrance (1962) reported that the general pattern of developmental curves of most creative thinking abilities demonstrated a steady increase from first through third grade and a sharp decrease between third and fourth grades, followed by a recovery during fifth and sixth grades. Another drop was noted between sixth and seventh grades after which there was a steady growth until near the end of high school years (Minnesota Studies of Yamamoto 1960 b and Torrance et al. 1960). Bedner and Parker (1965) also reported findings similar to those of Yamamoto (1960 b) and Torrance et al. (1960). Bedner and Parker (1965) further indicated that exceptionally intelligent young adults did not show any significant change in the creative tests scores within the first three years of college. Lehman (1963) was also of the view that the peak period of creativity falls in early part of one's life.

The review of related literature concerning the developmental trends of creativity leads to the inference that divergent findings have been reported by different researchers, hence this aspect has immense potentialities for research explorations.

1.10. Need of the Present Study

In view of the conflicting research findings as reviewed earlier under captions 1.2 to 1.8 pertaining to creativity -
its meaning, levels and types, stages, measurement, its relationship with intelligence, achievement, sex, residential background and age, it was thought proper to undertake the present investigation with a view to understand the role played by these variables in creativity among students. For the convenience of readers, the problem is once again reproduced below in caption 1.11:

1.11. Statement of the Problem

The problem specifically reads as, "An Exploratory Study of Creativity and Its Relationship with Intelligence and Achievement in School Subjects at Higher Secondary Stage". In order to have a specific and clear picture of the problem, the meanings of important concepts involved in the study along with their operational definitions have been elaborated below:

(a) Exploratory

Evidence to the research work done in the domain of creativity as compared to the other fields of testing, such as, intelligence, aptitudes, personality and achievement is very meagre especially in Indian settings. Its nature and construct have yet remained unfathomed and are not fully explored. Through the present investigation, efforts have been made to formulate and test some of the preliminary hypotheses regarding creativity. It is in this context that the use of the term 'Exploratory' has been made.
(b) Creativity

The operational definition of creativity given under caption 1.3., p.5 has directed the methodology and scope of the study. For the purpose of this investigation creativity or creative thinking abilities refer to the various characteristics as measured by a locally developed creativity test battery. The summed score of the different dimensions like fluency, flexibility, originality, inquisitiveness and persistency has been considered equal to creativity score for operational purposes. The workable concept of creativity as has been advanced here is in accordance with the line of action accepted by Getzels and Jackson (1962), Torrance (1962) and Yamamoto (1964).

(a) Intelligence

Verbal intelligence and nonverbal intelligence have been accounted by the scores on the Jalota's (1964) Group Test of General Mental Ability (1/60) which is on the lines of The Modified Army Alpha Form-9; and the Raven's (1960) Standard Progressive Matrices Test respectively.

(d) Achievement

In the absence of standardized achievement tests for use with the local population, the percentage of aggregate marks in the school subjects of the last final middle standard examination has been taken as an index of achievement of students.
(e) Higher Secondary Stage

The use of the expression 'higher secondary stage' in this study has been made for representing IX, X and XI grades of high and higher secondary schools of Punjab, Haryana and the Union Territory of Chandigarh.

Besides this, certain other variables, such as, sex, residential background and age which were not mentioned in the main topic have been considered for exploring their relationship with creativity. Age has been represented by grade levels. The residential background represents the residential status of students.

1.12. Objectives of the Study

The study was conducted keeping in view the following objectives:

1) To develop the Tests of Creativity for measuring verbal and nonverbal factors involved in the process of creative thinking and to prepare workable tools in English and Hindi both.

ii) To establish the relationship between measures of creativity on the one hand and the variables of intelligence (verbal and nonverbal), scholastic achievement, sex, residential background and age as reflected by grade levels on the other.

iii) To suggest measures for incorporating the application of research findings in Indian educational set-up with a view
to make our educational system more meaningful and effective.

1.13. Hypotheses

The study was advanced on the basis of the following hypotheses. The testing of the hypotheses is restricted to the total scores of creativity (CY-2). The minimum level of accepting or rejecting a hypothesis is .05 level:

1. The distribution of the scores of creativity based on the Tests of Creativity is normal for the total sample.

2. Low relationship exists between creativity and intelligence.

3. Creativity is a multiple factor construct having both verbal and nonverbal type of factors.

4. There is significant sex difference in creativity.

5. Urban and rural groups of students differ significantly in creativity.

6. Grade to grade (IX through XI grades) differences exist in mean scores on the Tests of Creativity. The hypothesis implies that the developmental trends indicating increase in mean scores from lower to the higher grade are likely to be observed.

7. Low relationship exists between creativity and achievement at higher secondary stage.
8. Double-talented (high creative - high intelligent, CI), single-talented (high creative - low intelligent, Ci, or high intelligent - low creative, Io) and no-talented (low creative - low intelligent, ci) groups of higher secondary stage students differ significantly with regard to achievement in school subjects.

9. Creativity like intelligence has significant contribution (beta coefficient) for predicting the criterion of school achievement when studied with the help of multiple regression equation approach.

1.14. Plan of Reporting

The process of reporting the present study consists of three major parts. Part 'a' covers the first five chapters devoted for introducing the problem, procedure and techniques, and construction of tools with their reliability and validity. Part 'b' includes the next five chapters (VI to X) meant for testing the abovementioned nine hypotheses. Part 'c' includes the last global chapter XI which gives summary and conclusions of the present study along with their educational implications, thus, fulfilling the third objective (vide caption 1.12, p. 31).