Significance:

Creative minority is one of the chief resources of our nation. To know about the requisites of creative performance and to provide for them is essential for our progress. However, identification of and education for creatives have not been seriously undertaken by us. Various studies have shown that the conventional IQ metrics do not identify creative potential, that the creative potential requires different environment to flourish, and that people can be trained in the habits of creative thinking.

Scientific progress will not accelerate unless we realise and work out this fact. Present educational practices, examination methods and selection procedures are all in favour of intelligence with its limited customary connotation. This situation accounts for our failure to increase the number of original thinkers to a target figure. Training for creativity is more important in view of advancement that we strive to achieve.

Aims:

In the present study an attempt is made to ask and answer, under our conditions, the following questions.

'What are the characteristics of creative thinking?'
What are the limitations of identification of creativity?

What environmental factors facilitate its functioning?

What are the adjustment problems of an average creative person? and

What sort of personality does he possess?

Historical Background:

A short history of the studies in creativity shows that creativity has been studied from four diverse approaches: The creative product, the process of creative thinking, creativity as a cognitive ability that can be distinguished from intelligence and the creative person. Reviewing the theses and antitheses proposed in the first three approaches, an attempt is made to find out a sounder theoretical foundation for the identification of creativity in the present work. In that, limitations of product approach and ambiguities in process approach were noted. This led us to follow Guilford's factor analytic approach. Studies emphasizing the characteristics of the creative person have not been reviewed in a single note and have been referred only at relevant places.

A review of Indian studies has been reported separately. What this brief note makes clear is that our research is too short of our needs.

Methodology:

Limiting the concepts of creativity and intelligence to the operational definitions, we specified a few problems
and hypotheses within the framework of the afore-mentioned aims. These problems and hypotheses served as the guiding lines for the comprehensive and thorough enquiries.

Sample:

The sample (1054) was drawn from the boys of the grades VII through XI of a single school.

This choice of sample was necessarily limited by the choice of measuring instruments. The scoring procedures of creativity tests put forth some unusual problems. On most of the creativity tests the score is the number of responses which varies not only with age, sex and grade but also with school. Use of norms for these four variables makes the procedure obscure. Hence in studies of creativity, aiming at distinguishing between creativity and intelligence, and relating creativity to various other factors, single school method is generally followed.

Similarly use of Raven's Advanced Progressive Matrices, restricts the lower threshold of the sample age on the age eleventh, and consequently necessitates to exclude the grades VI and below in which students below the age eleven years, are expected in majority.

Tools of Measurement:

Measures of cognitive ability - A battery of creativity tests patterned after Guilford and Wallach, and Raven's APBMW were used as measures of independent variables.
The measures of dependent cognitive and non-cognitive variables included Bennett's Mechanical Comprehension test, School Marks, Interests regarding academic subjects, games and hobbies, Students' Ratings for peers and teachers, and the Personality Inventory by Bernreuter. For the upper extreme groups various other instruments were used. These are: Bell's School Inventory, Pasadena Pupil Judgement test, Speed of Verbal Thinking—an indirect sentence completion test, Self Perception test, Personal Data Sheet, Teacher's Ratings, and Your Expectations About Your Child (for mothers). Over and above these measures, home visits and interviews were the methods of enquiry used in the study of nine topmost students.

Procedure:

Six months before the major work a pilot study was conducted. Enough pre-testing was done to ascertain the reliability of translation, adaptation and construction of the tools of measurement.

Major Work:

Tests of creativity and intelligence, and the personality inventory were administered in four sessions to the whole sample. During the first two sessions the students also provided the information regarding their interests and hobbies, and rated their peers and teachers.

On the basis of their scores on independent cognitive variables, upper extreme groups were selected for
deeper explorations, and projective and non-projective tests were administered to them. Students from these groups also filled Personal Data Sheets. All these students were rated by their class teachers.

Mothers of top 50 students - first 25 on creativity and the first 25 on intelligence were approached and given the check list 'Your Expectations About Child.' The nine top most students and their mothers were interviewed and their homes were visited.

Scoring, data processing and treatment:

All necessary precautions and controls were observed while scoring the tests and analyzing the data. Reliabilities and validities as established by original authors have been assumed to remain unaltered. Inter-scorer reliability was found out wherever necessary. Where qualitative information was changed into numerical, scaling was done by mature judges.

Analysis of data was mainly quantitative and at certain places qualitative. For quantitative analysis ICT sorters were used. The results were tested against the rigors of statistics. The statistical analysis comprised means, standard deviations, analysis of variance, chi-square tests, 't' tests, various correlation methods and factor analysis.

Results and implications:

The value of our findings lies in some such considerations as reliability of measuring instruments,
statistical significance and consistency of results, and the extent to which our qualitative treatments yielded a fund of coherent details that form into a meaningful picture of the creative individual. About the reliability we have just now explained the position. About the significance we observe that our results were not significant at certain places, but they were always consistent. This consistency and coherence of information will be readily seen in a synoptic overview of the findings.

Characteristics of creativity:

(1) The importance of the results obtained in the present study, rests considerably on the positive answer to the question, 'Is creativity a unified dimension that can be distinguished from intelligence?' Wallach and Kogan examine the studies following Guilford's approach and conclude that these studies do not measure general ability by their creativity tests, which is independent of intelligence, because these creativity tests are equally or even more strongly correlated with intelligence than with other creativity tests. Wallach relates this fact to 'ignoring of social psychological aspects' of assessment situation, and proposes for permissive task attitude and freedom from time pressure as the requirements of the creative performance. We employed these propositions though we do not follow associationist's approach. We defined creativity by the abilities of fluency, flexibility and originality of thinking, of redefinition and elaboration, and relaxing the time limits and creating friendly atmosphere, we administered certain tests to measure
these abilities. The inter-correlations between these creativity tests were generally higher than their correlations with intelligence, suggesting that the chosen variables of creativity tend to remain closer to each other at the same time farther from intelligence. This was substantiated by the analysis of correlations which yielded one general factor showing how small is the portion that creativity and intelligence have in common, and other bipolar factors representing creative abilities. Consequently we get the ability of creativity which, within the defined limits, possesses substantial degree of generality across different tasks. Thus we can talk of creativity and intelligence.

(2) Creativity thus differentiated from intelligence was found to be susceptible to both grade and age. The effects of grade and age were not similar for all subtests. Hence use of grade and age norms for all subtests is necessitated. Raw scores thus converted into standard scores could be summated to get a creativity composite score. Another characteristic that emerged from this procedure is that when grade effect was controlled by normalizing the scores on grades the age means of these scores decreased with increasing age. What this decrement apparently means is that with increasing age creative thinking is restricted to a greater degree.

(3) With the help of one of the creativity variables, the growth pattern of creativity was traced from the age
11 through 14 *. It was seen that creativity and intelligence develop in a different pattern. At the age of 13 * there is little gain in creativity.

(4) Creativity develops with certain ebbs and flows, in a pattern different from intelligence making the impression of the rivalry between the two. Another noteworthy characteristic of the growth curve is that at the age of 13 * there is very little gain in creativity.

(5) Creativity though related to intelligence to some extent, becomes more and more independent of it as the intelligence level increases. It is a decreasing function of increasing intelligence. Above 1.2 SD distance on the positive side on intelligence scale, creativity shows zero correlation with intelligence.

(6) At the higher levels of intelligence, the mental distance between different age groups tend to decrease. APM percentiles showed it clearly. Creativity scores also showed a similar tendency but no clear pattern could be established.

(7) Limitations of Creativity Tests - The correlation matrix and factor analysis pointed out that the factors are more task specific than construct specific. It has been noted by other workers in respect of Torrance's tests and Guilford's test too. Hence we can conclude nothing but, "For the moment, ... our creativity tests suffer from the absence of strong construct validational evidence" (K. Yamamoto - Personal Communication 1970).
(8) Relation with other cognitive abilities - When creativity was correlated with other cognitive abilities, it was found that the aptitude of mechanical comprehension shows lower correlation with creativity than with intelligence, and scholastic performance shows rather higher correlation with creativity than with intelligence. In the respect of scholastic performance, a comparison of high and low achievers pointed out that the poor quality of academic performance is related to low intelligence and the good quality is related to high creativity.

Creativity and Personality Traits:

Creatives are seen to be self-sufficient and confident but associable; with neurotic tendency they show no relationship. When the four grounds are formed by median split on creativity and intelligence and their responses are seen through items, the conclusions based on correlational analysis got supported.

The four group analysis further shows that creatives differ from intelligents, in their hobbies and academic interests. Such difference could not be traced in game interests. The failure to obtain conclusive results in the respect of game interests is ascribed to the possible shortcomings in the procedure of classifying games under different heads.

The four group analysis revealed significant and conclusive differences in the respect of 'preference for teachers' and 'desirability among peers'. The high creativity
low intelligence students find very few teachers to prefer to others. For them all teachers are more or less alike. The desirability among peers seems to be related to both intelligence and creativity and more so with the latter.

**Upper Extreme Groups:**

As the median split did not yield statistically significant differences, students above 30th percentile on creativity, intelligence or on both, were selected to form three upper extreme groups, the HI, HL and LI.

Study of these groups revealed that creative performance is significantly related to cultural practices. Culture is more dominant factor than socio-economic status. Income per se was not an important factor so as to stimulate creativity but lower income was seen to be detrimental to creativity when it was not so to intelligence. The class of middle class professionals seemed to facilitate creativity to the maximum extent.

The creative performance is also seen to be reflected to some other environmental characteristics such as higher intellectual stimulation as reflected in the education of father and other relations. Low education of father hinders creativity decisively. The most noteworthy finding is that low education of mother is not a significant factor though her higher education is a definite help. The quality of mother-child relationship is more important factor than her education. When father's education nourishes creativity mother's affection
helps to flourish. Though creativity is not directly related to the reading provision at home, creatives show dissatisfaction with available reading material.

Creatives need greater freedom. It was seen that, creatives come more from those who depend less on their parents. Creatives show their freedom of thinking in their occupational choice. Moreover in response to one of the questions in Personal Data Sheet, creatives freely express their difficulties which reflect their inner struggle for freedom.

Creatives seem to be maladjusted in the school. Their complaints are more subjective, regarding the attitudes and temperaments of the teachers. They differ from intelligents in the perception of problematic situation and response to.

On the whole intelligents seem to be more objective, more adjusted and more reluctant to disclose the personal things. In fact their expression in all fields ranged within narrow limits. This was also evinced by their interview reports.

The interview reports distinguish clearly between two family patterns - one facilitating creativity and the other not facilitating. The family that protects the creative potential from detrimental effects, seems to be characterized by greater intellectual stimulation with absence of deleterious sanctions of success and failure, by more permissiveness and closer mother-child relationship, by more freedom of thinking
and behaviour, less success orientation and less practical adjustment. The family patterns, not facilitating creativity, seem to value learning for some extrinsic goals. Knowingly or unknowingly the parents epitomized training in intellectual skills to the exercise in class lessons. The educational background of this type of family was characterized by academic distinctions and the intellectual stimulation meant more a pressure for similar or higher distinctions than a situation challenging varied kinds of abilities. Where such pressure was accepted it was for bright future where it was not, it resulted in rebelliousness and hostilities.

All that this adds up to is that creativity goes with many other abilities. It makes difference in the affective and motivational qualities, ways of perceiving the world and adjusting with it, styles of expression and domains of overt behaviour. And further, our thorough explorations strongly conclude that in the development of this core ability, environment plays a dominant role. Parents, teachers and educationalists will not afford to ignore this conclusion.

Implications for the parents:

Parents should note that freedom of thinking and behaviour are essential for the growth of creativity. They should create non-evaluative atmosphere at home where every child can exercise his abilities whatever they may be. Self-initiated learning, is more important than the fact feeding. A censoring attitude based on success and failure should be
avoided. This does not mean non-control or tolerance for unruliness. Jetzels has very well clarified between freedom and unruliness, evaluation and censorship. From the first pair we insist on freedom, from the second, we condemn censorship.

Such freedom will encourage the child to ask freely. The inquisitive behaviour should be respected even if it puts parents some times at a difficult position. Good memory and quick answer are not the only symbols of intellectual abilities. Intelligent question too is a significant sign. This inquisitiveness needs much more to read and see but what matters more is not availability of all the material but a challenge to search for it and openness to use it.

Modern society gives exclusive importance to socialization of child and this insistence on being along with others creates disturbances in a thinking process leading to original and unusual solution. Preferred isolation is the need of creatives. It is not to be worried if it is not compulsive.

All these things are more important than parents' education and income. The way of thinking and the attitude of both the parents are the salient features. For Indian children, it seems to be more related to mother. It is her permissiveness, acceptance of and close relation with the child that enhance the creative performance while higher educational atmosphere promotes it.
Implications for Education:

Our findings in educational context carry us to a stage where we should ask a self evaluating question, "Whether the present teaching techniques aim at providing the opportunities for the development of variety of modes of thinking." The answer will be obviously negative. However before suggesting changes in educational policies so as to include the training for both traditional intelligence and divergent thinking, it should be seen how far it is practical, and whether we can introduce any alternative programme effectively instead of changing the established educational patterns.

We shall consider the second point first. Some of the creativity studies with children and adults have resulted in developing group techniques for stimulating creative thinking. The training procedures mainly consist of introducing the environmental conditions that will encourage uninhibited expression of ideas and flexibility of thinking. These procedures in extra-piecemeal training have been effective in producing more and better ideas but not so useful for developing the individual ability. In fact, every opportunity in job work or in society at large, in the school work or at home should be utilized to promote growth of neglected abilities. Special training workshops will remain virtually ineffective if learning opportunities in the school do not permit the use of it. Hence what is more essential is reformulation of the entire educational procedure.
Guilford’s SI model hypothesizes 120 specific abilities of thinking. Then, should we train a child in each of these specific abilities? Can training in one ability be transferred for learning the skill pertaining to other ability? In this respect, Guilford’s propositions solve the issue. Learning is neither too broad as faculty psychologists think, nor too specific as associationists think so as not to have any transfer value. Recent experiments in learning show that transfer value depends on ‘identical elements’ in two different tasks. Thus common factor tasks will have more transfer effect. Tasks for training can be selected so that the training in that specific task will increase more generalized ability and also carry the skill and knowledge to some other specific abilities through their interconnections. A careful and thorough look over definitions of SI abilities and the descriptions of the prescribed tests, readily suggest the kind of teaching methods and the tasks required.

Present educational policies in their aims of keeping the child nearer to the ever advancing world, are presenting him a curriculum that is more weighted by the units of information. Instead, they should create the situation for the cultivation of general abilities and their specific utilities. Further, curricular changes may keep the situation much as it is if other techniques are not concomitantly changed. What makes the great difference is teaching method and the attitude of the teacher. This has been very well pointed out by the complaints of creatives against their...
teachers. It is not that teachers are not able to teach. They teach well and the creatives follow well. But there is dissatisfaction. Teachers should change their attitudes, perhaps those attitudes which neglect unusual answers and do not understand the eager minds. If a teacher is imaginative he may change the routine exercise into a situation which demands productive thinking. He will respect the original answer which is unlike the one correct answer, will support the perceptual openness and free playing with facts, and will stimulate the reasoning at the basis of it. But the need for training the diverse minds in one convergent way to reach at only one correct answer divides free, unrestricted thinking as non-significant ability.

Training in both the abilities, convergent and divergent, is essential. However for the training in early age precedence is for the latter. Divergent thinking abilities emerge at an early age that assumes less learning and less conditioning, whereas, convergent and evaluative thinking result from more learning. This phenomenon is strongly supported by our results.

Another short coming of teaching technique is that it is examination oriented. This is just a reflection of our society which emphasizes success in examinations for future successes as job achievement and higher salaries. Child's performance in school examinations is all important. It gives prestige not only to the child but also to the
teacher, parents and the school authorities. This success orientation more than learning orientation induces ego involved motivation rather than the task involved. The situation is thus becoming detrimental for creativity. As Worthrimer (1959) points out the thinker has to forget himself, get absorbed in thinking of the structural requirements of the situation for creative thinking. Presently with its non-educational ends education means more like a tool that aids to earn for living though philosophically it means to aid the living in which all abilities are realized maximally and enjoyed to the full extent.

This is not to disparage the importance of examinations in educational procedures but to point out that we have shifted the emphasis from the act of learning to the measurement of learning. In the spirit of making the examination procedures more standardized, and assessment more reliable we have limited them only to a certain abilities. Thus customary methods have been too inappropriate to measure the degree of achievement in various abilities. The answer sheet method implies the use of certain abilities more than other. As Guilford criticizes, "The use of the answer-sheet examination has often put teacher convenience ahead of student needs. While as testing experience shows, we can assess cognitive abilities (with the exception of those involving implications) with answer sheet tests and while evaluative and memory abilities can be so tested to a large
extent, it is virtually impossible to assess the more creative divergent production and many of the convergent production abilities in this manner. Thus the exclusive use of answer sheet tests does not encourage productive thinking effort. In fact, it discourages it by rewarding other kinds of performance in answer sheet tests. Even within the answer sheet category of tests attention should be given to forms that may encourage something more than the cognition and memory for units of information. It is alarming to contemplate what an exclusive use of answer sheet tests could do to the intellectual character of the nation" (Guilford 1967, p. 476). The measuring instruments devised by Guilford group are the illustrations how within the answer sheet procedure conditions can be changed so as to encourage different thinking processes.

Another relevant observation is by Wallach. Enough has been said so far, about his criticism of Guilford's work, and about his insistence of game-like context for the measures of divergent thinking. Freedom from time pressure and evaluative atmosphere set forth creative solutions. But these are not sufficient. Simply liberating the S from the time pressure does not change a convergent thinking or memory task into divergent thinking task. Moreover, abilities of fluency, flexibility or originality are not sufficient for adult creative performance that requires various processes including creativity and intelligence. What specific abilities are more important will depend on the specific situation.
All these considerations present a challenge. We need educational policies that emphasize more educational ends than non-educational ends. We want teaching techniques that encourage variety of thinking processes. We sincerely urge to relieve learning from extrinsic pressures. We aim to make our examinations more meaningful and important. We require our assessment methods to remain objective. Moreover we have to see that our creative boys make for creative adults.

We have to face this challenge at any cost of efforts, if we do not want to lose much of our cognitive potential at school levels and consequently at adult levels. We cannot afford these failures in the classroom teaching, which in effect imply failures of the nation.