PROCEDURE OF THE STUDY
CHAPTER - III

PROCEDURE OF THE STUDY

DESIGN OF THE STUDY:

The investigator has tried to study the personality traits and learning style of creative and non-creative secondary students. The present study was carried out under the broad framework of descriptive method of research. The procedure of data collection and related aspects necessary for testing and null hypotheses stated in chapter I have been set under the following sub-heads:

(i) The sample  
(ii) Tools  
(iii) Data collection  
(iv) Data analysis

THE SAMPLE:

The sample for the present study was selected through "Incidental purposive sampling technique" (Guilford 1978). The term incidental sampling is applied when groups are selected because they are easily or readily obtainable (Garrett 1971). Incidental purposive sampling is always resorted to when the objectives of the study are served even without taking random
sample. Moreover it does not suffer from any serious disadvantage and many psychometric studies in west have been based on data obtained from samples selected by this method (Garrett, 1971). This type of sample was also found to yield normal distribution resulting in the yielding of generalizable results by a number of Indian rearches also (Joshi, 1960, Kapoor 1963, Bhattacharya, 1978, Giri 1987).

A population of class XI students studying in recognized and Government Schools of Pratapgarh city was taken into consideration for the present study. It was assumed that this city being district head quarter has students from all sections of society and truly represents the secondary population.

In the present study the sample was drawn in two stages. In the first stage a frame of all recognized and Government Intermediate Schools of Pratapgarh city was prepared. From which a sample of 5 schools, affiliated to U.P. Board of High Schools and Intermediate Education was randomly drawn. These schools were recognized and the students were from different socioeconomic status group of the society. In the second stage
all the students of class XI from each of these schools were drawn out for this study. This technique has been commonly used in educational researches and found to be practical economical, yielding generalizable results.

Thus a total sample of 400 secondary students of science and arts group studying in class XI and having a range of 15 to 18 years was drawn 5 randomly selected schools. It was assumed that such a sample of students would fairly represent the population on the basis of the sample size which normally include subjects representing the full range of socio-economic environment. Schoolwise breakup of the sample for the main study has been given in Table-3.1

Table - 3.1

INSTITUTION-WISE BREAKUP OF THE SAMPLE

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Institutions</th>
<th>No. of students selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Govt. Girls Intermediate College, Pratapgarh</td>
<td>75</td>
</tr>
<tr>
<td>2.</td>
<td>Govt. Intermediate College, Pratapgarh</td>
<td>125</td>
</tr>
<tr>
<td>3.</td>
<td>K.P. Hindu Intermediate College, Pratapgarh</td>
<td>75</td>
</tr>
<tr>
<td>4.</td>
<td>Tilak Intermediate College, Pratapgarh</td>
<td>75</td>
</tr>
<tr>
<td>5.</td>
<td>Ram Raj Intermediate College, Patti, Pratapgarh</td>
<td>59</td>
</tr>
</tbody>
</table>

TOTAL 409
This sample of students (boys and girls) was utilized for final study to obtain data on personality traits, creativity and learning style.

TOOLS:

In order to quantify the variables under study, different tools were selected on the basis of scientific and practical considerations. This selection gives the relevant details of the tools used. The following tools have been used in the present study to collect data:


(3) Learning style Inventory (L.S.I. By Agarwal 1983)

A brief description of these tools have been presented here-

DESCRIPTION OF 16 P.F. QUESTIONNAIRE BY CATTELL (16 P.F.Q.)

The sixteen personality factor (16 P.F.) questionnaire of cattell (1957) is one step forward
in the development of questionnaires for the measurement of various personality dimensions on scientific basis. It was first published by the institute for personality and ability Testing, Illinois, (IPAT) in 1949 and was presented as a research instrument with possible applied psychology uses (Buros, 1963 P.148). Sixteen questionnaire scales that were juxtaposed and arranged in omnibus from giving a multidimensional set is now known, for brevity, as the 16 P.F.Test. This test (16 P.F.) is a measure of all the main dimensions of personality revealed by factor analysis (Cattell & Eber, 1967). In this questionnaire, the personality is assessed in terms of 16 factors in which 12 source traits. Previously identified from behaviour rating are presented together with 4 additional factors emerged from factorial analyses of questionnaires alone. They have been established as unitary. Psychologically meaningful entitles in many researches, in various life situations and enter into general psychological theory (Cattell, 1950, 1956 a, 1956 B, 1964). Cattell, Day and mccland (1953) have given the methodology and the laborious procedure by which the questionnaire items have been arrived at. In general, the items have been selected on the basis of their
factor saturation with respective factors. In addition to provide measures on sixteen primary personality dimensions for an individual, it covers some eight derivative there from as second-stratum, higher-order, broader secondaries (cattell, 1970).

The items in the questionnaire are of two major types each with three alternative answers:-

(i) I like to watch team games:
   (a) Yes, (b) Occasionally, (c) No.

(ii) I prefer people who:
   (a) Are reserved (b) In between
   (c) Make friends quickly

The first type of items include statements about individuals own behaviour, as well as general expressions of opinions about people with which he may agree or disagree. In the second type of items, the testee must choose between different occupations, recreational activities, types of persons or other alternatives requiring 'Value judgement'. It also includes few verbal and numerical items of the types used in group intelligence testing to give scores to facote B, viz. general intelligence Vs. mental
defect. Three alternative answers to each item are provided for the testee because it has been found that the pseudo "forced choice" frustrates genuine attempts to give accurate answers and may produce poor test morale and a general disinclination to respond to the test (Cattell and Stice, 1957).

Cattell's factors representing "source traits", referred to as oblique factors, are correlated. Their intercorrelations, when factor analyzed, produce second-order factors which represent "surface traits".

The A and B forms (187 items in each) are the appropriate forms for college students and general adult literate population with higher educational levels. When time resources are "tight", from C (105 items) are used. Form C is shorter and slightly less vocabulary-demanding. For educationally disadvantaged groups, Forms E and F (128 items in each) are planned. All these forms are equivalent in that each one of the them yields scores on the same sixteen factor and results are equivalent when expressed in standard scores.

Cattell (1946, 1950, 1957) has given the technical psychological titles to the factors
in bipolar form with the standard symbol (alphabet index) and universal index (U.I. Number) along side. Through a wide array of research and applied publications, the symbols A, B, C, E, F, G, H, I, L, M, N, O, Q, Q₂, Q₃ and Q₄ have been applied to the 16 Factors. The four Q Factors are so labelled because they have been established only in questionnaire realm of tests, though they predict many criteria. He has also suggested a "Universal Index" (U.I.) number to avoid misleading influences from semantics. In this universal index of personality factors, the factors of the 16 P.F. rn from U.I.L. through U.I. 19, omitting U.I. numbers 4, 10 and 11 since these rating factors have never shown clearly enough in questionnaire measures to be systematically included. However, it is far more usual to use the alphabetical symbols which, in research publications in English, have associated with these factors, namely, A through O (D, J and K being omissions, corresponding to 4, 10 and 11) with Q₁, Q₂, Q₃ and Q₄ added. He has also given the best popular terms for each source trait for use in communicating with the lay public.
Bipolar descriptions of source traits (factors) $A$ through $Q_4$, with the standard symbol (alphabetic index) and universal index (U.I.) number alongside have been represented in Table 32 below.
| TEFPM         | Lowsten Score Discription | Factor      | Highsten Score Discription | Factor                      | Universal Index Num
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Professional</td>
<td>Sizothymia</td>
<td></td>
<td>Affectothymia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Reserved, Detached Critical, Aloof, Stiff</td>
<td>A-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Popular Term</td>
<td></td>
<td></td>
<td>Warm hearted, outgoing</td>
<td>A+</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Easy going, Participating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>Low Intelligence Dull</td>
<td>B-</td>
<td>High Intelligence Bright</td>
<td>B+</td>
<td>U.I.No. 2</td>
</tr>
<tr>
<td>Popular</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>Emotional Instability Effected by Feelings</td>
<td>C-</td>
<td>Higher Ego Strength</td>
<td>C+</td>
<td>U.I.No. 3</td>
</tr>
<tr>
<td>Popular</td>
<td>Emotionally less Stable, Easily upset, Changeable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>Submissiveness Obedient, Mild, Easily Led Docile, Accommodating</td>
<td>E-</td>
<td>Dominance or Ascendance Assertive, Competitive, Stubborn</td>
<td>E+</td>
<td>U.I.No. 5</td>
</tr>
<tr>
<td>Popular</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>Popular</td>
<td>Desurgency</td>
<td>Surgency</td>
<td></td>
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<tr>
<td>--------------</td>
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<td>------------</td>
<td>----------</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>F-</td>
<td>F+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sober, prudent, Serious</td>
<td>Happy-co-Lucky, Enthusiastic Gay, Impulsively Lively</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>Popular</td>
<td>Weaker Super Ego Strength Expedient Evades rules</td>
<td>Stronger Super Ego Strength or character Conscientious, rule bound Persevering, Moralistic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>G-</td>
<td>G+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>Popular</td>
<td>Threctia Sky, Timid, Restrained</td>
<td>Parmia Tender Minded, Socially bold thick Skinned</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>H-</td>
<td>H+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>Popular</td>
<td>Harria Tough minded, Realistic, Self-reliant</td>
<td>Premsia Tender Minded, Sensitive Dependent over Protected</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I-</td>
<td>I+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>Popular</td>
<td>Alaxia Trusting, Easy to get on with</td>
<td>Protension Suspicious, Hard to fool</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>L-</td>
<td>L+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Popular</td>
<td>Praxernia</td>
<td>M-</td>
<td>Autia</td>
<td>M+</td>
<td>U.I.No. 13</td>
</tr>
<tr>
<td>---------------------</td>
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<td>----</td>
<td>-------</td>
<td>----</td>
<td>------------</td>
</tr>
<tr>
<td></td>
<td>Practical, Careful, Conventional</td>
<td></td>
<td>Imaginative, Absent Minded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional popular</td>
<td>Naivete</td>
<td>N-</td>
<td>Shrewdness</td>
<td>N+</td>
<td>U.I.No. 14</td>
</tr>
<tr>
<td></td>
<td>Forthright, Natural, Sentimental</td>
<td></td>
<td>Astute, worldly. Calculating Penetrating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Popular</td>
<td>Untroubled Adequacy</td>
<td>O-</td>
<td>Guilt Prencess</td>
<td>O+</td>
<td>U.I. No. 15</td>
</tr>
<tr>
<td></td>
<td>Self assured, Confident Placid</td>
<td></td>
<td>Apprehensive, Insecure, Worrying Troubled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Popular</td>
<td>Conservatism</td>
<td>Q₁-</td>
<td>Radicalish</td>
<td>Q₁+</td>
<td>U.I.No. 16</td>
</tr>
<tr>
<td></td>
<td>Conservative, Respecing established ideas, Tolerant of Tolerant of traditional difficulties</td>
<td></td>
<td>Experimenting, Liberal, Free-Thinking, Analytical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Popular</td>
<td>Group Adherence</td>
<td>Q₂-</td>
<td>Self Sufficiency</td>
<td>Q₂+</td>
<td>U.I. No. 17</td>
</tr>
<tr>
<td></td>
<td>Group dependent, A &quot;Joiver&quot; and A sound follower</td>
<td></td>
<td>Self sufficient, prefers own decisions Resourceful</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Popular</td>
<td>Low Integration ( Q_3^- ) Uncontrolled, Careless of social rules, follows own urges</td>
<td>High self-concept ( Q_3^+ ) Control Controlled, Socially precise, following self image</td>
<td>U.I.NO. 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>----------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Popular</td>
<td>Low Ergic Tension ( Q_4^- ) Relaxed, Tranquil Tropic unfrustrated</td>
<td>High Ergic Tension ( Q_4^+ ) Driven over wrought</td>
<td>U.I.NO. 19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The 16 P.F.Q. meets a long standing demand for a personality measuring instrument properly validated to the primary personality factors. It is unique in having:

(A) every item of demonstrated factor saturation.

(B) each of the questionnaire factor found notably in behaviour ratings and observation from life record, self rating and the objective tests, the meaning and importance of which have systematically been explored in wide array of life situations; and

(C) its factors are based on even sampling from personality sphere and ability (intelligence), temperamental factors and dynamic source traits.

In the 16 P.F. Form C and D, one more factor has been included - called Motivational Distortion (M.D.) factor. This factor tells the examiner the extent to which deliberate faking of the questions (items) has been made by the testee, when a subject consciously or unconsciously gives a picture of himself distorted by the prism of his own personality in the given testing role, he fakes the responses. In real life, many kinds of "Social desirability".
for the intelligent subject modifies to each kind of role-situations. Low social desirability is a function of anxiety. From inspection of the operation of objective performance tests in anxiety, it is easy to see that self-doubt, guilt and self-denigration are an intrinsic expression of the anxiety factor. The best solution regarding social-desirability-faking correction would therefore be to include it comprehensively in traitview theory techniques (Krug and Cattell, 1971). Meredith (198 B), Braun and Lafaro (1968) indicated that deliberate faking is made on two major situations:

(a) deliberate maximum faking for what the individual believes everyone considers socially desirable, and

(b) bending the self-concept to fit his own personal conception of what he would ideally like to be. Roughly, the conclusion is that for more shift takes place in (a-) The "ideal self" is already appreciably adjusted by most people to their real limitations and hopes. Meredith's researches on the 16 P.F. showed that the differences between the "honest" and the "socially more attractive" picture on certain
factors are quite significant. However, the distortions differ significantly between men and women; e.g., women raise dominance (factor E), whereas men, who are averagely more dominant, lower dominance when faking, conversely, women who are higher on premsia (factor L), fake low and men who are lower, fake slightly above average.

In the 16 P.F. MD (motivational distorting) scales have been built into the C and D forms (but not in the A and B) because these forms are much more commonly used in occupational selection work. The MD items are those which (a) themselves show maximum shift from an anonymous to a job-seeking situation, and (b-) correlate most with shifts on the personality factors in the same situational change. However, since the MD score can not be considered to start at zero, but already represents some fixed personality traits, the correction as a regression of the MD on factors A, C, F etc. takes out real personality variance as well as motivational shift. For example, extraverts and individuals of low anxiety score higher on the MD items in all situations tried. In any case, the best way to reduce distortion effects is probably
in the test administration itself, by taking time to get report and to convince the individual that if he is taking the trouble to take a test, his own best interests in the long run are served by avoiding misrepresentation.

ADMINISTRATION OF THE 16 PF HINDI VERSION FROM 'C':

The form 'C' were administered to the secondary students in groups of 25 to 30 in each. Form 'C' of the 16 P.F. test was given to 409 students. Normal conditions of testing were maintained. Subjects were asked fill in their names, age, sex, class and college etc. as printed on the answer sheets of 16 P.F. Form 'C'. Further the instructions printed on the test-book-lets were read aloud verbatim and explained to the subjects. After the four examples given on the front page were explained and their responses obtained, they were asked to turn over the page and proceed for item response in the test proper. It was ensured that no item of the questionnaire could remain unresponded before the answer sheet and test booklet were collected. It took about 40-45 minutes for each form to fill in.
SCORING OF 16 P.F. TEST:

All the answer-sheets were scored with a hand made punched key. The time taken in scoring each answer-sheet came to about 10 minutes. Nineteen students were discarded from the sample on account of high distortion score (MD score) and some other mistake that could invalidate the results. Thus the final sample consisted of 409 students from whom the responses on each of the two forms could be obtained.

RELIABILITY OF THE 16 P.F. QUESTIONNAIRE FORM 'C':
(HINDI VERSION).

Reliability of 16 P.F. Q is estimated for Form 'C' and 'D' (Pavable form) and their combinations. The dependability co-efficient were calculated by List-Retest method with six says interval and stability Coefficients with 12 months interval. The equivalence co-efficients between pavable forms C & D are also satisfactory shown by the author. The statistical calculations for reliability prove that the test is highly reliable.

VALIDITY:

In the absence of a factor analytical approach involving correlation of a factor scores with true factors, it is difficult to find
innumerable external criterion against which forms C and D of the bigger multifactor scales like the 16 PF can be validated. The mean sten values of the group of Form A and the other group on Form C and D were compared. The data collected across two points of time and samples are not identical but similar, the factor scores yield almost the same result. There are no statistical differences on 12 factors out of the 16, when the mean sten scores are compared between Forms A & C. This goes to prove that Form C & D are valid measures of the 16 personality measures because they are giving the same results as measured by the form A which also measures the same 16 factors although different in content and number of items per factor.

DESCRIPTION OF TORRANCE TESTS OF CREATIVE THINKING (T.T.C.T.):

The Torrance Tests of creative Thinking (Torrance, 1966) consist of two forms - verbal and figural (non-verbal). The researcher has used only the verbal form for the purpose of creativity.

The Torrance of Test of creative Thinking (verbal form) comprises of seven activities:-

The types of tasks or activities chosen for the tests were those that could be most easily and economically administered and scored, and that had stood best the tests of reliability and validity, while at the same time sampling as many as different kinds of manifestations of creative thinking ability as possible. The seven tasks are believed to bring into play somewhat different mental processes, yet all of them require the subjects to think in divergent direction in terms of possibility.

(i) **RATIONALE AND DESCRIPTION OF THE TEST ACTIVITY:**

The development of the Torrance Tests of Creative Thinking has, in general been guided by the definition of creativity given by the author of the tests. According to Torrance (1966 a), Creativity is "a process of becoming sensitive of problems, deficiencies, gaps in knowledge missing elements, disharmonies, and so on, identifying the difficulty, searching for solutions, making guesses, or formulating
hypotheses about the deficiencies, testing and retesting these hypotheses and possibly modifying and retesting them, and finally communicating the results". The author claims that he has tried to assemble batteries of figural and verbal activities that require kinds of thinking analogous to the thinking involved in recognized creative achievements.

An attempt will be made now to briefly describe and sketch the psychological rationale of the activities or test tasks contained in verbal form A (April, 1968, Revision).

ASK AND GUESS ACTIVITIES:

The first three activities, Ask, Guess Causes, and guess consequences activities are based on a drawing which the subjects are required to look at. The ask activity requires the subjects to write out all the questions they would need to ask to know for sure what is happening in the picture. In the guess causes activity, the subjects are to enlist as many possible causes as they can think of the action shown in the picture, and in the guess consequence activity, they are to enlist as many possibilities as they can of what might happen as a result.
of what is taking place in the picture. Time allowed for each activity is five minutes.

As for rationale behind these activities, the Ask Activity is designed to reveal the individual's ability to sense what he cannot find out from looking at the picture and to ask questions that will enable him to fill in the gaps in his knowledge. The guess cause and guess consequences Activities are designed to reveal the subject's ability to formulate hypotheses concerning cause and effect.

Three types of scores are derived. The number of relevant responses produced by a subject yields one measure of ideational fluency. The number of shifts in thinking or number of different categories of questions causes, or consequences, gives one measure of flexibility. The statistical infrequency of these questions, causes, or consequences or the extent to which the response represents a mental leap or departure from the obvious and common place gives one measure of originality.
PRODUCT IMPROVEMENT ACTIVITY:

A sketch, as well as a standard model, of a stuffed toy elephant is exhibited to the subjects. They are required to give within 10 minutes the cleverest, most interesting and unusual ways they can think of for changing this toy elephant so that children will have more fun playing with it.

This activity permits most subjects at all age levels to "regress in the service of the ego and enables them to play with ideas that they would not dare express in a more serious task.

Three scores - fluency, flexibility and originality are derived - The fluency score for this activity is the number of relevant responses produced. The flexibility score is the number of different approaches used in producing ideas for improvement. The originality score is based on the statistical infrequency and appropriateness of the ideas produced.

UNUSUAL USES ACTIVITY:

This activity requires the subjects to list within 10 minutes as many of interesting
and unusual uses as they can think of the empty card board boxes.

The author of the tests recognized that card board boxes create in many individuals rigid sets that are difficult to overcome. It is to define a card board box as a "container" and then to think of all the different things that can be put into card board boxes, making it difficult to produce other types of responses. Thus the task is in part a test of ability to free one's mind of a well-established set. The activity yields scores for fluency, flexibility and originality determined in a manner similar to that described for the Ask-and-guess Activity.

UNUSUAL QUESTIONS ACTIVITY:

The subjects are required to think of within five minutes, as many questions as they can without card board boxes. These questions should lead to a variety of different answers and might arouse interest and curiosity concerning boxes in others.

This activity was from a technique devised by Burkhart (1963) to measure what Burkhart term as "Divergent Power" - a factor essential for high degree of creative achievement and
considered to be of critical importance for creativity in the classroom. Only two scores, fluency and originality are determined for time being. Fluency is scored as in all other activities, but originality score is accomplished according to the procedure developed by Burkhart (1963), detailed in Torrance (1966 b) Directions, Manual and Scoring Guide for verbal Tests-A.

JUST SUPPOSE ACTIVITY:

An improbable situation - Just suppose clouds had strings attached to them which hang down to earth is presented to the subjects. They are required to test the consequences of this situation with in five minutes.

This activity, a variation of the Guess consequences Activity of the Ask-and-Guess series, was designed in an attempt to elicit a higher degree of spontaneity. In order to responed productively to this task, the subject must "play with" the possibility and imagine all the things that would happen as a consequence Scoring is similar to that described for Ask-and-Guess Activities.
RELIABILITY:

Mainly two kinds of reliability of the Torrance tests of creative thinking have been studied: interscorer reliability and test-retest reliability:

(i) TEST-RETEST RELIABILITY:

Yamamoto (1963 a) studied the interscorer reliability of the Test of Imagination and the Ask-and-Guess. Test for three scores (fluency, flexibility and originality) derived from the Test of Imagination and three scores derived from the Ask-and-Guess test. He reported that the reliability coefficients based upon 64 protocols scored by two experienced scorers ranged from 0.84 to 1.00 for the various sub-scores and 0.99 for the total creativity score.

(ii) INTER-SCORER RELIABILITY:

The extent to which unselected and untrained classroom teachers could reliably score the test has been reported for six teachers ranging from 0.86 to 0.99 for fluency, flexibility and originality.

The reported reliabilities of the Torrance Tests of creative Thinking indicate
that the test is fairly reliable measure for appraising creativity.

VALIDITY:

A large variety of content, concurrent and construct validity data have been reported by Torrance in the manual of the test.

(i) CONTENT VALIDITY:

To ensure content validity, a consistent and deliberate attempts has been made by Torrance to base the test stimuli, the test task, instructions and scoring procedures on the best theory and research presently available.

(ii) CONSTRUCT VALIDITY

After quoting several studies in his manual for the test, Torrance has remarked, "It has become clear that test of creative thinking identify gifted children and adolescents who behave in ways may be regarded as creative....".

(iii) CONCURRENT VALIDITY:

Employing the technique of nominated group, the test could significantly differentiate between the pupils nominated by teachers as most fluent, flexible, original and elaborate
in their thinking and lowest on these dimensions by appropriate scores on the test of the creative thinking.

(iv) PREDICTIVE VALIDITY:

Reviewing several researches on predictive validity of the test in his manual, Torrance has given two types of predictive validity: 
(a) Short range and (b) Long range predictive validities.

Short range predictive validity studies have revealed that creativity test scores have predicated such creative behaviour of elementary and high school pupils and also of teachers as the production of creative ideas, humour and fantasy, originality in imaginative stories, creative science questions, creative teaching behaviour, superior performance on subject matter tests of productive thinking or creative applications in a mental health course, and inventiveness of ideas in mental health.

Long range predictive validity studies, spread over a period ranging from 5 to 12 years, have demonstrated acceptable range of predictive validity creative achievement out of school of seventh graders \( r = 0.51 \), in quantity and
quality of creative achievement of VII to XII graders \( r = 0.50 \) in highest creative achievement \( r = 0.50 \), in creative aspirations of XII graders \( r = 0.51 \), in creative teaching behaviour \( r = 0.62 \) for originality and \( r = 0.57 \) for total creativity.

As the present investigator has used the Indian adoption provided by Jaiswal (1977) has been utilized. Jayaswal has reported the reliability of the test to be ranging from 0.84 to 0.96 for different samples of students of the aforesaid Indian adoption for the use of the present investigation is self-evident.

ADMINISTRATION OF THE CREATIVE TEST:

The Torrance Test of Creative Thinking (TTCT) verbal form was administered to XI graders in the batches of 25-30 students each. Proper care was taken to keep the testing situation free from anxiety and conductive environment was created for free play of imagination among the testees. Best efforts were made to reduce hindrances in the production of novel ideas. Instructions printed in test booklet were read loudly and explained. Answersheets were distributed containing sufficient space (7 pages) for recording responses on different activities. Difficulties mentioned in the administration of creativity
tests by different researchers (Fleischer, 1963, Vernon, 1964, Middents, 1968) were kept in mind and possible measures were taken to overcome them. Time allotted was announced separately under each activity and examples were thoroughly explained. Total time consumed by each group in test administration including instructions, distribution and collection of test booklets and answer-sheets, clarification of examples, was approximately 80-minutes.

SCORING OF ANSWER-SHEETS (CREATIVE TEST):

Scoring of answer-sheets of (TTCT) were accomplished as per instructions in the manual. On the verbal test of creativity, the three scores, viz., fluency, flexibility and originality were derived as per instructions given in the manual, but the total creativity score was obtained by using the method of weight scoring as suggested by Guilford (1956).

COMPOSITE CREATIVITY SCORE:

For obtaining a composite creativity score without converting the total raw (fluency, flexibility and Originality) scores to standard scores could not be considered appropriate. Hence a rational weighing method that was of
applying to each one a weight inversely proportional of its standard deviation was used as suggested by Guilford (1956) and Brown (1970). Various steps involved in determining weights have been depicted in Table - First means and standard deviations of three component tests were calculated, individual standards deviations were divided into the largest one among them and the quotients were rounded to the nearest integer which are shown in the fourth line. For the sake of convenience the maximum and minimum marks in individual tests were also noted. Totals after applying weights have also been indicated. The integral numbers so obtained were taken to be the corresponding weights to be applied to the three tests, to arrive at a composite creativity score. (Table 1.3.)

| TABLE -33 |
| SHOWING THE PROCESS OF WEIGHTING COMPONENTS OF CREATIVITY TEST INVERSELY AS THEIR DISPERSIONS |

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Fluency</th>
<th>Flexibility</th>
<th>Originality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>35.68</td>
<td>20.67</td>
<td>26.18</td>
</tr>
<tr>
<td>S.D.</td>
<td>11.99</td>
<td>6.09</td>
<td>12.22</td>
</tr>
<tr>
<td>Integral weight.</td>
<td>1.019</td>
<td>2.006</td>
<td>1.000</td>
</tr>
<tr>
<td>(W)</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
Description of Learning Style Inventory (L.S.I.)

The learning style inventory constructed and standardized by Agarwal (1983) has been used for measuring learning style of students.

The learning style inventory comprises of seven dimensions of learning style and nine items for each learning style which are arranged in a sequence as following in the Table - 3.4

Table - 3.4

Showing item number of dimensions of learning style

<table>
<thead>
<tr>
<th>NO.</th>
<th>Learning Style</th>
<th>Items Serial No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Flexibility Vs Non-flexibility</td>
<td>1, 8, 15, 22, 29, 36, 43, 50, 57</td>
</tr>
<tr>
<td>2.</td>
<td>Individualistic Vs Non-individualistic</td>
<td>2, 9, 16, 23, 30, 37, 44, 51, 58</td>
</tr>
<tr>
<td>3.</td>
<td>Visual Vs Aural</td>
<td>3, 10, 17, 24, 32, 38, 45, 58, 59</td>
</tr>
<tr>
<td>4.</td>
<td>Field-independent Vs Field-dependent</td>
<td>4, 11, 18, 25, 32, 39, 46, 53, 60</td>
</tr>
<tr>
<td>5.</td>
<td>Short-attention-span Long-attention-span</td>
<td>5, 12, 19, 26, 33, 40, 47, 54, 61</td>
</tr>
<tr>
<td>6.</td>
<td>Motivation Non-Centred Vs Motivation non-centred</td>
<td>6, 13, 20, 27, 34, 41, 48, 55, 62</td>
</tr>
<tr>
<td>7.</td>
<td>Environmental-oriented Vs Environmental -Free</td>
<td>7, 14, 21, 28, 35, 42, 49, 56, 63</td>
</tr>
</tbody>
</table>

A brief description of these seven dimensions of learning style is evident as follows:-

(1) **Flexibility Vs non-flexibility** -
Students who are not satisfied with the traditionally accepted solution to an educational task/problem and always try to arise at unique responses, solutions etc., will be identified as having flexibility learning style. Students who are satisfied with carrying out traditionally accepted responses, will be classified as having non-flexibility learning style.

(2) **Individualistic Vs Non-Individualistics**
Students, who enjoy working themselves at best on some educational task/assignment will be named as having individualistic learning style. Whereas others, who prefer carrying out any educational task with a group or in a team will be characterized as having non-individualistic learning style.

(3) **Visual Vs Aural (Modality preference)**:-
Modality preference refers to students ability to learn and retain information
more efficiently when certain channels of communication are employed students, who rely upon 'eyes' than 'ear' for learning i.e. word symbols that are printed, written or on observation and the like will be classified as having visual learning style. Similarly other students, who rely upon 'ear' for learning i.e. when they hear human voice directly or indirectly will be named as having aural learning style.

Field independent Vs Field Dependent

Students, who do not enjoy working structured learning situation, will be called as having field independent learning style. On contrary, students who prefer to work in structured learning situations will be classified a having field dependent learning style.

Short-attention-span Vs Long-attention-span :-

Students who are not able to concentrate on some learning task for a longer period of time and may some time need some intake like (water, juice, tea etc.) to continue that task, will
be similarly students, who can give long continuous sitting on doing some assignment without any intake, will be characterized as having long attention-span learning style.

(6) Motivation Central Vs Motivation -Centred:

Students, who are eager to learning situations, are more conscious about demonstrating their best to get high grade, praise etc., for their performance/achievement, will be characterized as having motivation-centred learning style. Contrary to it will be taken as having motivation non-centred learning style.

(7) Environmental-Orientation Vs Environmental -Free :

A student while studying, if affected by environmental variables like heat, sound, light will be identified as having environmental orientation learning style. Likewise, one whose learning is not interfered by any kind of environmental variables will be identified as having environmental free style.
Reliability -

The reliability coefficient of Learning Style Inventory ranged from 0.84 to 0.91. The test is highly reliable.

Validity -

Objective validity was estimated of this tool due to unavailability of Indian tool which could severe as a criterion for determining its validity. LSI was get rated by 5 experts of repute in the area. Experts were requested to rate each item in the inventory on 5 point scale according to the purposiveness of the items. The ratings of these 5 experts on five point scale about suitability of the items in each learning style sub-set indicated that there is close agreement between the ratings of the experts on each item. Hence, LSI has high validity.

Administration -

After entering the classroom, the investigator told the students about the purpose of inventory that he just want to know their preferences for learning. She then told them that for knowing their preferences, she will give them a booklet consisting of 63 items. He further told them that every item is biopolar
in nature. Their agreement with an item will exhibit the preference for one learning style. So they have to respond every item. In case they found undecided on certain items, they were told to respond either favourably or disfavourably towards which they feel more inclined.

Thereafter, the investigator gave the booklets and asked them to fill in the identification of data i.e. name, name of institution, class and section. Instructions were read loudly and enquired about the students whether they had understood the instructions. The queries made by students, were replied to their satisfaction. The investigator, then asked students to open their booklets. They were instructed not to consult or copy others and to finish it as early as they can. Most of the students finished it in 20 minutes. Thus, the data was obtained.

Scoring -

Seven learning styles were considered in this inventory. Every style was measured by nine items and every items was bipolar in nature. If an individual showed agreement with an item, he was identified as having the first learning style in every type of learning style
(e.g. Flexibility learning style) and the disagreement with an item showed that he has preferred the second learning style in the same type of learning style (e.g. non-flexibility learning style). To be more specific if an individual showed agreement with an item -2 i.e. he had put on 'yes' (✓), he had been identified as for individualistic learning style, thus, demonstrating his preference for non-individualistic learning style.

This procedure of scoring has been followed in scoring the Learning style Inventory (L.S.I) to get students scores on all seven types of learning styles. Thus, for every student 7 scores were found out (each score representing a separate learning style) composite score on L.S.I. was not calculated.

DATA COLLECTION -

The final data for the present study was collected in two sessions by the researcher personally, so as to keep the testing situation constant and to ensure collection of valid and reliable data under the existing circumstances. In the first session, after contacting the the respective schools, the 16 P.F.Test was administered to
the students in batches of 25 - 30 each. The students were requested to participate sincerely in the study which was expected to reveal many important points of their personality. Each student was given 16 P.P. Test and asked to fill the relevant information about themselves in the answersheet. They were told that the information given by them will be kept strictly confidential and is being used for the research purpose only.

The students were then requested to attend all the questions one by one strictly accordingly to the instructions printed on the first page of the test booklet, which was read out loudly by the researcher and explained. After completion the answersheets and booklets were collected from all the students.

In order to avoid fatigue in the students 10 minutes rest of creative thinking (T.T.C.T. Hindi version) was administered to the some students and instructions were given to them according to the manual of the test. Separate answersheets were given to each students and were told to fill and write the correct answers. After an hour the answer sheets were collected. After 10 minutes interval the final test of
learning style inventory was administered to each student and instructions were explained as printed on the first page of the test booklet. After 40 minutes the test booklets were collected from the students.

Scoring And Tabulation -

All the answer sheets were scored with the help of hand-made punched by "Differential Weight Scoring" method by the investigator himself. The scoring was rechecked for the mistakes, if any.

Before tabulation of the master - chart for statistical analysis. The entire sample was categorised into creative and non creative groups on the basis of their scores of T.T.C.I. For this purpose Top 100 and the Bottom 100 on the T.T.C.T were kept in 'Creative' and 'Non-creative' groups respectively. From these master-charts requisite tables were then prepared for different statistical analysis as when necessary.

Data Analysis -

In addition to the general descriptive statistics, following statistical techniques were utilized in this study for analysing the obtained data and arriving at generalizable conclusions.
(1) The 't' test was applied to determine the significance of difference between mean and S.D. of 16 P.F. in the sample.

(2) 2 x 2 contingency tables were made and chi square values were calculated for comparing the learning style preferences of creative and Non-Creative students.

(3) The statistical significance of all the results were considered at 0.05 and 0.01 levels of confidence. The learning styles were considered at 0.10 level also in order to show the sharp differences between the creative and non-creative group of students.

(4) To find out the composite creativity scores, integral weights were determined by using the method of "Differential Weight Scoring" by weighting measures inversely as their standard deviations, as suggested by Guilford (1956).