CHAPTER III
CHAPTER III
DESIGN OF THE STUDY

3.1. MEANING OF RESEARCH

Research is considered as a systematic approach to solve a problem and/or development of new knowledge. Therefore research demands accurate, precise and planned activities.

According to Best and Kahn, "Research may be defined as the systematic and objective analysis and recording of controlled observations that may lead to the development of generalizations, principles or theories, resulting in prediction and possibly ultimate control of events."

Types of research:

All research involves careful observation, description, and the analysis of what happens under certain circumstances.

Educational research can be classified into the following three types:

1. **Historical research** provides a method of investigation to discover, describe and interpret what existed in the past.

2. **Descriptive research** provides a method of investigation to study, describe and interpret what exists at present.

3. **Experimental research** provides a method of investigation to discover cause and effect relationships among phenomena under

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controlled conditions or, more simply, to identify the conditions underlying the occurrence of a given phenomenon.

**Experimental research**

In an experimental study, the researcher manipulates certain stimuli, treatments or environmental conditions and observes how the condition or behaviour of the subject is affected or changed. This manipulation is deliberate and systematic. The researcher must be aware of those other factors that could influence the outcome so that the logical associations can be formed between manipulated factors and observed effects on the subject.

After a problem is defined, the experimenter proposes a tentative answer, or a hypothesis. He/she tests the hypothesis and accepts or rejects it in the context of the controlled variable relationship that they have observed. The results are in terms of probability rather than certainty.

Although experiments are associated with a laboratory, they can be conducted effectively in a non-laboratory setting also, such as the classroom, where significant variables can be controlled to some degree. The purpose of such experimentation is to predict events in experimental setting. The ultimate aim is to generalize relationships so that they may be applied outside the setting also.
3.2. METHODOLOGY OF THE PRESENT STUDY

The selection of the methodology of the study depends upon the aims of the study. The present study is aimed at enhancing creativity by using eclectic approach. The research attempts to provide answer to the question: “If eclectic approach is used, will it enhance creativity?” The researcher has manipulated teaching approach to observe how the subjects are affected. So the methodology selected is the experimental one.

The researcher first obtained permission from two selected schools for administering the tests and taking up lessons. The students of standard VIII of both the schools were taught English language, History and Geography subjects. The content matter covered in both the schools was the same. The lessons were taken from the text books prescribed by Maharashtra State Text Book Production and Curriculum Research, Pune. The content matter covered was the one included in the first terminal examination of both the schools. In one of the schools, the researcher taught the content matter by using the eclectic approach. In the other school, the researcher used the traditional lecture method to teach the same content matter to the students. Thirty periods from the school time table were taken up to teach the content in each school. It was spread over fifteen working days. Five days per week, were taken up for three weeks, teaching two school periods a day of half hour duration each. The content was taught on the same day to both the schools in the mornings.
Instructional Material

For teaching, the researcher prepared instructional material providing enough scope for flexibility and openness using brainstorming, inquiry training, synectics and role-playing models / method. In creativity classes, the teacher cannot plan her questions and answers ahead of time. She can only plan the general way for behaving during the session. Since she is expecting the students to react in a divergent, flexible and open manner. Therefore even though every lesson was planned in this experiment, it was not a final way of work, and hence neither was it elaborately made nor was it followed in a rigid form and style. It simply provided a general structure.

The instructional material was prepared with the help of the guide, the literature available and some colleagues. Fifteen lesson plans were prepared including four lessons of each based on role-playing, inquiry training and synectics and three lessons of brainstorming. Some sample lesson plans for the experimental group are given in Appendix K.

TABLE 3.1
SUBJECTWISE DISTRIBUTION OF EXPERIMENTAL LESSONS

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject</th>
<th>Chapter No.</th>
<th>Chapter Title</th>
<th>Technique / Method</th>
<th>No. of Lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>History</td>
<td>1</td>
<td>Dawn of the Modern Age</td>
<td>Role-Playing</td>
<td>2</td>
</tr>
<tr>
<td>02</td>
<td>Geography</td>
<td>1</td>
<td>The Universe</td>
<td>Inquiry Training</td>
<td>2</td>
</tr>
</tbody>
</table>
3.3. EXPERIMENTAL DESIGN IN THE PRESENT RESEARCH

There are various experimental designs. Selection of a design is based upon the purpose of the experiment, the type of variables to be manipulated, and the conditions under which the experiment is conducted, how subjects are to be assigned to experimental and control groups, the way variables are to be manipulated and controlled, the way extraneous
variables are controlled, how observations are to be made and the type of statistical technique to be employed in analyzing variable relationships.

The three categories of experimental designs are as follows:

1. **Pre-Experimental Design:** This design is the least effective. It provides no control group or no way of equating the groups that are used.

2. **True-Experimental Design:** In a true experiment, the experimental and control groups are equated by random assignment of subjects. It is the strongest type of design.

3. **Quasi-Experimental Design:** In quasi-experimental design the experimental and control groups are not equated by random assignment of subjects.

In the present investigation, the following quasi-experimental designs have been used.

A. **The pretest-posttest non-equivalent groups design:**

\[
\begin{align*}
O_1 & \times O_2 & O_1 \text{ and } O_3 &: \text{Pretests} \\
O_3 & \times O_4 & O_2 \text{ and } O_4 &: \text{Posttests} \\
X: \text{Experimental group} & \quad C: \text{Control group}
\end{align*}
\]

This design is often used in classroom experiments when experimental and control groups are naturally assembled groups such as intact classrooms, which may be similar. The difference of the mean of the \(O_1\) and \(O_2\) scores and the difference between the mean of the \(O_3\) and \(O_4\) scores are tested for statistical significance. Analysis of covariance may
also be used. If this design is the only feasible one, the comparison is justifiable, but caution should be taken in interpreting the results.

The researcher first took up the pretest of both the experimental and control groups. After the pretest, the experimental group was taught using the eclectic approach and the control group was taught using the traditional lecture method. At the end of which posttest was administered on the students and scores were analyzed by using statistical techniques.

The researcher has used this design as it was the most feasible one and the interpretation of the results has been cautiously done.

B. Factorial Design:

In a true experiment or quasi experiment, when more than one independent variable is included in the study, a factorial design is necessary. Since most outcomes are the result of combination of factors, most experimentation involves the analysis of interaction of a number of variable relationships.

By using factorial design, researchers can determine whether the treatment interacts significantly with certain variables.

The present research deals with two dependent variables, viz, creativity and students' attitude towards school. Some mediator variables like hemisphericity, motivational factors, introversion – extroversion and locus of control are also considered. A factorial design is used to analyse
the interaction effect of these mediator variables with the treatment on the dependent variables.

3.4. VARIABLES OF THE STUDY

According to Best and Kahn, "Variables are the conditions or characteristics that the experimenter manipulates, controls or observes. The independent variables are the conditions or characteristics that the experimenter manipulates or controls in his or her attempt to ascertain their relationship to observed phenomena. The dependent variables are the conditions or characteristics that appear, disappear or change as the experimenter introduces, removes or changes independent variables."¹

There are two types of independent variables: treatment and organismic or attribute variables. Treatment variables are those factors that the experimenter manipulates. Attribute variables are those characteristics that cannot be altered by the experimenter.

**Independent Variables:**

1. In the present research, the treatment independent variables are as follows:

   a) Eclectic Approach: This is an approach which involves brainstorming, inquiry training, synectics and role-playing. This approach was used as treatment to the experimental group.

   b) Lecture method: The control group was taught by lecture method.

2. The attribute variables that were controlled in the present research were:

   a) Gender
   b) Socio-Economic Status.

**Dependent Variables:**

The following were the dependent variables of the study:

   a) Creativity
   b) Students’ Attitude towards School

Thus, creativity and attitude towards school of the students are the measured changes in student-outcomes attributable to the influence of the eclectic approach used by the researcher.

**Mediator Variables:**

Some psychological characteristics of an individual are expected to influence the effect of the independent variables on the dependent variables i.e. they are likely to mediate between the independent and the dependent variables. Such mediator variables included in the present study are as follows:

   a. Extroversion - Introversion
   b. Motivational Factors
   c. Locus of Control
   d. Hemisphericity Dominance
**Confounding Variables:**

Confounding variables are those variables which may influence the dependent variable and whose effect may be confused with the effects of the independent variable. They are of two types: intervening and extraneous variables.

In educational research, there are certain variables which cannot be controlled or measured directly but may, have an important effect upon the outcome. These modifying variables intervene between the cause and the effect. These are intervening variables.

**Controlling Intervening Variables:**

In the present study, the researcher has tried to control such intervening variables as

a) Anxiety: The students’ level of anxiety was controlled to some extent by the researcher. The researcher herself has taught both the groups. So the effect of a new teacher was the same on both the groups. Besides, the researcher also made sure that there was no unit test in between or immediately after the treatment got over. Thus test anxiety was also controlled.

b) Fatigue: The students of both the groups were taught in their own classrooms. The researcher made sure that the students were mentally and physically fresh, as the students of both the groups
were taught in the mornings. The teacher also asked unstructured
questions to the students to ensure that they were not tired.

c) Motivation: Since the researcher herself taught both the schools, she
motivated the students in both the groups equally. The introduction
of the lesson was the same for both the groups to motivate the
students to grasp the content at hand. The content matter was
presented in an equally interesting manner, by the researcher to both
the groups. The teacher personality was the same. Thus, an attempt
was made to ensure that there was equal interest, attention and
motivation from the students.

**Controlling Extraneous Variables:**

The following extraneous variables were controlled in the present
research.

a) Gender: This was controlled by the researcher by including it in the
research in both the groups.

b) Socio-Economic Status: This was also controlled by including it in
the research.

c) Time of teaching: The researcher taught both the schools in the
mornings so this variable was also controlled.

d) Content Matter: Both the groups were taught the same content
matter on the same day.
e) Teacher Personality and Characteristics: Since the researcher herself has taught both the groups, teacher’s personality, her presage characteristics, teaching style, classroom behaviour with students was the same in both the groups.

f) Classroom Climate: The researcher measured the students’ opinion on classroom climate. The tool was administered on the fifth, tenth and the fifteenth lesson days to both the groups. The average of their scores was taken and t-test was used to compare the classroom climate as perceived by students on availability of materials, the objective of the lesson, sympathetic attitude towards all students, group interaction, definite goals, time management, respect for each other’s ideas, impartiality shown by the teacher and concern for all children. It was ensured that both the groups were exposed to similar classroom climate during the experiment.

g) Age: The students belonged to the same age group. They ranged between 13 to 15 years in both the groups.

h) Analysis of Covariance: This method eliminates initial differences on several variables between the experimental and control groups by using statistical methods. The use of pretest mean scores as covariant is considered preferable to the conventional matching of groups.

The present research has used this method. The researcher used this technique because the subjects in both the groups were found to differ on
the pretest scores. In this case, the effect of the pretest is partialled out and the resulting adjusted means of the posttest scores were compared. It enabled the researcher to equate the pre-experimental status of the two groups in terms of pretest scores. The initial status of the two groups was determined by pretest scores. Differences in the initial status of the groups were removed statistically by using ANCOVA so that they can be compared on the posttest scores though their initial status had differed.

**Experimental Validity:**

If significant contribution has to be made to the development of knowledge, an experiment must be valid. Campbell and Stanley have described two types of experimental validity: internal and external.

According to Campbell and Stanley, "An internal validity is the basic minimum without which any experiment is uninterpretable: Did in fact the experimental treatment make a difference in this specific experimental instance? External validity asks the question of generalisability: to what population, settings, treatment variables, and measurement variables can this effect be generalized?"

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Accordingly, an experiment is said to have internal validity to the extent that the factors manipulated have a genuine effect on the observed consequences in the experimental setting. An external validity is the extent to which the variable relationships can be generalized to other settings, other treatment variables, other measurement variables, and other populations.

**Threats to Internal Experimental Validity:**

In educational experiments, a number of extraneous variables influence the results, which are difficult to evaluate, and cannot be completely eliminated. Sound experimental design minimizes the influence of these variables.

The following factors jeopardize the power of the experimenter to evaluate the effects of independent variables unambiguously. How the researcher has overcome these factors is as follows:

1) **Maturation:** The lessons given to both the groups lasted over a period of fifteen working days. The pretest and the posttest were taken immediately before and after the treatment. Moreover, since the duration of the experiment was the same in both the groups, the average maturation, if any, is likely to be equal in both the groups.

2) **History:** There was no impending examination or unit test, so it was assured that test-related anxiety of students is controlled. To the extent that there were no class or surprise tests taken during the time while
the experiment was being carried out on the students in both the groups. Since the researcher taught both the groups, the researcher showed emotional resilience, which controlled the emotional tirade of a teacher. There were no pep sessions conducted on the students in both the schools while the experiment was going on. There were no catastrophic events that took place in the larger community during the conduction of the experiment.

3) **Testing:** Pretest was given to both the groups, so the practice effect on both, the control group as well as on the experimental group is expected to be the same. Moreover, for the pretest, Form A and for the posttest, Form B of creativity was administered so as to reduce eliminate the practice effect.

4) **Unstable instrumentation:** The tests used to measure the subjects on different variables were reliable and valid as explained in Chapter III.

5) **Statistical regression:** The subjects were not selected on the basis of extremely high or extremely low scores. The sample consisted of intact classes. Moreover the measurement device was found to be reliable. Thus, the researcher does not expect a significant statistical regression.

6) **Selection bias:** The sample comprised of VIII standard students of two different schools. The experimenter assigned one of the schools as
experimental group and the other as control group using the lottery method so as to eliminate the selection – bias.

7) **Introduction of selection and maturation**: The subjects were not given the freedom to select which treatment they will receive. Hence differential motivation is not likely to affect the outcome of the study.

8) **Experimental mortality**: In none of the groups, experimental mortality was found since the duration of the experiment was limited.

9) **Experimenter bias**: Experimenter did not have any previous knowledge about the subjects involved in the experiment since the schools were chosen randomly. Hence the experimenter did not convey any clue that could affect the subject’s reaction and would affect the objectivity of the judgment.

**Threats to External Experimental validity.**:

1) **Interference of prior treatment**: This poses a severe threat to the experimental design in which, the same subjects serve as members of both control and experimental groups. But in the present research the experiment was carried out on two different groups- one-control group and the other experimental group. Thus this threat was controlled by the selection of the design.

2) **The artificiality of the experimental setting**: There were no controls exhibited in the class. Since the intact classes formed the groups the teaching took place within the classrooms for both the groups. There
were no observers from outside. The researcher alone went to the class and taught both the groups very freely using the eclectic approach to one group and the traditional lecture method to the other group. Besides, no video cameras or one way screens were used in the classrooms. Hence efforts were made to minimize or eliminate the artificiality of the experimental setting.

3) Interaction effect of testing: The pretest taken at the beginning of the study was the same for both the groups. The subjects did not know whether they belonged to the experimental group or the control group so the subjects could not have been sensitized or be aware of the hidden purposes of the researcher.

4) Interaction of selection and treatment: The schools selected had willingness to try a new approach, a desire to improve their performance, the teachers had high morale and less insecurity. There are many other schools also where the same conditions prevail. Especially now because of schools competing among themselves to be the best, they have become conscious to improve their performance. Therefore prediction can be made about the whole population. Moreover, both the schools were equally willing to participate in the experiment. Thus, the interaction effect of selection and treatment is likely to be the same in both the groups.
5) The extent of the treatment verification: The experimenter has tried to
the best of her ability not to let her bias affect the outcome of the
experiment. If ever there has been any such interference it has been
unintended.

3.5. SAMPLE

According to Best and Kahn, "A sample is a small proportion of a
population selected for observation and analysis. By observing the
characteristics of the sample, one can make certain inferences about the
characteristics of the population from which it is drawn. Contrary to some
popular opinion, samples are not selected haphazardly; they are chosen in a
systematically random way, so that chance or the operation of probability
can be utilized."¹

Techniques of sampling:

Following are the techniques of sampling:

Simple Random Sampling
Systematic Random Sampling
Stratified Random Sampling
Cluster Sampling

¹ Best, J. and Kahn, J. Op. Cit, p.11
Volunteer Samples
Incidental Sampling
Purposive Sampling

In the present research, the sample of schools selected included two intact classes of two different schools in Mumbai. The Schools were selected randomly and there was random selection of schools for assignment to experimental and control group by the researcher. Both the Schools are aided schools.


According to Best and Kahn, "The ideal sample is large enough to serve as an adequate representation of the population about which the researcher wishes to generalize and small enough to be selected economically - in terms of subject availability, expense in both time and money, and complexity of data analysis."

Samples of 30 or more are considered to be large samples and less than 30 small samples. In the present research, the experimental group had 41 students of which 26 were boys and 15 were girls. The control group had 47 students of which 31 were boys and 16 were girls.

The following table shows the list of schools and sample size

selected for the study.

**TABLE 3.2**

**SAMPLE SIZE**

<table>
<thead>
<tr>
<th>Schools</th>
<th>Group</th>
<th>No. of Students</th>
<th>Boys</th>
<th>%</th>
<th>Girls</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.I.H. School</td>
<td>Control</td>
<td>47</td>
<td>31</td>
<td>65.96</td>
<td>16</td>
<td>34.04</td>
</tr>
<tr>
<td>V.W.A.H.School</td>
<td>Experimental</td>
<td>41</td>
<td>26</td>
<td>63.41</td>
<td>15</td>
<td>36.59</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88</td>
<td>57</td>
<td>31</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The preceding table shows that the sample size in both the groups is large.

3.6. **TOOLS OF RESEARCH**

To carry out research, data must be gathered to test the hypothesis. There are different methods and procedures developed for collecting data. These tools employ different ways of describing and quantifying data. Each tool has to be appropriate to collect the kind of data required for the study. Reliability and validity are important for any data gathering procedure to be effective. Reliability is the consistency of any instrument. Validity is that quality that enables it to measure what it is supposed to measure.

It is possible to quantitatively assess the reliability and validity of psychological tests, through a variety of statistical treatments.
The present research uses only those tools of research, which can be quantified.

Tools used in the Present Research:

The following tools were used to collect the data for the present study.

1) Creativity Test (Form A) by Mukadam (2000)
2) Creativity Test (Form B) by Naik (2000)
3) Classroom Climate Scale by Mukadam (2000)
4) Attitude to School Scale by Pandya (1987)
5) Extroversion Introversion Scale by Neymann – Kohlstedt (d.n.a.)
6) Locus of Control Scale by Shaikh (1999)
7) Hemisphericity Dominance Test by Venkatraman (1996)
8) Motivational Factors Scale by Naik (2000)
9) Socio-Economic Status Inventory by Patel (1997)

Creativity Tests (Form A and B)

In order to measure the creativity of the students a test was prepared by the researcher and another parallel form of the test was prepared by Naik (2000), so that one could be used as a pretest and the other posttest. Both the tests were based on the same dimensions of creativity. The tests include verbal, non-verbal and figural items. Students have to read the instruction and write their responses in the space provided for in both the tests.
A pre-pilot study was conducted for these tools in order to establish the validity of the tools and the individual items.

**Content validity:** To ascertain the content validity, the draft version of the tests was given to experts in the field of education. The operational definition of each variable was included to aid the experts in judging the content validity. The list of experts is given in appendix A. Those items, which were agreed upon, by ninety percent of the experts were retained and a few items were modified in accordance with their suggestions. The content validity was thus established.

**Item validity:** To determine the item validity of each item, item validity was carried out. The tools were administered to VIII standard students. The size of the sample was 71 students including 51 boys and 20 girls.

The item analysis was carried out by computing the Discrimination Index (DI) for each of the items using the following formula.

\[
DI = \frac{N_H - N_L}{0.27 \cdot N}
\]

Where

- \( N_H \) = Number of students getting a high score in the upper 27% of the group.
- \( N_L \) = Number of students getting a low score in the lower 27% of the group.
- \( N \) = Sample Size.

In order to segregate students into “upper” and “lower” groups, the total scores on a particular variable of every student were arranged in the
descending order. Highest 17 scores and lowest 17 scores of students then formed the ‘upper’ and ‘lower’ groups respectively. (27% of the total sample).

The discrimination index shows how sharply the item differentiates between persons higher on the scale of criterion from those lower on the scale. According to Garret, “items with validity indices of 0.20 or more are regarded as satisfactory.”

All the 13 items were found to have a D.I. of more than 0.20. So all the items were retained of both tests.

Pilot study of the Tools

After having finalized the tools pilot study was conducted to establish the reliability of the tools. (Form A and B). The reliability of any tool is of the following three types:

1) Internal Consistency Reliability.

2) Test Retest Reliability.

3) The Parallel form Reliability.

1. Internal Consistency Reliability:

   Internal Consistency Reliability was determined by

the Split Half Method.

This method has been used to establish the internal consistency of each of the dimension and of the total test.

In this formula, spearman – Brown prophecy formula is used. This formula is as follows:

\[
r = \frac{2 \cdot r^{1/2}}{1 + r^{1/2}}
\]

Where \( r^{1/2} = \frac{N \Sigma \Sigma YX - \Sigma X \Sigma Y}{\sqrt{(N \Sigma X^2 - (\Sigma X)^2)(N \Sigma Y^2 - (\Sigma Y)^2)}}\)

Form A was administered to the students of standard VIII of New Habib High School and Dadar Parsi Youth Association’s High School and the size of the sample was 71 students including 51 boys and 20 girls and the internal reliability was determined. It was found to be 0.815.

Form B was administered to the students of standard VIII of Aspee Nuton English Medium School. The size of the sample was 94 students including 58 boys and 36 girls and the internal consistency reliability was determined. It was found to be 0.891.

2. Test – Retest Reliability:

In this method, the same, test is administered to the same group after some time gap. Usually, four to five weeks and the correlation between the scores obtained for the two administrations is computed.
The test – retest reliability was computed and coefficient of correlation was 0.739 for Form A and 0.652 for Form B.

3. Alternate or Parallel Form Reliability:

This determines the reliability of the test with other similar test of known reliability.

The Parallel Form Reliability was obtained by ascertaining the correlation between the Form A and Form B. The two tests were administered on the same group. Coefficient of Correlation was computed. The ‘r’ obtained was 0.85. This proved the reliability of the test.

The following table shows all the three types of the reliability coefficients of both the forms of creativity test.

### TABLE 3.3

<table>
<thead>
<tr>
<th>Type of Reliability</th>
<th>Form A</th>
<th>Form B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability Coefficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Consistency Reliability</td>
<td>0.815</td>
<td>0.891</td>
</tr>
<tr>
<td>Test – Retest Reliability</td>
<td>0.739</td>
<td>0.652</td>
</tr>
<tr>
<td>Parallel Form Reliability</td>
<td>0.85</td>
<td>-</td>
</tr>
</tbody>
</table>

**Scoring Pattern:**

The scoring pattern for both the tests was the same. For every response on every item was given one score for fluency of ideas. For every shift, one score was given each for flexibility of ideas like use of a brick is
i) to construct houses, ii) to construct building, iii) to drown a cat. There is a shift in the idea between the second and third response where one score was given for flexibility. For originality, the responses were plotted and for an original idea given by only one student were given five scores. For every two similar responses each was given 4 scores.... likewise for every 5 similar responses each was given one score. For elaboration of ideas, scores were given for number of sentences as well as for originality of elaborated ideas – 5 scores for the most unique idea and so on. The form A of the test is given in Appendix B and Form B of the test is given in Appendix C.

Classroom Climate Scale:

In order to measure the classroom psycho-social climate as perceived by the students a scale was prepared by the researcher. The tool was prepared on the basis of relationship dimension, personal development and system maintenance dimension. The content validity of the test was established. For item validity, the tool was administered to 85 students including 54 boys and 31 girls. Discrimination Index was obtained of each item. All the items had a Discrimination Index of more than 0.20. A pilot study was carried out to establish the reliability of the tool. Internal consistency reliability was determined by using Rulon’s formula and was found to be 0.81 and the test-retest reliability was 0.87. The test has 53
items in all. The scoring pattern and response categories of the classroom climate scale are as follows:

<table>
<thead>
<tr>
<th>Response Category</th>
<th>Positively Worded Statements</th>
<th>Negatively Worded Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Agree</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

There were 26 positively worded statements and 27 negatively worded statements. So the maximum possible score would be of 212 and the minimum possible score of 53. The test is given as appendix D.

**Attitude to School Scale:**

To measure students’ attitude towards school Pandya (1987) ‘Attitude to School Scale’ was used.

Initially, a list of 30 items was prepared for measuring students’ attitude towards school. A pre pilot test was conducted on 98 students of 2 schools to carry out item analysis. Discrimination index was determined for each item. Those with 0.20 or more discrimination index were retained while others were discarded. Content validity was obtained by accepting the opinion of 8 experts. The items, which were agreed upon, by 95% of the
experts were retained while others were modified or discarded. At the end of this, 24 items were retained. To determine the reliability, a pilot study was conducted on 96 students of 2 different schools. The reliability was determined using split-half method, test – retest method and parallel form method. The coefficient of correlation using split half method was 0.88 using test-retest method was 0.80 and using parallel form method (for Rao’s School Attitude Inventory) was 0.81. For establishing internal consistency, item – total score coefficient of correlation was calculated. Each coefficient of correlation was found to be significant at 0.01 level. The final form had 24 items having four point scale of always, frequently sometimes and never.

Following are the examples of items used for measuring students’ attitude towards school.

(1) I think that going to school is a waste of time.

(2) I would love to visit my school even after I pass my SSC exams.

The scale was scored on the basis of the positively worded statements and negatively worded statements. For positively worded statements the scale value for always was 4, frequently – 3, sometimes – 2, never - 1 and for negatively worded statements, scale value for always was 1, frequently - 2, sometimes - 3 and never - 4.

There were 13 positively worded statements and 11 negatively worded statements. The lowest possible score of an individual is 24 and
highest possible score is 96 on this scale. The scale has been included in the appendix E.

**Extroversion - Introversion Test**

The researcher has used standardized test for extroversion-introversion. The test was constructed by Neymann – Kohlstedt and psychologist John Morgan. The name of the test is Neymann – Kohlstedt Diagnostic Test of Extroversion-Introversion. The test in his present form was standardized on more than 1000 individuals. Half of the questions stated were theoretically pleasing to the extrovert while others were theoretically pleasing to the introvert. In the test each of the 50 statements are followed by alternatives Yes / No. There is no implication of right and wrong in any of these statements and the students were asked to consider them from the viewpoint of their personal likes and dislikes. After reading the first statement if the student liked the idea it expressed, he had to put a tick mark under the ‘Yes’ column and if he did not like the idea expressed he had to put the same sign under the ‘No’ column. The reliability of the test was 0.79 according to Cornbach’s method. Its test – retest reliability was found to be 0.77. The test and the scoring key are included in the appendix F.
Locus of Control Scale:

The locus of control scale is a forced choice rating scale prepared by Shaikh (1999). In forced choice rating sale the respondent is ask, not to say whether the respondent has a certain trait or to say how much of a trait the respondent has but to say whether he has more of one trait than another of a pair. In this scale, two statements about the same high preference value are paired. One of which deals with internal locus of control and the other with external locus of control. In the initial tool, there were 21 pairs of ILOC and ELOC items. In order to determine the content validity, the tool was given to eight experts in the field of education and psychology. After modification of the test on the basis of the suggestions given by the experts a pre pilot study was administered on 93 girl students of standard eleventh from 2 colleges. After administering the tool, the responses were quantified and their Discrimination Index was calculated for each item. Items with DI of 0.20 were regarded as satisfactory and were retained. The reliability was computed using Cronbach’s Alpha method and Spearman Brown formula. The ‘r’ was 0.645 which was relatively high and hence the scale was internally consistent. The final form had 20 items.

Two examples used in Locus of Control Scale are as follows:

1) a) Careful planning done by students help in attaining their goals.
   
   b) Planning is not always helpful because things can turn out to be a matter of luck.
2) a) Failure in students' life is due to lack of efforts made by them for studies.

b) Failure in students' life is due to their bad luck.

The scoring of the scale for the responses were ‘1’ for ‘a’ and ‘0’ for ‘b’. All the 20 statements consisted of two options ‘a’ and ‘b’. The test has been included in Appendix G.

**Hemisphericity Dominance Test (SOLAT):**

This test was prepared by Venkatraman (1996). After going through the literature, functions of right and left hemisphere were listed. The hemisphere functioning in five different areas was considered for identification of dominance and items were written under each area. These items were subjected to jury opinion which consisted of 20 professors and 10 doctors, connected with psychology, anatomy and education. On the basis of their opinion some items were deleted. Some were modified and fifty items (in all the five areas namely learning style, thinking style, problem-solving, gender and affective) were retained. For each item there were 2 statements. In all, there were 100 statements. The tool was then submitted to a panel of judges requesting them to scrutinize the statements for clarity, relevance and appropriateness. A pilot study was conducted to elucidate difficult sentences and modify them into easy language of understanding. The
reliability of the tool was measured by test-retest method. The reliability coefficient for right, left and integrated functioning was 0.89, 0.65, 0.71 respectively which was significant.

The constructed tool was validated with the help of standardised SOLAT tool constructed by Torrance.

To find the validity both SOLAT tools were administered to 300 subjects and the coefficient of correlation for right, left, integrated functions was 0.842, 0.621 and 0.678. It revealed that SOLAT tool prepared possessed reasonable level of concurrent validity. The researcher also found the test – retest reliability by administering the test on 71 students of which 51 were boys and 20 were girls. The test – retest reliability was 0.65. The test and the scoring key have been included in Appendix H.

Motivational Factor Scale:

In order to measure the motivational characteristics of students, a scale prepared by Naik (2000) was used. The students have to read the statements and express their opinion by choosing any one of the four alternatives given. To ascertain the content validity the scale was given to 10 experts in the field of education and psychology. Those items which were agreed upon by 90 percent of the experts were retained, a few were modified according to the suggestions given by these experts. Some statements were deleted from the tool. To determine the item validity the
scale was administered on 63 students including 33 boys and 30 girls. Discrimination index was computed of each item. Those having discrimination index of 0.20 and above were retained, others were deleted. Formerly there were 45 statements, out of which only 25 were retained. To test the reliability of the tool, internal consistency reliability and test retest reliability were found. Internal consistency reliability was determined using Split-Half method which was 0.84 and test-retest reliability was 0.76. The scoring of the test for positively worded statements was 4 for always 3 for frequently, 2 for sometimes, 1 for never, and it was the reverse for negatively worded statements. The test and scoring key are included in the Appendix I

Socio Economic Status Inventory (SESI):

An inventory is a self report instrument in which individual reports, their likes and dislikes, their feelings, their interest or their possession or preferences depending upon the purpose of research.

SESI is prepared by Patel, (1997) which is the modified version of Kallath’s SES inventory prepared in 1985, to measure students’ socio-economic status in terms of the wealth, power, prestige enjoyed by the family. Where in, students indicate their material possessions, size of the family, occupational and educational status of the parents and their cultural and entertainment activities.
Content validity was established by considering the suggestion of 10 experts. To determine item validity, the tool was administered on 100 students of two schools. Discrimination index was computed for each item. Items having 0.20 or more were retained. The final version had 36 items.

Internal consistency reliability was determined by conducting a pretest on 100 students of 2 schools. Split half method was used to find the reliability co-efficient which was 0.96. Test-retest reliability was computed and found to be 0.77.

The examples of items in this inventory are as follows:

1) I live in
   a) a nuclear family  b) an extended family [with grand parents]
   c) a joint family

2) I live in
   a) bungalow,  b) flat,  c) Chawl,  d) hut.

3) We possess the following articles
   a) a bicycle,  b) a moped,  c) a scooter,  d) a motorcycle,  e) our own car,  f) Company given car,  g) more than one car.

The scoring key and the test are included in the appendix J.
3.7. TECHNIQUES OF DATA ANALYSIS

Statistics is a mathematical technique or a process after gathering, organizing, analyzing, and interpretation of numerical data. It is a basic tool of measurement, evaluation and research.

The present research used statistical techniques such as ttest, analysis of variance, analysis of covariance, Pearson’s ‘r’ and Dyer’s Regression Residuals method.

To compare the pretest and posttest scores on creativity and students’ attitude towards school the ttest was used.

Two-way, Analysis of variance was used to find the interaction effect of mediator variables and treatment on gain scores of creativity and students’ attitude towards school.

Analysis of covariance (ANCOVA) was used to remove the effect of the initial differences in the pretest of the experimental and control groups in the present study.

Coefficient of correlation was used to establish the relationship between the pretest and posttest of both the groups.

Dyer’s Regression Residuals Method was used to control pretest scores and SES, and also to control SES, MF and LOC. together.