Chapter - 3

Method

&

Procedure
METHOD AND PROCEDURE

Research Design

The research design is the detailed plan of the investigation. In fact, it is the “blue print” of the detailed procedure of testing the hypothesis and analyzing the obtained data. The research design there may be defined as the sequence of those steps taken ahead of time to ensure that the relevant data will be collected in a way that permits objective analysis of the different hypotheses formulated with respect to the research problems. Thus, the research design helps the researcher in testing the hypothesis by reaching valid and objective conclusions regarding the relationship between independent and dependent variables.

In this chapter a description of the sample, its size, research tools, administration and collection of data and statistical techniques used by the investigator for analyzing data, has been presented.

Sample of the study

The sample of the study has been selected from the two schools of Aligarh Muslim University. For the present purpose only XI standard students were selected for the
study from different streams. Three hundred students (100 boys and 200 girls) have been selected from the following schools on random basis.

These are the only two schools one for girls and one for boys which cater the +2 education under Aligarh Muslim University.


Total students enrolled in science were 935 (317 Girls and 618 boys). In Social Science and Arts stream the test was administrated only to girls of Abdullah School. The students enrolled in Social Science and Arts are 120 girls. The present test of higher mental ability is meant only for science students. Therefore, it could not be applied on social sciences and arts students. However, only for the sake of curiosity hundred girls were taken from social science and arts stream and were given the test of intuition and creative problem solving.

The sample break is as follows:

Stream wise break up of the sample:
Stream | No.
--- | ---
Science | 200 (100 boys and 100 girls)
Arts | 50 (only girls)
Social Science | 50 (only girls)

**Sex-wise break up of the sample**

<table>
<thead>
<tr>
<th>Sex</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>100</td>
</tr>
<tr>
<td>Girls</td>
<td>200</td>
</tr>
</tbody>
</table>

On the whole the sample is representative of the 10+2 school population of Aligarh Muslim University.

**Tools of the study**

In order to collect the data for the present investigation the following tools have been used.

- Test on intuition by Dr. Philip Goldberg
- Test on Higher Mental Ability (THMAS) by Dr. D.N. Sansanwal and Dr. (Mrs.) Anuradha Joshi.
- Passi Usha Test of creative problem solving (PUTCPS) by B.K. Passi and Usha Kumar.

**Test on Intuition**

The test was constructed by Psychologist and the author of “The Intuitive Edge” Dr. Philip Goldberg. This book was one of the first books to be printed for the layman on intuition.
This test contains 32 items. Each right answer was assigned one mark and each wrong answer was assigned zero mark. The test is developed for measuring intuition among students.

The reliability and validity of the test was determined for the present study on a sample of 300 students.

Validity

The discriminatory value of items was found out for the test of intuition. On the basis of high and low scoring in the test, the students on and above 75th percentile position are regarded as high scorers and students scoring on the 25th percentile or below are classified as low scorers. Those items are being accepted whose discriminatory value is 0.55 or above and those items were rejected whose discriminatory value is below 0.55. Total number of items in the test by Goldberg are 32 out of which 23 items were accepted and 9 items were rejected on the basis of discriminatory value of items.

Reliability

The reliability of twenty-three items was determined by split half method. The results are as follows.
\( r = 0.57 \)
\( r = 0.726 \) (after applying the formula \( 2r/1+r \) for correction)

Split Half Method

<table>
<thead>
<tr>
<th>Reliable Half Test</th>
<th>0.570</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliable Full Test</td>
<td>0.726</td>
</tr>
</tbody>
</table>

**Test on Creative Problem Solving**

The present investigator employed Passi-Usha Test of Creative Problem Solving (PUTCPS). This test battery is meant to identify creative talent among the students. The (PUTCPS) is developed for the purpose of measuring creative problem solving of school children and also adult. It measures development of thinking skills—creative, critical and integrative thinking. The abilities included are originality and elaboration.

**Reliability of the Test**

Reliability of the PUTCPS was established through test-retest method.

<table>
<thead>
<tr>
<th>Source</th>
<th>Reliability co-efficient of PUTCPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Originality</td>
<td>0.74</td>
</tr>
<tr>
<td>Elaboration</td>
<td>0.86</td>
</tr>
<tr>
<td>Total Score</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Significant at 0.01 level

74
The test-retest reliability of the PUTCPS and its components are found to be high. The PUTCPS was found reliable for practical purposes of conducting academic studies and research investigations.

**Validity of the Test**

Concurrent validity method was employed to validate the PUTCPS. Concurrent validity was established by working out the relationship between the PUTCPS scores with that of Passi-Tests of Creativity (PTC) and also Torrance Tests of Creative Thinking (TTCT).

**Concurrent Validity of the PUTCPS**

<table>
<thead>
<tr>
<th>Passi Test of Creativity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of students for PUTCPS and PTC</td>
<td>N = 61</td>
</tr>
<tr>
<td>Correlation Coefficient for Criterion Measure PTC</td>
<td>r = 0.40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Torrance Test of Creativity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of students present for PUTCPS and TTCT</td>
<td>N = 53</td>
</tr>
<tr>
<td>Correlation Coefficient for Criterion Measure TTCT</td>
<td>r = 0.56</td>
</tr>
</tbody>
</table>

Significant at 0.01 level
Scoring

The responses were non-verbal or in drawings form. These responses were scored for originality and elaboration on the lines of TTCT and PTC scoring system. The scores on the dimensions of originality and elaboration were added so as to represent a measure of creative problem solving ability.

Originality was assessed on the basis of commonness of responses for which a three-point scale from zero to two was developed. Wrong responses were scored zero, the right and more common responses were scored one, and exceptionally good and original responses were scored two. Level of commonness is decided by the frequency of occurrence of a particular response in a particular group. Greater the frequency of occurrence in the relevant groups, more is the commonness and lower is the score on originality, and vice-versa. Elaboration is the ability to give minute details and work out plans and refinements, implements and sell solutions. In the PUTCPS scoring, Elaboration is assessed by given credit to each pertinent detail (idea) added to the original stimulus figure.
Test on Higher Mental Ability

For measuring mental abilities test of higher mental ability in science (THMAS) was used. It was constructed by Dr. D.N. Sansanwal and Dr. (Mrs.) Anuradha Joshi. The scale consists of 20 items each with alternative responses. The respondents are required to place a tick mark against the best answer of their choice within the parentheses provided for the purpose. For the present test the four levels of cognitive domain have been taken viz application, analysis, synthesis and evaluation. It is applied only on science students.

Details of Items

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Class</th>
<th>No. of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Application</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Analysis</td>
<td>6</td>
</tr>
<tr>
<td>3.</td>
<td>Synthesis</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>Evaluation</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20</td>
</tr>
</tbody>
</table>

Reliability of the Test

Reliability of the test was established by test-retest method. The test was administered to 110 students of class IX. The correlation coefficient was found to be 0.504.
test-retest correlation co-efficient is high. The test-retest reliability co-efficient at the gap of 20 days was found out to 0.816 on 111 class IX students. So it reflects that the developed test of (THMAS) could be taken to be reliable.

Validity of the Test

The concurrent validity was established against the performance of students in science and total academic achievement.

Concurrent Validity Coefficient of the Test

<table>
<thead>
<tr>
<th>Correlation Between</th>
<th>N</th>
<th>Correlation Coefficient</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievement on Test of THMAS and Achievement in Science</td>
<td>104</td>
<td>0.24</td>
<td>Significant at 0.05 level</td>
</tr>
<tr>
<td>Achievement on test of THMAS and total academic achievement</td>
<td>102</td>
<td>0.26</td>
<td>Significant at 0.01 level</td>
</tr>
</tbody>
</table>

It can be seen that the concurrent validity coefficients are 0.24 and 0.26 which are significant at 0.05 level and 0.01 level with df. equal to 102 and 100 respectively.
Although the correlation coefficients are significant yet they are low.

**Scoring**

   The scoring was done according to the instructions provided in the respective manual.

**Administration of the Test**

   From the two schools of AMU, Aligarh, three hundred students were taken. In the process of data collection, the investigator first sought the permission from the Principal of respective schools. To get the correct information from the respondents, the following aspects were taken into consideration.

   The purpose of collection of data was highlighted

   (1) Respondents were assumed that the information provided by them would be kept confidential.

   (2) Respondents were assured that the information would only be used for research purposes and has nothing to do with their school achievement. Students were provided general orientation for the type of item given in the tool and the way to respond it.
(3) They were requested to answer the items carefully and correctly.

(4) The tools were then distributed and respondents were asked to read the instructions provided on the first page and to fill up the entries.

(5) The investigator was vigilant enough to see that each and every columns/items of the tools are filled up by the respondents.

(6) After the completion of the questionnaire according to the time limit, which was different for different section of the test, it was collected from the respondents.

**Statistical Techniques Employed**

In order to examine and justify the objectives of the study, the statistical techniques employed, are product moment correlation and factor analysis. Product moment correlation coefficient was calculated in order to find out the relationship between different variables of the study i.e. intuition, higher mental ability (Application, analysis, synthesis, evaluation) and creative problem solving (right, wrong and original).
In order to obtain the main objective of the study, factor analysis was carried out through the technique of rotated varimax. This was done to find out the factors behind intuition and higher mental ability.