"An individual's personality is his unique pattern of traits. A trait is any distinguishable, relatively enduring way in which one individual differs from others."

GUILFORD 1959
CHAPTER VI

DATA ANALYSIS

6.1 INTRODUCTION

6.2 PROCEDURE OF ANALYSIS

6.3 HOMOGENEITY OF VARIANCE TEST

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Study : 2  Trend across treatments

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Study : 4  Reading facility vs Creativity

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INTERACTIVE EFFECTS:

6.6.1 First order Interaction Effect

Study : 5  Treatment x Creative Personality (A x B)

Study : 6  Treatment x Reading facility (A x C)
Study : 7 Creative personality X Reading Facility (B X C)

6.6.2 Second Order Interaction Effect

Study : 8 Treatment X Creative Personality X Reading Facility

6.7 CR-BLOCK STUDY

Study : 9 CR-Blocks v/s Creativity

Study : 10 Trend Across 4 - CR - Blocks

6.8 RESUME
6.1 INTRODUCTION

Keeping in view with the various hypotheses formulated in the fourth chapter, there were mainly three independent variables under study. The independent variables incorporated are:

(i) Treatment: Three levels
   (a) CTP with feedback
   (b) CTP without feedback
   (c) No CTP i.e. no programme.

(ii) Creative Personality levels: Two levels
    (a) High
    (b) Low

(iii) Reading Facility levels: Two levels
     (a) Good
     (b) Poor

The dependent variable was creativity score obtained by pupils after taking creativity test developed by J.Z. Patel. Every due care was taken while administering, scoring and conducting the research study. As described earlier the entire research study was done through factorial design.
According to the design and the main, as well as interactive effects which may occur, a complete structural model for a score in 3x2x2 factorial design is postulated below:

\[ Y = G + A + B + C + AB + AC + BC + ABC + E \]

where,

- \( Y \) = Dependent variable score
- \( G \) = Usual Grand mean
- \( A \) = Effects due to treatment (Creative Thinking Programme)
- \( B \) = Effects due to creative personality
- \( C \) = Effects due to reading facility
- \( E \) = Effects due to Errors.

The predetermined procedure for analysing data is briefed in next chapter.

6.2 PROCEDURE OF ANALYSIS

The analysis of the data was done with the help of calculator in the order given as under:

1. The mean and variance of 3x2x2 factorial design was computed.
2. The tests of homogeneity of variance were given prior to ANOVA to the data of F.C.
3. Orthogonal Contrast Matrix were constructed to
partition sum of square for one/two degree/s of freedom for F.D.

(4) To locate significance among means, Newman-Keul's sequence Range test was given to arrive at appropriate means.

(5) Trend test was also completed for the F.D. for treatment.

6.3 HOMOGENEITY OF VARIANCE TEST

Prior to Carrying out ANOVA on the data, Homogeneity of variance must be tested according to Ray Meddis.¹

"When there are three or more samples it is necessary to test whether all groups were drawn from the population with the same variance."

Despite the fact, there is an equal number of observations per cell, the investigator was anxious to know whether or not the independent variables produced unusual differences in the variability of response measures. The descriptive data together with scored X mean and variances of the F.D. are given below in table 6.1 and 6.2.

TABLE: 6.1.
SCORES FOR 3x2x2 (TREATMENT X CTE. PER. X READ. FAC.)
FACTORIAL DESIGN (N = 10, K = 12).

<table>
<thead>
<tr>
<th>NO.</th>
<th>CTP - With F.B.</th>
<th>CTP - Without F.B.</th>
<th>No CTP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High CTE. PER.</td>
<td>Low CTE. PER.</td>
<td>High CTE. PER.</td>
</tr>
<tr>
<td>1</td>
<td>316</td>
<td>306</td>
<td>219</td>
</tr>
<tr>
<td>2</td>
<td>306</td>
<td>285</td>
<td>245</td>
</tr>
<tr>
<td>3</td>
<td>216</td>
<td>272</td>
<td>162</td>
</tr>
<tr>
<td>4</td>
<td>228</td>
<td>203</td>
<td>187</td>
</tr>
<tr>
<td>5</td>
<td>236</td>
<td>235</td>
<td>155</td>
</tr>
<tr>
<td>6</td>
<td>251</td>
<td>206</td>
<td>223</td>
</tr>
<tr>
<td>7</td>
<td>240</td>
<td>197</td>
<td>128</td>
</tr>
<tr>
<td>8</td>
<td>276</td>
<td>228</td>
<td>162</td>
</tr>
<tr>
<td>9</td>
<td>255</td>
<td>170</td>
<td>186</td>
</tr>
<tr>
<td>10</td>
<td>265</td>
<td>213</td>
<td>172</td>
</tr>
<tr>
<td>X</td>
<td>2609</td>
<td>2315</td>
<td>1839</td>
</tr>
<tr>
<td>X²</td>
<td>2600.9</td>
<td>2315.5</td>
<td>1839.9</td>
</tr>
<tr>
<td>X² footwear</td>
<td>68295</td>
<td>554777</td>
<td>349347</td>
</tr>
<tr>
<td>X² footwear</td>
<td>1069.69</td>
<td>1566.42</td>
<td>1156.87</td>
</tr>
</tbody>
</table>
From the table 6.1 necessary statistics for analysis were briefed and displayed in the Table 6.2

### TABLE 6.2

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>TREATMENT</th>
<th>CTP-WITH F.B.</th>
<th>CTP-WITHOUT F.B.</th>
<th>NO - CTP</th>
<th>GRAND</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$\Sigma x$ 2609</td>
<td>$\Sigma x$ 2298</td>
<td>1737</td>
<td>6644</td>
</tr>
<tr>
<td>Good</td>
<td>$\Sigma x^2$ 6882.95</td>
<td>5388.67</td>
<td>310698</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R.F.</td>
<td>$\Sigma x$ 260.9</td>
<td>229.8</td>
<td>173.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>Vari. 1069.69</td>
<td>1196.3</td>
<td>808.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crea.</td>
<td>$\Sigma x$ 2315</td>
<td>180</td>
<td>1773</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>$\Sigma x^2$ 522777</td>
<td>333740</td>
<td>301699</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pet.</td>
<td>$\Sigma x$ 231.5</td>
<td>180.6</td>
<td>177.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Vari. 1566.42</td>
<td>883.64</td>
<td>1157.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crea.</td>
<td>$\Sigma x$ 1839</td>
<td>503</td>
<td>1322</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>$\Sigma x^2$ 183.1</td>
<td>81</td>
<td>132.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pet.</td>
<td>Vari. 1156.89</td>
<td>732.21</td>
<td>1682.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>$\Sigma x$ 11512</td>
<td>53</td>
<td>1125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crea.</td>
<td>$\Sigma x^2$ 238352</td>
<td>164125</td>
<td>135097</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>$\Sigma x$ 51.5</td>
<td>125.3</td>
<td>112.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pet.</td>
<td>Vari. 913.25</td>
<td>712.41</td>
<td>1330.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRAND</td>
<td>$\Sigma x^2$ 1798771</td>
<td>1264855</td>
<td>934148</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Sigma x$ 206.95</td>
<td>171.5</td>
<td>148.92</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The statistics shown in this table could be easily used for analysis of variance in the next caption.

Hartley's Fmax statistics for 3x2x2 factorial design can be used appropriately on the cell variance.\(^2\)

Thus,

\[
F_{\text{max}} = \frac{\text{Highest variance}}{\text{Lowest variance}}
\]

\[
= \frac{1682.36}{712.41}
\]

\[
= 2.3615
\]

The value of F\(_{\text{max}}\) is 2.3615 which is non significance. Then it was held that the variances were homogeneous.

The above test of homogeneity of variance paved the way for the ANOVA for the study undertaken.

6.4. ANALYSIS OF VARIANCE

The ANOVA model, the primary ANOVA, Orthogonal Matrix and detailed ANOVA are discussed hereunder and computed statistics are shown in the tables.

6.4.1 ANOVA Model

The creativity was the dependent variable, while treatment, creative personality and reading facility were the independent variables. Each of the independent variable was dichotomized into three and two levels respectively.

According to Allen L. Edward\(^3\)

"When the levels of factors are not randomly selected, the ANOVA model is referred to as a fixed effect model when the levels of each factor have been randomly selected from the large population. The ANOVA model is referred to as a random effect model. If the levels of some factors have been randomly selected and those of others have not, the ANOVA model is referred to as a mixed model."

Before proceeding with the ANOVA it would be useful to look into the assumption underlying the ANOVA technique. They are parametric assumption.

(i) An equal unit scale is assumed for the measurement of the dependent variable.

(ii) Homogeneity of variance is the basic assumption. That is sample of the group coming from the same population have equal \textit{variance}.

\---

6.4.2 Primary ANOVA

The sum of squares (SST) between, sum of squares (SSB) and within the sum of squares (SSW) are to be computed for the significance of the mean square for observed data by the formula shown in Table 6.3.

**TABLE 6.3**

**COMPUTATION OF SUM OF SQUARES**

(n=10, K=12)

\[
SST = \sum X_1^2 + \sum X_2^2 + \cdots + \sum X_{120}^2 - \frac{\sum X^2}{N}
\]

= 878342

SSB = 455773

SSW = SST - SSB

= 878342 - 455773

= 422569

The analysis of variance resulted into a partitioning of the total sum of squares and the degree of freedom into two parts. One part was associated with the differences among twelve group means and was based on K-1=11, degree of freedom. The other part was associated with the variation within each of the 12 groups, and have K(n-1)=108 degree of freedom. This analysis is shown in table 6.4.
Table 6.4

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>Sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Group</td>
<td>455773</td>
<td>11</td>
<td>41433.90</td>
<td>10.88</td>
</tr>
<tr>
<td>Within group</td>
<td>422569</td>
<td>108</td>
<td>3912.67</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>878342</td>
<td>119</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the above table, the F was found to be significant at 11/119 degree of Freedom.

Hence it was concluded that the group means differed significantly.

6.4.3 Orthogonal Matrix for ANOVA

This research study consisted of a factorial design which studied three main effects i.e. one at three levels and other two at two levels. It also studied the partitioning of the sum of squares of such main effect. As it was felt that the factorial design would take a lot of time, the investigator tried to compute ANOVA by means of orthogonal contrast. The concept of orthogonal contrast is in short described in the following paragraphs.

An unique and silent features of a set of orthogonal contrast is that they form the basis for a complete partitioning of the treatment sum of squares from the
analysis of variances. For samples of equal size, the following conditions define a set of orthogonal contrast.

(i) The sum of gross products of co-efficients for every pairs of contrasts must be zero.

(ii) The sum of contrasts co-efficients for contrast must be zero.

For a set of n sample, means set of n-1 orthogonal contrasts 'consume', the degree of freedom available in the set of sample means. Various sets of orthogonal contrasts can be built on the same set of sample means. The number of orthogonal contrast depends on the nature of the research design and the interest of the investigator, each set will absorb the n-1 degree of freedom and will completely partition the treatment sum of squares. In the present factorial design the cell in the phase were 3x2x2 = 12. Thus under the phase, there might be 12-1 = 11 orthogonal contrast. The orthogonal matrix of 3x2x2 phase factorial design is given in table 6.5.
## Table 6.5

**Orthogonal Matrices of 3x2x2 Design** (N=10, K=12)

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>CTP- With F.B</th>
<th>CTP-Without F.B</th>
<th>NO CTP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Low High</td>
<td>Low High Low</td>
<td>Ex</td>
</tr>
<tr>
<td>Good</td>
<td>Poor Good</td>
<td>Poor Good</td>
<td>Good</td>
</tr>
<tr>
<td>A_1</td>
<td>1 1 1 1 -1</td>
<td>-1 -1 -1 0</td>
<td>0</td>
</tr>
<tr>
<td>A_2</td>
<td>1 1 1 1 1</td>
<td>1 1 1 1 -2 -2 -2</td>
<td>-2</td>
</tr>
<tr>
<td>B</td>
<td>1 -1 -1 -1</td>
<td>1 1 -1 -1 1</td>
<td>1 1 1 1 1</td>
</tr>
<tr>
<td>C</td>
<td>-1 1 -1 -1</td>
<td>-1 -1 -1 -1 1 1</td>
<td>-1 1 1 1</td>
</tr>
<tr>
<td>A_1B</td>
<td>1 1 -1 -1</td>
<td>-1 -1 -1 1 1 0</td>
<td>0</td>
</tr>
<tr>
<td>A_1C</td>
<td>1 -1 1 -1</td>
<td>-1 1 -1 -1 1 1</td>
<td>-1</td>
</tr>
<tr>
<td>A_2B</td>
<td>1 1 -1 -1</td>
<td>-1 1 -1 -1 -2 -2</td>
<td>2 2 2</td>
</tr>
<tr>
<td>C</td>
<td>-1 1 -1 -1</td>
<td>-1 -1 -1 -1 -2 -2</td>
<td>2 2 2</td>
</tr>
<tr>
<td>B_1</td>
<td>1 -1 -1 1</td>
<td>-1 1 -1 -1 1 1</td>
<td>-1</td>
</tr>
<tr>
<td>B_2</td>
<td>1 -1 -1 -1</td>
<td>-1 -1 -1 -1 1 1</td>
<td>-1</td>
</tr>
<tr>
<td>A_1B_2</td>
<td>1 -1 -1 1</td>
<td>-1 1 -1 -1 -2 -2</td>
<td>2 2 2</td>
</tr>
</tbody>
</table>

**MSdi** | **MSS**
---|---
8 | 1373 | 18933.74 |
24 | 2612 | 23048.57 |
12 | 3122 | 298910.52 |
12 | 1187 | 0.37 |
8 | 16 | 3207.56 |
8 | 7 | 87.32 |
24 | 32 | 2.57 |
24 | 197 | 0.07 |
12 | 237 | 0.82 |
8 | 326 | 830.05 |
24 | 67 | 92.48 |

**SUM** 2609 2315 1839 1515 2298 1806 1503 1253 1737 1773 13 1125 455773.07
From the table 6.5, it can be seen that, from the Orthogonal Contrast matrix the ANOVA summary for factorial design was extracted. The computation for error variance was made and entered into the ANOVA summary of 3x2x2 phase factorial design. The ANOVA summary for factorial design is given in the table 6.6.

6.4.4 Detailed ANOVA

The sum of all the MSS for each degree of freedom is 455773.07 (table 6.5) which is nearly equal to the sum of square between 455773.00 (table 6.4). It confirms the right process of constructing the orthogonal matrix for detailed analysis of variance.

The computed ANOVA summary for 3x2x2 factorial design is shown in table 6.6.
### Table 6.6

**ANOVA Summary for 3x2x2 Factorial Design**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MSq</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>1</td>
<td>18933.74</td>
<td>18933.74</td>
<td>4.83</td>
</tr>
<tr>
<td>A2</td>
<td>1</td>
<td>23048.57</td>
<td>23048.57</td>
<td>5.89</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>298910.52</td>
<td>298910.52</td>
<td>76.30</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>80904.37</td>
<td>80904.37</td>
<td>20.67</td>
</tr>
<tr>
<td>A1B</td>
<td>1</td>
<td>3207.56</td>
<td>3207.56</td>
<td>0.81</td>
</tr>
<tr>
<td>A1C</td>
<td>1</td>
<td>89.32</td>
<td>89.32</td>
<td>0.02</td>
</tr>
<tr>
<td>A2B</td>
<td>1</td>
<td>4482.57</td>
<td>4482.57</td>
<td>1.14</td>
</tr>
<tr>
<td>A2C</td>
<td>1</td>
<td>7893.07</td>
<td>7893.07</td>
<td>2.01</td>
</tr>
<tr>
<td>BC</td>
<td>1</td>
<td>8104.82</td>
<td>8104.82</td>
<td>2.07</td>
</tr>
<tr>
<td>A1BC</td>
<td>1</td>
<td>8306.05</td>
<td>8306.05</td>
<td>2.12</td>
</tr>
<tr>
<td>A2BC</td>
<td>1</td>
<td>1892.48</td>
<td>1892.48</td>
<td>0.48</td>
</tr>
<tr>
<td>Error</td>
<td>108</td>
<td>422569</td>
<td>3912.67</td>
<td></td>
</tr>
</tbody>
</table>

For df 1/108

\[
F = 3.57 \text{ at } 0.05 \quad *^5 \\
\text{NS + Non Significant}
\]

\[
= 6.57 \text{ at } 0.01 \quad **
\]
### TABLE 6.7
**MEAN FOR THE LEVELS OF THE MAIN VARIABLES UNDER THE STUDY**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variables</th>
<th>Means for the levels</th>
<th>M.D. between level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CTP-with F.B.</td>
<td>206.95</td>
<td>35.45</td>
</tr>
<tr>
<td></td>
<td>CTP-without F.B.</td>
<td>171.50</td>
<td>22.58</td>
</tr>
<tr>
<td></td>
<td>No CTP</td>
<td>148.92</td>
<td>58.03</td>
</tr>
<tr>
<td>2</td>
<td>Creative Personality</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>201.48</td>
<td>69.36</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>140.12</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Reading facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>179.52</td>
<td>31.85</td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>147.67</td>
<td></td>
</tr>
</tbody>
</table>

After analysing the data, the next step would be to test the various hypothesis enumerated in the fourth chapter one by one into two parts.

(i) Main effects

(ii) Interaction effects.

Along with the testing hypothesis the trend analysis study had been done in the next chapter.
6.5 TESTING OF HYPOTHESIS : MAIN EFFECTS

The hypothesis of the main effects viz. Creative Thinking Programme (CTP), Creative Personality and Reading Facility are tested as shown below:

**Study-1 : Treatment v/s Creativity**

In order to know the effectiveness of the Creative Thinking Programme on the creativity of the primary school students of class VII, the following alternative hypothesis was formulated and put F-test.

**HA :** Creative Thinking Programmes increase the level of creativity of the primary school students.

From the table 6.6 it is observed that value of treatments is 4.83 which is significant at 0.05 level. The students of experimental group (to whom CTP was tried, with and without F.B.) and control group (to whom CTP was not tried out) differed significantly in their creativity levels.

From table 6.6 it is also observed that F value of treatments is 5.89 which is significant at 0.01 level. Three treatments groups differ significantly in their creativity scores.

To look at the significance of mean, The Newman -
Keul's sequential information for the test is given in the table 6.8.

**Table 6.8**

**SUMMARY OF EXACT DIFFERENCES BETWEEN THE PAIRS OF MEANS OF TREATMENT GROUPS AND N.K. VALUES**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No CTP</th>
<th>CTP Without F.B.</th>
<th>CTP With F.B.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\bar{x}$</td>
<td>148.92</td>
<td>171.5</td>
<td>206.95</td>
</tr>
<tr>
<td>MD</td>
<td></td>
<td>22.58*</td>
<td>58.03**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>35.45**</td>
</tr>
<tr>
<td>N.K. Value</td>
<td>$\frac{MD}{SE}$</td>
<td>2.28</td>
<td>5.86</td>
</tr>
</tbody>
</table>

First mean difference 22.58 between CTP without F.B. and No CTP group is significant at 0.05 level, while the last two mean differences between CTP with F.B. and CTP without F.B. groups are significant. The relationship between these three treatment groups can be shown symbolically as below:

CTP WITH F.B. $\Rightarrow$ CTP WITHOUT F.B. $\Rightarrow$ NO CTP

This result reveals in graph No.1.
Graph 1

Mean of creativity scores of students of 3 treatments groups.

Treatments:
- CTP With F.B.
- CTP Without F.B.
- No CTP

Mean scores of CR:
- 260
- 240
- 220
- 200
- 180
- 160
- 140
- 120
- 100
To see the trend across treatments the trend test was also attempted.

**Study-2 : Trend Across Treatments**

The functional relationship of creativity across the three given treatments viz. Creative Thinking Programme with Feedback, Creative Thinking Programme without feedback and no Programme, can be studied by employing trend test. The relevant data and the computation of trend are given in the table 6.9.

**TABLE 6.9**

**TREND TEST ACROSS THREE TREATMENTS**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>CTP with F.B.</th>
<th>CTP Without F.B.</th>
<th>NO CTP</th>
<th>Coeff² contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sums trends</td>
<td>8278</td>
<td>6860</td>
<td>5957</td>
<td></td>
</tr>
<tr>
<td>Linear</td>
<td>-1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Quadratic</td>
<td>1</td>
<td>-2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Linear Component = \( \frac{(-2321)^2}{10 \times 4 \times 2} \)

= \( \frac{5387041}{80} \)

= 67338.012
The trend of creativity developed by the three different treatments is seemed to be linear one. The trend across treatments can be read from the graph-1.
**Study-3 : Creative Personality v/s Creativity**

In order to know whether there is a relationship between the creative personality of the primary school students and the creativity acquired by them after the administration of CTP, the following hypothesis is generated and put to F-test.

**H₀** There is no significant mean difference in creativity of the primary students who possess High and Low creative personality.

From table 6.6 it is observed that the F-value for creative personality as one variable is 76.39, which is significant at 0.01 level. Hence the null hypothesis is not accepted.

So it was concluded that the means of creativity scores of children possessing high or low creative personality differed significantly and the mean difference of 58.03 (table 6.7) was in favour of the CTP Programme implementation signifying thereby that the creative personality was effective variable in enhancing the creativity level of primary students.

This result reveals in the graph No.2.
CREATIVE PERSONALITY SCORES OF STUDENTS OF HIGH & LOW GROUPS.
In order to know whether there is a relationship between the reading facility of the students and their creativity, the following null hypothesis was generated and put to F-test.

$H_0$ There is no significant mean difference in the creativity scores of students having Good and Poor reading facility.

From table 6.6, it is observed that $F$ value for variable R.F. is 20.67, which is significant at 0.01 level. Hence null hypothesis was not acceptable.

Therefore it was concluded that there was a significant difference of 69.36 (Table 6.7) between the creativity scores of pupils of the Good and Poor Reading facility and this difference was in favour of good level R.F.

This difference of 31.85 can be perceived from the graph No.3.
Good
Reading facility

Mean creativity scores of students of G.R. & P.R. groups.
6.6 TESTING HYPOTHESIS : INTERACTIVE EFFECT

The ANOVA summary given in table 6.6 furnishes full detail as regards significant and non-significant interaction of independent variables. It can be seen from the table that no any significant effects of interaction effect (first or second order) of the independent variables on the creativity of the students, so the study for each inactive effect had been stated as below:

6.6.1 First Order Interaction Effect

Study-5 : Treatment x Creative personality (AXB)

In order to know whether treatments and initial creativity of the primary students interact with each other in the enhancement of creativity scores, the following null hypothesis was generated and put to F-test.

HO There is no significant interaction effect of treatments and creative personality of students on their creativity scores.

From table 6.6 it can be observed that the F values for $A_1B$ and $A_2B$ are 0.81 and 1.14 respectively, which are not significant, hence the above null hypothesis was accepted and it was concluded that there was no significant interaction between the given treatment and the creative personality. This can be read from the graph No. 4.
Graph 4

Mean scores of C.R.

<table>
<thead>
<tr>
<th>B₁</th>
<th>A₁</th>
<th>CTP with F.B.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B₂</td>
<td>A₂</td>
<td>CTP without F.B.</td>
</tr>
<tr>
<td></td>
<td>A₃</td>
<td>NO CTP</td>
</tr>
</tbody>
</table>

Creative Personality

Interaction effect of treatment × creative personality on creativity scores.
Study-6: Treatment and Reading Facility (AXC)

In order to know whether treatments and reading facility of primary school students interact with each other in enhancing the creativity scores, the following null hypothesis was generated and put to F-test.

\[
H_0 \quad \text{There is no significant interaction effect of the treatment and reading facility to the students on their creativity scores.}
\]

From the table 6.6 it can be seen that the F value for A_1C and A_2C are 0.02 and 2.01 respectively which are not significant. Hence the above null hypothesis was accepted and it was concluded that there was no significant interactive effect of given treatments and reading facility of the students in developing their creative ability.

This can be easily read from the graphic data shown on the graph No. 5.
INTERACTION EFFECT OF TREATMENT X READING FACILITY ON CREATIVITY SCORES.
Study-7 : Creative Personality x Reading Facility (BXC)

In order to know whether initial creativity and reading facility of the primary school students on interactive effect in developing the creativity level of the students, the following null hypothesis was generated and put to F-test.

H0 There is no significant interaction effect of creative personality and reading facility of the students on their creativity scores.

From table 6.6, it can be read that F values for B x C is 2.07 which is not significant. Hence the above null hypothesis was accepted and it was concluded that there was no significant interaction between the initial creativity and reading facility of the students in enhancing their creative levels. This can be easily read from graph No.

6.6.2 Second Order Interaction Effect

Study-8 : Treatment x Creative personality x Reading facility

To study the joint effect of all the three independent variables on the creativity of the primary school students, the following null hypothesis was generated and put
to F-test.

\[ \text{HO There is no significant interaction effect of treatment, creative personality and Reading Facility on creativity of children.} \]

From table 6.6 it can be observed that the F values for \( A_1BC \) & \( A_2BC \) are 2.12 and 0.48 respectively which are not significant. Hence the above null hypothesis was accepted and it was concluded that there was no significant interaction effect of treatments, creative personality and reading facility in the enhancement of the creativity scores, which is revealed in the graph No. 6

6.7 **CR - BLOCK STUDY**

It is found that the interactive effect of initial creativity and reading facility of the primary school students was not significant on the acquired creativity of the students. As initial creativity and reading facility of the pupils are the creative correlates, the investigator had decided to construct the creative reading facility blocks by dichotomized both the variables. They are as follows:

Block : 1 : High Creativity and Good Reading Facility
INTERACTION EFFECT OF CREATIVE PERSONALITY X READING FACILITY ON CREATIVITY.
Block 2: High Creativity & Poor Reading Facility
Block 3: Low Creativity & Good Reading Facility
Block 4: Low Creativity & Poor Reading Facility

To see the significance of means of the four CRF-Blocks one study is undertaken and to test the trend across the blocks other study is undertaken in the caption follows:

Study 9: CR-Blocks vs Creativity

In order to know whether there is a relationship between the CR-Blocks and their creativity, the following hypothesis was generated.

$H_0$: There is no significant mean difference in the creativity scores of the students of different CR-Blocks.

To locate the significance of means, the Newman-Keul's sequential test was applied, the relevant information of the test is given in table 6.10 below.
TABLE 6.10

SUMMARY OF EXACT DIFFERENCES BETWEEN PAIRS OF MEANS OF 4 CR - BLOCKS (n= )

<table>
<thead>
<tr>
<th>CR-BLOCKS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LCPR</td>
<td>LCGR</td>
<td>HCPR</td>
<td>HGGR</td>
</tr>
<tr>
<td>$\bar{x}$</td>
<td>129.76</td>
<td>155.46</td>
<td>196.46</td>
<td>221.46</td>
</tr>
<tr>
<td>$x - \bar{x}$</td>
<td>25.7</td>
<td>64.66**</td>
<td>93.95**</td>
<td>38.96**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>67.28**</td>
<td></td>
</tr>
<tr>
<td>N.K. Value</td>
<td>2.59</td>
<td>3.94</td>
<td>6.80</td>
<td>1.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.86</td>
<td>1.51</td>
</tr>
</tbody>
</table>

The Newman-Keul's statistics have been calculated by applying the formula:

$$\text{N.K. Value} = \frac{\text{Mean Difference}}{\sqrt{\text{Error Variance}/n}}$$

and shown in the above table, the significant level is decided from the steps between two means by using the table C-4.

The mean difference 25.7 between LCPR and LCGR blocks was not significant, while the mean differences 28.32 between HCPR and HGGR block was significant.
Other four mean differences 64.66, 93.95, 38.96 and 67.28 have been found significant at 0.01 level.

The following relationships are established:

\[(HCG) > (HCP) > (LCPGR = LCPFR)\]

This relationship is revealed in the graph No.7.

From the above, it is evident that-

(i) Students possessing low creativity level but different reading facility level could not significantly gain the creativity scores.

(ii) Students possessing high creativity level but different reading facility level could significantly gain the creativity scores.

(iii) Students possessing high creativity level and poor reading facility level could gain significantly the creativity scores.

To study the trend of the creativity across these four CR-Blocks, the test is worth to apply.

Trend Study 10: Across 4 CR-Blocks

The functional relationship of creativity across the four creative personality, reading facility blocks, can be studied by employing trend test. The relevant
THE MEAN CREATIVITY SCORES OF THE STUDENTS OF DIFFERENT CR BLOCKS.
data and computation involved are given in Table 6.11.

**TABLE 6.11**

**TREND ACROSS FOUR BLOCKS**

<table>
<thead>
<tr>
<th>Blocks</th>
<th>LCPR</th>
<th>LCGR</th>
<th>HCPR</th>
<th>HCGR</th>
<th>Coeff²</th>
<th>Contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sums trends</td>
<td>3893</td>
<td>4664</td>
<td>5894</td>
<td>6644</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear</td>
<td>-3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>20</td>
<td>9483</td>
</tr>
<tr>
<td>Quadratic</td>
<td>1</td>
<td>-1</td>
<td>-1</td>
<td>1</td>
<td>4</td>
<td>-21</td>
</tr>
<tr>
<td>Cubic</td>
<td>-1</td>
<td>3</td>
<td>-3</td>
<td>1</td>
<td>20</td>
<td>939</td>
</tr>
</tbody>
</table>

Linear Component = \(\frac{(9483)^2}{24 \times 20}\)

= \(\frac{89927289}{480}\)

= 187348.51

F-Linear = \(\frac{187348.51}{3912.67}\)

= 47.8825

Hence, F-linear is significant.

Quadratic component = \(\frac{(-21)^2}{24 \times 4}\)

= \(\frac{441}{96}\)

= 4.5937

F-Quadratic = \(\frac{4.5937}{3912.67}\)

= 0.00117
Hence F-quadratic is Non significant.

Cubic Component  
\[ (939)^2 \over 24 \times 20 \]  
\[ = \frac{881721}{480} \]  
\[ = 1836.91 \] 

F-Cubic  
\[ = \frac{1836.91}{3912.67} \]  
\[ = 0.4694 \] 

Hence F-Cubic is Non significant.

From the above table it is seen that only the linear trend is significant with respect to the different CRF - Blocks, while the quadratic and cubic trends are non-significant with respect to the different CRF - Blocks.

This proves that the block has a linear concern with the creativity scores of the primary school students in the blocks. The results can be read from the graph-8 with respect to the given three treatments.
TREND OF CREATIVITY ACROSS CR BLOCKS W.R.T. TREATMENTS.
In this chapter, the investigator has discussed in detail the main effect as well as interactive effect of the various independent variables on the creativity level of the students. The trend test across treatments have been applied to study the functional relationship i.e. trend between student's creativity and the treatment given to them.

The investigator, in the next chapter, intends to present the result of the research study in terms of general observations, tentative conclusions arrived at, and some suggestions for further researches.