Chapter - IV

Analysis & Interpretation of Data...
CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

In the preceding chapters, the problem of the study, theoretical basis of the problem its objectives, hypotheses and the methods of the study were discussed. The present chapter has been devoted to the analysis, interpretation and the discussion of results. The analysis of the attainment scores has been performed through analysis of variance technique for two factors experiment with repeated measures on one factor separately for class VI, VII and VIII.

4.1. ANALYSIS OF VARIANCE ON SCORES OF MATHEMATICAL SKILLS: VI GRADE

The analysis has been designed to test the following null hypotheses:

Ho.1: Mean achievement scores on Mathematical Skills of VI graders belonging to different levels of Parental Involvement do not differ.

Ho.2: Mean achievement scores on Mathematical Skills of VI graders on different taxonomic categories of objectives do not differ.

Ho.3: Parental Involvement and categories of Bloom’s Taxonomy do not interact in respect of mean achievement of Mathematical Skills of VI graders.

The sum of squares, degrees of freedom and F-ratios for Parental Involvement and Categories of objectives have been given in the following table no.4.1. for ANOVA.
Table 4.1. Summary table of 3x3 analysis of variance on scores of mathematical skills: VI Grade

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>S.S.</th>
<th>d.f.</th>
<th>M.S.S.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>47527.63</td>
<td>90</td>
<td>528.08</td>
<td></td>
</tr>
<tr>
<td>A (Parental Involvement)</td>
<td>9319.47</td>
<td>2</td>
<td>4659.73</td>
<td>10.73**</td>
</tr>
<tr>
<td>Subjects within groups</td>
<td>38208.16</td>
<td>88</td>
<td>434.18</td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td>120303.34</td>
<td>182</td>
<td>661.01</td>
<td></td>
</tr>
<tr>
<td>B (Objectives)</td>
<td>96306.35</td>
<td>2</td>
<td>48153.17</td>
<td>358.66**</td>
</tr>
<tr>
<td>A x B</td>
<td>367.09</td>
<td>4</td>
<td>91.77</td>
<td>0.68</td>
</tr>
<tr>
<td>B x Subjects within groups</td>
<td>23629.90</td>
<td>176</td>
<td>134.26</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level of confidence
**Significant at the 0.01 level of confidence

- **Main Effect A: Parental Involvement**

It may be observed from the table that the F-ratio for the difference between mean scores of the three parental involvement groups was found significant at the 0.01 level of confidence. It suggests that the means of the three parental involvement groups may be considered as different at the specified level of confidence. Hence, the null hypothesis Ho.1 is rejected. This may be inferred that the means of the achievement scores of the three groups were different beyond the contribution of chance factor.

In order to ascertain which pairs of the groups showed difference, the F-ratio has been followed by t-test. The values of t-ratios for different pairs of parental involvement groups along with their respective means have been given in the table no.4.2. below:
Following hypotheses were tested through this analysis:

**Ho.1.1:** Mean achievement scores on Mathematical Skills of VI graders belonging to high and low Parental Involvement do not differ.

**Ho.1.2:** Mean achievement scores on Mathematical Skills of VI graders belonging to high and average Parental Involvement do not differ.

**Ho.1.3:** Mean achievement scores on Mathematical Skills of VI graders belonging to average and low Parental Involvement do not differ

Table 4.2. Showing t-ratios for the difference between means of different combination pairs.

<table>
<thead>
<tr>
<th></th>
<th>High PI N=90</th>
<th>Average PI N=93</th>
<th>Low PI N=90</th>
</tr>
</thead>
<tbody>
<tr>
<td>High PI</td>
<td>--</td>
<td>1.69*</td>
<td>4.57**</td>
</tr>
<tr>
<td>M1=63.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average PI</td>
<td></td>
<td>--</td>
<td>2.91**</td>
</tr>
<tr>
<td>M2=58.54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low PI</td>
<td></td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>M3=49.54</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level of confidence

* *Significant at the 0.01 level of confidence

It may also be observed from the table no.4.2, that the t-ratio for the difference in means of achievement score of between high and low parental involvement group was found significant at the 0.01 level of confidence. Hence, the hypothesis Ho.1.1 was rejected at the specified level of confidence. The observation of their respective means reveals that the mean attainment (63.77) of high parental involvement group was higher than the mean attainment (49.54) of low parental involvement group.

It may be observed from the table no.4.2, that the t-ratio for the difference in means of achievement scores of high and average parental involvement groups was found to be marginally significant at the 0.05 level of confidence. Hence, the hypothesis Ho.1.2 was rejected at the specified level of confidence. It indicates that
the two means may be taken as different at the specified level of confidence. The observation of their respective means reveals that the mean attainment scores (63.77) in mathematical skills of the high parental involvement was found higher than the mean attainment (58.54) of average parental involvement.

It may be observed from the same table no.4.2 that the difference in means of achievement scores of average and low parental involvement groups was found significant at the 0.01 level of confidence. Hence, the hypothesis Ho.1.3 was rejected at the specified level of confidence. The observation of their respective means reveals that, the mean attainment scores (58.54) of average parental involvement group was higher than the mean attainment scores (49.54) of low parental involvement group.

- **Main Effect B: Bloom’s Taxonomic Categories**

Referring back to the Analysis of variance table no.4.1, it may be observed from the table that the F-ratio for the difference in mean achievement scores for the different taxonomic categories was found highly significant at the 0.01 level of confidence, suggesting that the means, at the different taxonomic categories were different. Hence the hypothesis Ho.2 was rejected at the specified level of confidence. In order to ascertain which combination of groups were different, F-ratio was followed by t-test. The t-ratios for the different pairs of objective categories along with their respective means have been given in the table no.4.3.

Following hypotheses were tested through this analysis:

**Ho.2.1:** Mean achievement scores on Mathematical Skills of VI graders are not different on Remembering and Understanding category of Bloom’s Taxonomy.

**Ho.2.2:** Mean achievement scores on Mathematical Skills of VI graders are not different on Remembering and Higher Order category of Bloom’s Taxonomy.

**Ho.2.3:** Mean achievement scores on Mathematical Skills of VI graders are not different on Understanding and Higher Order category of Bloom’s Taxonomy.
Table 4.3. Showing t-ratios for the difference between means of different combination pairs

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Remembering M&lt;sub&gt;1&lt;/sub&gt;=78.56</th>
<th>Understanding M&lt;sub&gt;2&lt;/sub&gt;=60.45</th>
<th>Higher Order M&lt;sub&gt;3&lt;/sub&gt;=32.88</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=91 (N=91)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10.53</strong></td>
<td></td>
<td><strong>16.03</strong></td>
<td></td>
</tr>
<tr>
<td><strong>26.56</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level of confidence
* * Significant at the 0.01 level of confidence

It may be observed from the table no.4.3 that the t-ratio for the difference in means at Remembering category and understanding category was found to be significant at the 0.01 level of confidence. Hence, the hypothesis H<sub>0</sub>.2.1 was rejected at the specified level of confidence. It indicates that the two means may be taken as different at the specified level of confidence. Observation of their means reveals that the mean attainment (78.56) at the Remembering category was more than the mean attainment (60.45) at the Understanding category.

It may also be observed from the table no.4.3 that the t-ratio for the difference in mean attainment at Remembering category and at Higher order category was found to be significant at the 0.01 level of confidence. Hence, the hypothesis H<sub>0</sub>.2.2 was rejected at the specified level of confidence, suggesting that the two means differ from each other. The observation of their respective means reveals that the mean attainment (78.56) at Remembering category was much higher than the same (32.88) at Higher order Category.
It may also be observed from the table no.4.3 that the t-ratios for the difference in mean attainment scores at Understanding and Higher order category was found significant at the 0.01 level of confidence. Hence, the hypothesis Ho.2.3 was rejected at the specified level of confidence, suggesting that the two were different from each other. The observation of their respective means reveals that mean attainment (60.45) at Understanding category was higher than the mean attainment (32.88) at Higher order category.

**Interaction Effect: Parental Involvement X Bloom’s Taxonomic Categories**

Referring back to table No.4.1 it may be observed from the table that the F-ratio for the interaction between Parental Involvement and objective categories was not found significant even at the 0.05 level of confidence. Hence, the hypothesis Ho.3 was rejected at the specified level of confidence. It suggests that two variables do not interact with each other and they act independently of each other.

### 4.2. ANALYSIS OF VARIANCE ON SCORES OF MATHEMATICAL SKILLS: VII GRADE

The analysis has been designed to test the following null hypotheses:

**Ho.4:** Mean achievement scores on Mathematical Skills of VII graders belonging to different levels of Parental Involvement do not differ.

**Ho.5:** Mean achievement scores on Mathematical Skills of VII graders on different taxonomic categories of objectives do not differ.

**Ho.6:** Parental Involvement and categories of Bloom’s Taxonomy do not interact in respect of mean achievement of Mathematical Skills of VII graders.

The sum of squares, degrees of freedom and F-ratios for Parental Involvement and Categories of objectives have been given in the following table no.4.4. for ANOVA.
Table 4.4. Summary table of $3 \times 3$ analysis of variance on scores of mathematical skills: VII Grade

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>S.S.</th>
<th>d.f.</th>
<th>M.S.S.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>69040.3</td>
<td>84</td>
<td>821.91</td>
<td></td>
</tr>
<tr>
<td>A (Parental Involvement)</td>
<td>29364.41</td>
<td>2</td>
<td>14682.20</td>
<td>30.34**</td>
</tr>
<tr>
<td>Subjects within groups</td>
<td>39675.89</td>
<td>82</td>
<td>483.85</td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td>61947.34</td>
<td>170</td>
<td>364.39</td>
<td></td>
</tr>
<tr>
<td>B (Objectives)</td>
<td>38501.19</td>
<td>2</td>
<td>19250.59</td>
<td>142.83**</td>
</tr>
<tr>
<td>A x B</td>
<td>1341.37</td>
<td>4</td>
<td>335.34</td>
<td>2.49*</td>
</tr>
<tr>
<td>B x Subjects within groups</td>
<td>22104.78</td>
<td>164</td>
<td>134.78</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level of confidence

** Significant at the 0.01 level of confidence

- **Main Effect A: Parental Involvement**

It may be observed from the table that the F-ratio for the difference among mean scores of the three parental involvement groups was found significant at the 0.01 level of confidence. It suggests that the means of the three parental involvement groups may be considered as different at the specified levels of confidence. Hence, the null hypothesis $H_0.4$ was rejected at the specified level of confidence. This may be inferred that the means of the achievement scores of the groups were different beyond the contribution of chance factor.

In order to ascertain which pairs of groups showed difference, the F-ratio has been followed by t-test. The values of t-ratios for different pairs of parental involvement groups along with their respective means have been given in the table no. 4.5 below:
Following hypotheses were tested through this analysis:

**Ho.4.1:** Mean achievement scores on Mathematical Skills of VII graders belonging to high and low Parental Involvement do not differ.

**Ho.4.2:** Mean achievement scores on Mathematical Skills of VII graders belonging to high and average Parental Involvement do not differ.

**Ho.4.3:** Mean achievement scores on Mathematical Skills of VII graders belonging to average and low Parental Involvement do not differ.

Table 4.5. Showing t-ratios for the difference between means of different combination pairs.

<table>
<thead>
<tr>
<th></th>
<th>High PI N=90</th>
<th>Average PI N=84</th>
<th>Low PI N=81</th>
</tr>
</thead>
<tbody>
<tr>
<td>High PI</td>
<td>--</td>
<td>1.97*</td>
<td>7.63**</td>
</tr>
<tr>
<td>M1=75.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average PI</td>
<td>--</td>
<td></td>
<td>5.54**</td>
</tr>
<tr>
<td>M2=69.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low PI</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>M3=50.31</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* *Significant at the 0.05 level of confidence

* *Significant at the 0.01 level of confidence

It may also be observed from the table no.4.5 that the t-ratio for the difference between the means of achievement scores of high and low parental involvement groups was found to be significant at the 0.01 level of confidence. Hence, the hypothesis Ho.4.1 was rejected at the specified level of confidence. The observation of their respective means reveals that the mean attainment (75.79) of high parental involvement group was higher than the mean attainment (50.31) of low parental involvement group beyond the contribution of chance factor.

It may be observed from the table no.4.5 that the t-ratio for the difference between the means of achievement scores of high and average groups on parental involvement was found marginally significant at the 0.05 level of confidence. Hence,
the hypothesis Ho. 4.2 was rejected at the specified level of confidence. It indicates that the two means may be taken as different beyond the contribution of chance factor. The observation of their respective means reveals that the mean attainment scores (75.79) in mathematical skills of the high Parental Involvement was found higher than the mean attainment (69.19) of average Parental Involvement.

It may be observed from the table no.4.5 that the difference between the means of achievement scores of average and low parental involvement groups was found to be significant at the 0.01 level of confidence. Hence, the hypothesis Ho. 4.3 was rejected at the specified level of confidence. The observation of their respective means reveals that, the mean attainment scores (69.19) of average parental involvement group was higher than the mean attainment scores (50.31) of low parental involvement level.

- **Main Effect B: Bloom's Taxonomic Categories**

Referring back to the variance of table no.4.4, it may be observed from the table that the F-ratio for the difference in mean achievement scores for the different taxonomic categories was found highly significant at the 0.01 level of confidence, suggesting that the means, at the different taxonomic categories were different. Hence, the hypothesis Ho. 5 was rejected at the specified level of confidence. In order to ascertain which combination of groups were different, F-ratio was followed by t-test. The t-ratios for different pairs of objective categories along with their respective means have been given in the table no.4.6 below:

The analysis was designed to test the following hypotheses:

**Ho.5.1:** Mean achievement scores on Mathematical Skills of VII graders are not different on Remembering and Understanding category of Bloom’s Taxonomy.

**Ho.5.2:** Mean achievement scores on Mathematical Skills of VII graders are not different on Remembering and Higher Order category of Bloom’s Taxonomy.

**Ho.5.3:** Mean achievement scores on Mathematical Skills of VII graders are not different on Understanding and Higher Order category of Bloom’s Taxonomy.
Table 4.6. Showing t-ratios for the difference between means of different combination pairs

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Remembering N=85</th>
<th>Understanding N=85</th>
<th>Higher order N=85</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remembering</td>
<td>--</td>
<td>11.39**</td>
<td>16.52**</td>
</tr>
<tr>
<td>M1=82.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understanding</td>
<td>--</td>
<td></td>
<td>5.12**</td>
</tr>
<tr>
<td>M2=61.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher Order</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M3=52.68</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level of confidence
**Significant at the 0.01 level of confidence

It may be observed from the table no.4.6 that the t-ratio for the difference in means at Remembering category and Understanding category was found to be significant at the 0.01 level of confidence. Hence, the hypothesis Ho. 5.1 was rejected at the specified level of confidence. Observation of their means reveals that the mean attainment (82.08) at the Remembering category was more than the mean attainment (61.8) at the Understanding category.

It may also be observed from the table the t-ratio for the difference between the mean attainment at Remembering category and at Higher order category was found to be significant at the 0.01 level of confidence. Hence, the hypothesis Ho.5.2 was rejected at the specified level of confidence, suggesting that the two means differ from each other. The observation of their respective means reveals that the mean attainment (82.08) at Remembering category was much higher than the same (52.68) at Higher order category.

It may also be observed from the table no.6 that the t-ratios for the difference in mean attainment scores at Understanding category and higher order category was found significant at the 0.01 level of confidence. Hence, the hypothesis Ho. 5.3 was rejected at the specified level of confidence, suggesting that the two were different from each other. The observation of their respective means reveals that mean attainment (61.8) at Understanding category was higher than the mean attainment (52.68) at Higher order category.
• Interaction effect: Parental Involvement X Bloom’s Taxonomic Categories

Referring back to table no.4.4, it may be observed from the table that the F-ratio for the interaction between parental involvement and objective categories was found marginally significant at the 0.05 level of confidence. Hence, the hypothesis Ho.6. could not be rejected. It suggests that the two variables interact with each other.

The results were further probed with the help of the t-test. The t-ratios for the different pairs of groups of three Parental Involvement and three Bloom’s Taxonomic categories. The t-ratios for the difference between the means different pairs of interaction combinations have been given in the table no.7.

The analysis has further been designed to test the following hypotheses:

For High Parental Involvement

Ho.6.1: The mean scores on Mathematical Skills of VII graders will not be different for Remembering and Understanding categories of Bloom’s Taxonomy.

Ho.6.2: The mean scores on Mathematical Skills of VII graders will not be different for Remembering and Higher Order categories of Bloom’s Taxonomy.

Ho.6.3: The mean scores on Mathematical Skills of VII graders will not be different for Understanding and Higher Order categories of Bloom’s Taxonomy.

For Average Parental Involvement

Ho.6.4: The mean scores on Mathematical Skills of VII graders will not be different for Remembering and Understanding categories of Bloom’s Taxonomy.

Ho.6.5: The mean scores on Mathematical Skills of VII graders will not be different for Remembering and Higher Order categories of Bloom’s Taxonomy.

Ho.6.6: The mean scores on Mathematical Skills of VII graders will not be different for Understanding and Higher Order categories of Bloom’s Taxonomy.
For Low Parental Involvement

Ho.6.7: The mean scores on Mathematical Skills of VII graders will not be different for Remembering and Understanding categories of Bloom’s Taxonomy.

Ho.6.8: The mean scores on Mathematical Skills of VII graders will not be different for Remembering and Higher Order categories of Bloom’s Taxonomy.

Ho.6.9: The mean scores on Mathematical Skills of VII graders will not be different for Understanding and Higher Order categories of Bloom’s Taxonomy.

Table 4.7. Showing t-ratios for the difference in the different pairs of groups of Parental Involvement and Bloom’s Taxonomic Categories

<table>
<thead>
<tr>
<th></th>
<th>P1 O1</th>
<th>P2 O1</th>
<th>P3 O1</th>
<th>P1 O2</th>
<th>P2 O2</th>
<th>P3 O2</th>
<th>P1 O3</th>
<th>P2 O3</th>
<th>P3 O3</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=30</td>
<td></td>
<td></td>
<td></td>
<td>N=28</td>
<td></td>
<td></td>
<td>N=27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1 O1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M=89.66</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.68*</td>
<td>6.02**</td>
<td>5.72**</td>
<td>7.2**</td>
<td>14.95**</td>
<td>8.21**</td>
<td>15.92**</td>
<td>17.46**</td>
<td></td>
</tr>
<tr>
<td>P2 O1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M=84.5</td>
<td></td>
<td></td>
<td>4.14**</td>
<td>3.92**</td>
<td>5.42**</td>
<td>12.98**</td>
<td>6.35**</td>
<td>13.99**</td>
<td>15.44**</td>
</tr>
<tr>
<td>P3 O1</td>
<td></td>
<td></td>
<td></td>
<td>0.46</td>
<td>1.11</td>
<td>8.67**</td>
<td>1.96*</td>
<td>9.56**</td>
<td>11.11**</td>
</tr>
<tr>
<td>M=71.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1 O2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M=72.56</td>
<td></td>
<td></td>
<td>1.6</td>
<td>9.39**</td>
<td>2.48*</td>
<td>10.31**</td>
<td>11.9**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2 O2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.62**</td>
<td>0.84</td>
<td>8.57**</td>
<td>10.08**</td>
</tr>
<tr>
<td>M=67.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P3 O2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M=43.74</td>
<td></td>
<td></td>
<td>6.97**</td>
<td>0.84</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.44*</td>
</tr>
<tr>
<td>P1 O3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M=65.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.88**</td>
<td>9.47**</td>
<td></td>
</tr>
<tr>
<td>P2 O3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M=41.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.62*</td>
<td></td>
</tr>
<tr>
<td>P3 O3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M=36.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level of confidence
* *Significant at the 0.01 level of confidence
The table gives as many as 36 values. Out of the entire list only 9 values pertain to the hypotheses formulated for the purpose of investigation are being interpreted. The values have been arranged for different parental involvement categories separately.

**For High Parental Involvement**

It may be observed that in respect of high Parental Involvement group the t-ratio $P101 & P102$ (5.72) have been found significant at the 0.01 level of confidence. Hence, the hypothesis $Ho:6.1$ was rejected at the specified level of confidence. It indicates that high Parental Involvement group of VII graders, attain different mean scores at Remembering and at Understanding categories of Bloom’s Taxonomy. The observation of their means suggests that the high Parental Involvement group scored higher at Remembering category than at Understanding category of Bloom’s Taxonomy.

It may be observed that in respect of high Parental Involvement group the t-ratio $P101 & P103$ (8.21) was found to be significant at the 0.01 level of confidence. Hence, the hypothesis $Ho:6.2$ was rejected at the specified level of confidence. It indicates that high Parental Involvement group of VII graders, attain different mean scores at Remembering and at Higher Order categories of Bloom’s Taxonomy. The observation of their respective means suggests that the high Parental Involvement group scored higher at Remembering category than at Higher Order category of Bloom’s Taxonomy.
It may be observed that in respect of high Parental Involvement group the t-ratio P102 & P103 (2.48) was found to be significant at the 0.05 level of confidence. Hence, the hypothesis Ho:6.3 was rejected at the specified level of confidence. It indicates that high Parental Involvement group of VII graders, attain different mean scores at Understanding and at Higher Order categories of Bloom’s Taxonomy. The observation of their respective means suggests that the high Parental Involvement group scored higher at Understanding category than at Higher Order category of Bloom’s Taxonomy.

For Average Parental Involvement

It may be observed that in respect of average Parental Involvement group the t-ratio P201 & P202 (5.42) have been found significant at the 0.01 level of confidence. Hence, the hypothesis Ho:6.4 was rejected at the specified level of confidence. It indicates that average Parental Involvement group of VII graders, attain different mean scores at Remembering and at Understanding categories of Bloom’s Taxonomy. The observation of their means suggests that the average Parental Involvement group scored higher at Remembering category than at Understanding category of Bloom’s Taxonomy.

It may be observed that in respect of average Parental Involvement group the t-ratio P201 & P203 (13.99) was found to be significant at the 0.01 level of confidence. Hence, the hypothesis Ho:6.5 was rejected at the specified level of confidence. It indicates that average Parental Involvement group of VII graders, attain different mean scores at Remembering and at Higher Order categories of Bloom’s Taxonomy. The observation of their respective means suggests that the average Parental Involvement group scored higher at Remembering category than at Higher Order category of Bloom’s Taxonomy.

It may be observed that in respect of average Parental Involvement group the t-ratio P202 & P203 (8.57) was found to be significant at the 0.01 level of confidence. Hence, the hypothesis Ho:6.6 was rejected at the specified level of confidence. It indicates that average Parental Involvement group of VII graders, attain different mean scores at Understanding and at Higher Order categories of Bloom’s
Taxonomy. The observation of their respective means suggests that the average Parental Involvement group scored higher at Understanding category than at Higher Order category of Bloom’s Taxonomy.

**For Low Parental Involvement**

It may be observed that in respect of low Parental Involvement group the t-ratio P3O1 & P3O2 (8.67) have been found significant at the 0.01 level of confidence. Hence, the hypothesis Ho:6.7 was rejected at the specified level of confidence. It indicates that low Parental Involvement group of VII graders, attain different mean scores at Remembering and at Understanding categories of Bloom’s Taxonomy. The observation of their means suggests that the low Parental Involvement group scored higher at Remembering category than at Understanding category of Bloom’s Taxonomy.

It may be observed that in respect of low Parental Involvement group the t-ratio P3O1 & P3O3 (11.11) was found to be significant at the 0.01 level of confidence. Hence, the hypothesis Ho:6.8 was rejected at the specified level of confidence. It indicates that low Parental Involvement group of VII graders, attain different mean scores at Remembering and at Higher Order categories of Bloom’s Taxonomy. The observation of their respective means suggests that the low Parental Involvement group scored higher at Remembering category than at Understanding category of Bloom’s Taxonomy.

It may be observed that in respect of low Parental Involvement group the t-ratio P3O2 & P3O3 (2.44) was found to be significant at the 0.05 level of confidence. Hence, the hypothesis Ho:6.9 was rejected at the specified level of confidence. It indicates that low Parental Involvement group of VII graders, attain different mean scores at Understanding and at Higher Order categories of Bloom’s Taxonomy. The observation of their respective means suggests that the low Parental Involvement group scored higher at Understanding category than at Higher Order category of Bloom’s Taxonomy.
4.3. ANALYSIS OF VARIANCE ON SCORES OF MATHEMATICAL SKILLS: VIII GRADE

The analysis has been designed to test the following null hypotheses:

Ho.7: Mean achievement scores on Mathematical Skills of VIII graders belonging to different levels of Parental Involvement do not differ.

Ho.8: Mean achievement scores on Mathematical Skills of VIII graders on different taxonomic categories of objectives do not differ.

Ho.9: Parental Involvement and categories of Bloom’s Taxonomy do not interact in respect of mean achievement of Mathematical Skills of VIII graders.

The sum of squares, degrees of freedom and F-ratios for Parental Involvement and Categories of objectives have been given in the following table no.4.8 for ANOVA.

Table 4.8. Summary table of 3x3 analysis of variance on scores of mathematical skills: VIII Grade

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>S.S.</th>
<th>d.f.</th>
<th>M.S.S.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>64358.33</td>
<td>83</td>
<td>775.40</td>
<td></td>
</tr>
<tr>
<td>A (Parental Involvement)</td>
<td>29908.71</td>
<td>2</td>
<td>14954.35</td>
<td>35.16**</td>
</tr>
<tr>
<td>Subjects within groups</td>
<td>34449.62</td>
<td>81</td>
<td>425.30</td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td>71846</td>
<td>168</td>
<td>427.65</td>
<td></td>
</tr>
<tr>
<td>B (Objectives)</td>
<td>44674.38</td>
<td>2</td>
<td>22337.19</td>
<td>153.39**</td>
</tr>
<tr>
<td>A x B</td>
<td>3580.95</td>
<td>4</td>
<td>895.24</td>
<td>6.15*</td>
</tr>
<tr>
<td>B x Subjects within groups</td>
<td>23590.67</td>
<td>162</td>
<td>145.62</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level of confidence

**Significant at the 0.01 level of confidence
Main Effect A: Parental Involvement

It may be observed from the table that the F-ratio for the difference between mean scores of the three parental involvement groups was found significant at the 0.01 level of confidence. It suggests that the means of the three parental involvement groups may be considered as different at the specified levels of confidence. Hence, the null hypothesis Ho.7 was rejected at the specified level of confidence. This may be inferred that the means of the achievement scores of the two groups were different beyond the contribution of chance factor.

In order to ascertain which pairs of the groups showed difference, the F-ratio has been followed by t-test. The values of t-ratios for different pairs of parental involvement groups along with their respective means have been given in the table no4.9 below:

Following hypothesis were tested through this analysis:

Ho.7.1: Mean achievement scores on Mathematical Skills of VIII graders belonging to high and low Parental Involvement do not differ.

Ho.7.2: Mean achievement scores on Mathematical Skills of VIII graders belonging to high and average Parental Involvement do not differ.

Ho.7.3: Mean achievement scores on Mathematical Skills of VIII graders belonging to average and low Parental Involvement do not differ.

Table 4.9. Showing t-ratios for the difference between means of different combination pairs.

<table>
<thead>
<tr>
<th></th>
<th>High PI N= 78</th>
<th>Average PI N=93</th>
<th>Low PI N=81</th>
</tr>
</thead>
<tbody>
<tr>
<td>High PI</td>
<td>--</td>
<td>3.06*</td>
<td>8.28**</td>
</tr>
<tr>
<td>M1=64.45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average PI</td>
<td>--</td>
<td></td>
<td>5.51**</td>
</tr>
<tr>
<td>M2=54.68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low PI</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M3=37.44</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level of confidence

**Significant at the 0.01 level of confidence
It may also be observed from the table no. 4.9 that the t-ratio for the difference between means of achievement scores of high and low parental involvement groups was found significant at the 0.01 level of confidence. Hence, the hypothesis Ho.7.1 was rejected at the specified level of confidence. The observation of their respective means reveals that the mean attainment (64.45) of high parental involvement group was much higher than the mean attainment (37.44) of low parental involvement group.

It may be observed from the table no. 4.9 that the t-ratio for the difference between means of achievement scores of high and average groups of parental involvement was found marginally significant at the 0.05 level of confidence. Hence, the hypothesis Ho.7.2 was rejected at the specified level of confidence. It indicates that the two means may be taken as different at the specified level of confidence. The observation of their respective means reveals that the mean attainment scores (64.45) in mathematical skills of the high parental involvement group was found higher than the mean attainment (54.68) of average parental involvement group.

It may be observed from the same table no. 4.9 that the t-ratio for the difference between means of achievement scores of average and low parental involvement group was found significant at the 0.01 level of confidence. Hence, the hypothesis Ho.7.3 was rejected at the specified level of confidence. The observation of their respective means reveals that, the mean attainment scores (54.68) of average parental involvement group was higher than the mean attainment scores (37.44) of low parental involvement group.

- **Main effect B: Bloom’s Taxonomic Categories**

Referring back to the analysis of variance of table no. 4.8, it may be observed from the table that the F-ratio for the difference in mean achievement scores for the different taxonomic categories was found highly significant at the 0.01 level of confidence, suggesting that the means, at the different taxonomic categories were different. Hence the hypothesis Ho.8 was rejected at the specified level of confidence. In order ascertain which combinations of groups were different, F-ratio was followed by t-test. The t-ratios for the different pairs of objective categories along with their respective means have been given in the table 10.
The analysis has been designed to test the following null hypotheses:

Ho.8.1: Mean achievement scores on Mathematical Skills of VIII graders are not different on Remembering and Understanding category of Bloom’s Taxonomy.

Ho.8.2: Mean achievement scores on Mathematical Skills of VIII graders are not different on Remembering and Higher Order category of Bloom’s Taxonomy.

Ho.8.3: Mean achievement scores on Mathematical Skills of VIII graders are not different on Understanding and Higher Order category of Bloom’s Taxonomy.

### Table 4.10. Showing t-ratios for the difference between means of different combination pairs

<table>
<thead>
<tr>
<th></th>
<th>Remembering (M1=62.96)</th>
<th>Understanding (M2=60.12)</th>
<th>Higher Order (M3=33.4)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N=84</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remembering</td>
<td>--</td>
<td>1.53*</td>
<td>15.89**</td>
</tr>
<tr>
<td>Understanding</td>
<td></td>
<td>--</td>
<td>14.36**</td>
</tr>
<tr>
<td>Higher Order</td>
<td></td>
<td></td>
<td>--</td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level of confidence
**Significant at the 0.01 level of confidence

It may be observed from the table no.4.10 that the t-ratio for the difference in means at the Remembering category and understanding category was found to be significant at the 0.01 level of confidence. Hence, the hypotheses Ho.8.1 was rejected at the specified level of confidence. It indicates that the two means may be taken as different at the specified level of confidence. Observation of their means reveals that
the mean attainment (62.96) at the Remembering category was more than the mean attainment (60.12) at the understanding category.

It may also be observed from the table no.4.10 that the t-ratio for the difference between the mean attainment at Remembering category and at Higher order category was found to be significant at the 0.01 level of confidence. Hence, the hypotheses Ho.8.2 was rejected at the specified level of confidence, suggesting that the two means differ from each other. The observation of their respective means reveals that the mean attainment (62.96) at knowledge category was much higher than the same (33.4) at higher order.

It may also be observed from the table no.4.10 that the t-ratios for the difference in mean attainment scores at Understanding and Higher order category was found significant at the 0.01 level of confidence. Hence, the hypotheses Ho.8.3 was rejected at the specified level of confidence, suggesting that the two were different from each other. The observation of their respective means reveals that mean attainment (60.12) at understanding category was higher than the mean attainment (33.4) at higher order category.

- **Interaction Effect: Parental Involvement X Bloom’s Taxonomic Categories**

Referring back to table no.4.8 it may be observed from the table that the F-ratio for the interaction between parental involvement and objective categories was found marginally significant at the 0.05 level of confidence. Hence, the hypothesis Ho.9 could not be rejected at the specified level of confidence. It suggests that two variables interact with each other.

The results were further probed with the help through t-test. The t-ratios for the different pairs of groups of three Parental Involvement and three Bloom’s Taxonomic Categories. The t-ratios for the difference between the means of different pairs of interaction combination have been given in the table no.4.11.
The analysis has further been designed to test the following hypotheses:

**For High Parental Involvement**

Ho.9.1: The mean scores on Mathematical Skills of VIII graders will not be different for Remembering and Understanding categories of Bloom’s Taxonomy.

Ho.9.2: The mean scores on Mathematical Skills of VIII graders will not be different for Remembering and Higher Order categories of Bloom’s Taxonomy.

Ho.9.3: The mean scores on Mathematical Skills of VIII graders will not be different for Understanding and Higher Order categories of Bloom’s Taxonomy.

**For Average Parental Involvement**

Ho.9.4: The mean scores on Mathematical Skills of VIII graders will not be different for Remembering and Understanding categories of Bloom’s Taxonomy.

Ho.9.5: The mean scores on Mathematical Skills of VIII graders will not be different for Remembering and Higher Order categories of Bloom’s Taxonomy.

Ho.9.6: The mean scores on Mathematical Skills of VIII graders will not be different for Understanding and Higher Order categories of Bloom’s Taxonomy.

**For Low Parental Involvement**

Ho.9.7: The mean scores on Mathematical Skills of VIII graders will not be different for Remembering and Understanding categories of Bloom’s Taxonomy.

Ho.9.8: The mean scores on Mathematical Skills of VIII graders will not be different for Remembering and Higher Order categories of Bloom’s Taxonomy.

Ho.9.9: The mean scores on Mathematical Skills of VIII graders will not be different for Understanding and Higher Order categories of Bloom’s Taxonomy.
Table 4.11. Showing t-ratios for the different combination groups of Parental Involvement and Bloom’s Taxonomic Categories

<table>
<thead>
<tr>
<th></th>
<th>PI01 M=76.35</th>
<th>P201 M=64.5</th>
<th>P301 M=54.37</th>
<th>P102 M=74.04</th>
<th>P202 M=63.16</th>
<th>P302 M=39.37</th>
<th>P103 M=45.31</th>
<th>P203 M=36.32</th>
<th>P303 M=18.59</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI01</td>
<td></td>
<td>1.71*</td>
<td>4.74**</td>
<td>2.40**</td>
<td>2.14*</td>
<td>9.28**</td>
<td>7.37**</td>
<td>10.56**</td>
<td>15.58**</td>
</tr>
<tr>
<td>P201</td>
<td>3.21**</td>
<td></td>
<td>4.23**</td>
<td>2.49**</td>
<td>2.77**</td>
<td>7.17**</td>
<td>4.57**</td>
<td>2.74**</td>
<td>9.22**</td>
</tr>
<tr>
<td>P301</td>
<td>7.17**</td>
<td>2.77**</td>
<td></td>
<td>4.57**</td>
<td>2.74**</td>
<td>5.69**</td>
<td>4.57**</td>
<td>9.77**</td>
<td>10.91**</td>
</tr>
<tr>
<td>P102</td>
<td>4.66**</td>
<td>11.72**</td>
<td>9.77**</td>
<td></td>
<td>8.77**</td>
<td>13.08**</td>
<td>13.08**</td>
<td>18.01**</td>
<td>14.06**</td>
</tr>
<tr>
<td>P202</td>
<td>7.5**</td>
<td>5.59**</td>
<td>8.77**</td>
<td>14.06**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P302</td>
<td>1.8*</td>
<td>0.96</td>
<td>6.33**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P103</td>
<td></td>
<td>2.82**</td>
<td>8.09**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P203</td>
<td></td>
<td></td>
<td>5.59**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P303</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level of confidence  
**Significant at the 0.01 level of confidence

(P101 & P102) High PI X Remembering category & Understanding category
(P101 & P103) High PI X Remembering category & Higher Order category
(P102 & P103) High PI X Understanding category & Higher Order category
(P201 & P202) Average PI X Remembering category & Understanding category
(P201 & P203) Average PI X Remembering category & Higher Order category
(P202 & P203) Average PI X Understanding category & Higher Order category
(P301 & P302) Low PI X Remembering category & Understanding category
(P301 & P303) Low PI X Remembering category & Higher Order category
(P302 & P301) Low PI X Understanding category & Higher Order category
The table gives as many as 36 values. Out of the entire list only 9 values pertain to the hypotheses formulated for the purpose of investigation are being interpreted. The values have been arranged for different parental involvement categories separately.

**For High Parental Involvement**

It may be observed that in respect of high Parental Involvement group the t-ratio $P1O1 & P1O2$ (2.40) have been found significant at the 0.01 level of confidence. Hence, the hypothesis $H0:9.1$ was rejected at the specified level of confidence. It indicates that high Parental Involvement group of VIII graders, attain different mean scores at Remembering and at understanding categories of Bloom’s Taxonomy. The observation of their means suggests that the high Parental Involvement group scored higher at Remembering category than at Understanding category of Bloom’s Taxonomy.

It may be observed that in respect of high Parental Involvement group the t-ratio $P1O1 & P1O3$ (7.37) was found to be significant at the 0.01 level of confidence. Hence, the hypothesis $H0:9.2$ was rejected at the specified level of confidence. It indicates that high Parental Involvement group of VIII graders, attain different mean scores at Remembering and at Higher Order categories of Bloom’s Taxonomy. The observation of their respective means suggests that the high Parental Involvement group scored higher at Remembering category than at Higher Order category of Bloom’s Taxonomy.

It may be observed that in respect of high Parental Involvement group the t-ratio $P1O2 & P1O3$ (9.77) was found to be significant at the 0.01 level of confidence. Hence, the hypothesis $H0:9.3$ was rejected at the specified level of confidence. It indicates that high Parental Involvement group of VIII graders, attain different mean scores at Understanding and at Higher Order categories of Bloom’s Taxonomy. The observation of their respective means suggests that the high Parental Involvement group scored higher at Understanding category than at Higher Order category of Bloom’s Taxonomy.

**For Average Parental Involvement**

It may be observed that in respect of average Parental Involvement group the t-ratio $P2O1 & P2O2$ (2.49) have been found significant at the 0.01 level of
confidence. Hence, the hypothesis Ho:9.4 was rejected at the specified level of confidence. It indicates that average Parental Involvement group of VIII graders, attain different mean scores at Remembering and at Understanding categories of Bloom’s Taxonomy. The observation of their means suggests that the average Parental Involvement group scored higher at Remembering category than at Understanding category of Bloom’s Taxonomy.

It may be observed that in respect of average Parental Involvement group the t-ratio P201 & P203 (9.22) was found to be significant at the 0.01 level of confidence. Hence, the hypothesis Ho:9.5 was rejected at the specified level of confidence. It indicates that average Parental Involvement group of VIII graders, attain different mean scores at Remembering and at Higher Order categories of Bloom’s Taxonomy. The observation of their respective means suggests that the average Parental Involvement group scored higher at Remembering category than at Higher Order category of Bloom’s Taxonomy.

It may be observed that in respect of average Parental Involvement group the t-ratio P202 & P203 (8.77) was found to be significant at the 0.01 level of confidence. Hence, the hypothesis Ho:9.6 was rejected at the specified level of confidence. It indicates that average Parental Involvement group of VIII graders, attain different mean scores at Understanding and at Higher Order categories of Bloom’s Taxonomy. The observation of their respective means suggests that the average Parental Involvement group scored higher at Understanding category than at Higher Order category of Bloom’s Taxonomy.

For Low Parental Involvement

It may be observed that in respect of low Parental Involvement group the t-ratio P301 & P302 (4.57) have been found significant at the 0.01 level of confidence. Hence, the hypothesis Ho:9.7 was rejected at the specified level of confidence. It indicates that low Parental Involvement group of VIII graders, attain different mean scores at Remembering and at Understanding categories of Bloom’s Taxonomy. The observation of their means suggests that the low Parental Involvement group scored higher at Remembering category than at Understanding category of Bloom’s Taxonomy.
It may be observed that in respect of low Parental Involvement group the t-ratio P301 & P303 (10.91) was found to be significant at the 0.01 level of confidence. Hence, the hypothesis Ho:9.8 was rejected at the specified level of confidence. It indicates that low Parental Involvement group of VIII graders, attain different mean scores at Remembering and at Higher Order categories of Bloom’s Taxonomy. The observation of their respective means suggests that the low Parental Involvement group scored higher at Remembering category than at Higher Order category of Bloom’s Taxonomy.

It may be observed that in respect of low Parental Involvement group the t-ratio P302 & P303 (6.33) was found to be significant at the 0.01 level of confidence. Hence, the hypothesis Ho:9.9 was rejected at the specified level of confidence. It indicates that low Parental Involvement group of VIII graders, attain different mean scores at Understanding and at Higher Order categories of Bloom’s Taxonomy. The observation of their respective means suggests that the low Parental Involvement group scored higher at understanding category than at Higher Order category of Bloom’s Taxonomy.

4.4 CONCLUSIONS

Following conclusions were drawn on the bases of analyses:

- Conclusions based on 3x3 ANOVA on scores of mathematical skills of students of grade VI.
  - The mean achievement scores on mathematical skills of grade VI were different for students belonging to parents having high average and low average involvement.
    - The mathematical skills of VI grade students belonging to high Parental Involvement group were higher than that of low Parental Involvement group.
    - The mathematical skills of VI grade students belonging to high Parental Involvement group were higher than that of average Parental Involvement group.
• The mathematical skills of VI grade students belonging to average Parental Involvement group were higher than that of low Parental Involvement group.

• The mean achievement scores on mathematical skills of VI graders were different at three categories of Bloom’s Taxonomy of objectives.
  • The mathematical skills of grade VI students were higher at Remembering category than at Understanding category.
  • The mathematical skills of grade VI students were higher at Remembering category than at Higher Order category.
  • The mathematical skills of grade VI students were higher at Understanding category than at Higher Order category.

• The two variables Parental Involvement and Bloom’s Taxonomic categories did not interact to yield differences in mathematical skills of grade VI students.

➢ Conclusions based on 3x3 ANOVA on scores of mathematical skills of students of grade VII.

• The mean achievement scores on mathematical skills of grade VII were different for students belonging to parents having high average and low average involvement.
  • The mathematical skills of VII grade students belonging to high Parental Involvement group were higher than that of low Parental Involvement group.
  • The mathematical skills of VII grade students belonging to high Parental Involvement group were higher than that of average Parental Involvement group.
  • The mathematical skills of VII grade students belonging to average Parental Involvement group were higher than that of low Parental Involvement group.

• The mean achievement scores on mathematical skills of VII graders were different at three categories of Bloom’s Taxonomy of objectives.

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• The mathematical skills of grade VII students were higher at Remembering category than Understanding category.
• The mathematical skills of grade VII students were higher at Remembering category than Higher Order category.
• The mathematical skills of grade VII students were higher at Understanding category than Higher Order category.

The two variables Parental Involvement and Bloom’s Taxonomic categories were found to interact to yield differences in mathematical skills of grade VII students.

For High Parental Involvement Group:
• The mathematical skills of grade VII students were higher at Remembering category than at Understanding category.
• The mathematical skills of grade VII students were higher at Remembering category than at Higher Order category.
• The mathematical skills of grade VII students were higher at Understanding category than at Higher Order category.

For Average Parental Involvement Group:
• The mathematical skills of grade VII students were higher at Remembering category than at Understanding category.
• The mathematical skills of grade VII students were higher at Remembering category than at Higher Order category.
• The mathematical skills of grade VII students were higher at Understanding category than at Higher Order category.

For Low Parental Involvement Group:
• The mathematical skills of grade VII students were higher at Remembering category than at Understanding category.
• The mathematical skills of grade VII students were higher at Remembering category than at Higher Order category.
• The mathematical skills of grade VII students were higher at Understanding category than at Higher Order category.
Conclusions based on 3x3 ANOVA on scores of mathematical skills of students of grade VIII.

- The mean achievement scores on mathematical skills of grade VIII were different for students belonging to parents having high average and low average involvement.
  - The mathematical skills of VIII grade students belonging to high Parental Involvement group were higher than that of low Parental Involvement group.
  - The mathematical skills of VIII grade students belonging to high Parental Involvement group were higher than that of average Parental Involvement group.
  - The mathematical skills of VIII grade students belonging to average Parental Involvement group were higher than that of low Parental Involvement group.
- The mean achievement scores on mathematical skills of VIII graders were different at three categories of Bloom’s Taxonomy of objectives.
  - The mathematical skills of grade VIII students were higher at Remembering category than at Understanding category.
  - The mathematical skills of grade VIII students were higher at Remembering category than at Higher Order category.
  - The mathematical skills of grade VIII students were higher at Understanding category than at Higher Order category.
- The two variables Parental Involvement and Bloom’s Taxonomic categories were found to interact to yield differences in mathematical skills of grade VIII students.

For High Parental Involvement Group:

- The mathematical skills of grade VIII students were higher at Remembering category than at Understanding category.
- The mathematical skills of grade VIII students were higher at Remembering category than at Higher Order category.
The mathematical skills of grade VIII students were higher at Understanding category than at Higher Order category.

**For Average Parental Involvement Group:**

- The mathematical skills of grade VIII students were higher at Remembering category than at Understanding category.
- The mathematical skills of grade VIII students were higher at Remembering category than at Higher Order category.
- The mathematical skills of grade VIII students were higher at Understanding category than at Higher Order category.

**For Low Parental Involvement Group:**

- The mathematical skills of grade VIII students were higher at Remembering category than at Understanding category.
- The mathematical skills of grade VIII students were higher at Remembering category than at Higher Order category.
- The mathematical skills of grade VIII students were higher at Understanding category than at Higher Order category.

### 4.5 DISCUSSION OF RESULTS

*(Conclusions related with impact of Parental Involvement and Performance in mathematics at Bloom’s Taxonomic Categories)*

The results of the present investigation revealed that high, average and low Parental Involvement yielded different scores of students in mathematical skills. It may be concluded that higher the Parental Involvement higher shall be achievement in mathematics. A number of studies have shown associations between Parental Involvement, Academic Achievement and demographic variables. *(Pate, 1992; Luce, 1993; Joy and Judith, 1996; Addington, 1996)* very strongly support the positive effect of high parental Involvement on students Mathematical Achievement. *(Padavick, 2009)* reported that Parental involvement such as reading to their child at an early age or constant supervision when the child was working on home work, was also related to academic success and their educational development. *(Olatoye and*
Agbatogun, 2009) found that parental involvement is an important predictor of mathematics.

O'Sullivan (2008) found relationship between frequency of mathematics homework assistance and parent efficacy, student grade level and student achievement level. He found parents provided more homework assistance to younger students and to those with lower achievement, and parents tended to be more involved when they had high levels of efficacy.

Although Parental Involvement may have a positive impact on children’s achievement, results from several studies suggest that this is a complex relationship (Powell, 2010; Jenkins and Renita, 2009; Begum, 2007; Sirvani, 2007; Macy, 1997) found little or no relationship between Parental Involvement and mathematics achievement, which contradicts earlier findings of most researchers.

The results of the present investigation may be justified in the light of basic construct of Parental Involvement which seems to be quite complex. Various dimensions of Parental Involvement have been identified by different researchers. But the dimensions which were chosen in the present investigation were mainly focused around activities of parents related with academic guidance at home by way of providing direct instruction or devoting time to the child. Hence involvement of parents into the academic activities may have led to higher achievement levels for children belonging to high parental involvement group.

The results of the present investigation also shows that by and large, the mean scores on Remembering category was found higher than Understanding category which was found better than the performance on higher order categories in present study. A number of studies have shown association between cognitive domain of Bloom’s Taxonomy. (Little, 1981; Moore, 1982) found co-relation between knowledge, comprehension and application categories and supported the hierarchy between them. (Congero, 1981) found the relationship between cognitive style and academic achievement. (Tootle 1986; Hadaway 1982) found students doing better at knowledge category than other categories in cognitive domain. Though, present study as well as earlier studies show hierarchy and co- relation between cognitive domain, but (Weiss 1984; Fandreyer 1984; and Waugh 1985) found no hierarchical and co-relation between cognitive objectives.
Further, the interaction studies lead to an inference that children growing in their age, show marked differences in their performance on mathematical skills. The investigator tried to explore which groups of students showed better results.

It was found that interaction effect of Parental Involvement and various categories of Bloom’s Taxonomy yielded higher scores on mathematical skills. For example, with high Parental Involvement, students performed higher at Remembering category as compared to Understanding and Higher order categories. This was observed for the students of all the three grades VI, VII and VIII. This justifies the positive role of Parental Involvement as far as learning outcomes in Remembering category is concerned. The second higher performance was shown in Understanding category and lowest was observed in higher order category.

This is quite understandable since the criteria of Parental Involvement used in present investigation were time which parents devote to students activities, amount of direct instruction with the child, discipline, verbal facility, frequency of verbal contact which facilitate performance in other categories than in Higher Order category. It seems that acquiring skills at Understanding category and Higher Order category are either more of self regulatory in nature or require different kinds of interactions with parents. This could have been a reason for such performance. The result get support from studies conducted by (Corington, Helen and Tiballi, 1982; Ekstrand, 1982; Tootle, 1986; Wruck, 2010).