Chapter - 5

Presentation, Analysis and Interpretation of Data
PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

To bring the study to its successful completion, the huge mass of data collected were critically analysed and responded through textual discussions, tabular and graphical devices. Tables and figures were used to clear the significant relationship. They are so constructed that they are self explanatory. Textual discussions may be used to point out generalization and significant interpretation. Tables and figures are simple and point out only one relationship.

The raw data was first organized in separate tables for each variable of the study. For computation of needed statistics and application of appropriate statistical tests, most of the data was analysed on SPSS. A part of the data was manually treated.

The present chapter is devoted to presentation, analysis and interpretation of the data as per the following scheme:

- Study of students' achievement in math and their personal factors.
- Study of students achievement in math and their familial factors
- Study of students' achievement in math and their institutional factors.

The objectives of the present study were to empirically test the assumptions regarding relationship between student achievement in math and their personal, familial and institutional factors. In order to test the hypotheses F and t-tests were employed to study the difference between the means of personal, familial and institutional factors. If the differences approached significant level, it would prove that personal, familial and institutional factors affect the math achievement of students.
5.1 Relationship between personal factors (gender, attitude, TV watching and sports activities) and math achievement of students.

The statistical method used in testing the hypotheses is the t-test for difference between mean of achievement scores of two groups using two tailed test. The mean (M), standard deviation (SD), degree of freedom (df) and t-value (significant difference between the two means) of the two groups are given in tables and figures. F-test is also applied where more than two groups involved in this study. F-test shows there were overall significant difference among the means, hence t-test was applied for further investigation. If F-test is found insignificant then there is no use of t-test for further investigation.

5.1.1 Relationship between gender difference and math achievement.

The total numbers of male and female students were 793 and 334 respectively as indicated by the table 5.1. Out of 60 scores, the mean achievement scores in math of male student is 20.24 and SD=8.94. In case of female students, the mean math achievement score is 20.42 and SD=10.70. The statistically calculated t-value is 0.26 which is not significant at 0.05 level with 1125 df. The result clearly indicates that there is no significant difference between mean math achievement score of male and female secondary school students. Both are equally good. Thus the first hypothesis stating that “Male and female students do not differ significantly on achievement in math” is accepted. The graphical presentation of mean achievement scores of both sexes is given in fig. 5.1.
Table 5.1 Comparison of mean math achievement scores of male and female students

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean score</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig./Not sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>793</td>
<td>20.24</td>
<td>8.94</td>
<td>0.26</td>
<td>1125</td>
<td>Not</td>
</tr>
<tr>
<td>Female</td>
<td>334</td>
<td>20.42</td>
<td>10.70</td>
<td>0.26</td>
<td>1125</td>
<td>Not</td>
</tr>
</tbody>
</table>

Fig. 5.1 Gender wise graphical presentation of math achievement
5.1.2 Relationship between attitude toward math and achievement in math of students.

The total students were divided into three groups that is positive, average and negative on the basis of their attitude scores. The range of score defining average attitude is determined by ± 6 points to 66, the students whose scores were found above and below of this range were considered as positive and negative respectively. An examination of table 5.2 shows that out of total sample (1127) 280 were found as having positive attitude, 267 having negative and rest 580 having average attitude towards math. The table also shows that the percentages of positive, average and negative attitude of total sample were 24.84%, 51.45% and 23.69% respectively. Further, result shows that the percentages in respect of male and female students were 25.61, 52.50 and 22.10 and 23.45, 50.51 and 26.04 respectively. Graphically it is shown in figure 5.2. Thus, it is evident from this analysis that one fourth of the total sample have positive attitude towards math and also one fourth of the sample have negative attitude towards math and rest nearly half of the sample have average attitude towards math. The results of the analysis also makes it clear that male and female both have the same pattern as the total sample has and they do not differ in their attitude towards math.

The technique of analysis of variance was employed to find out the influence of students attitude towards math, which is categorized as positive, average and negative students on the basis of their attitude scores. The mean achievement scores of positive, average and negative attitude students were found to be 25.58, 16.60 and 16.26 respectively. When these means were examined by the analysis of variance, the F-ratio obtained in table 5.3 was found significant (F=78.56, P<0.01, df=2, 1124)

In this study F-test was found significant, hence t-test was applied for further investigation. When the data was analyzed to see
significant difference in math achievement among three groups of the students i.e. positive, average and negative, t-tests were employed. It is evident from the table 5.4 that number of students having positive, average and negative attitude towards math are 280, 580 and 267 respectively. The mean of the math achievement score of students having positive attitude is 25.58, SD=10.64, while the mean of math achievement score of student having average attitude is 16.60, SD=8.46, while the mean of math achievement score of students having negative attitude is 16.26, SD=7.77 respectively. The statistical method used in testing the major hypothesis was the t-test for the difference between the means of three groups. The t-values obtained by comprising each group mean achievement score with that of every other group show that all the 3 t's were found to be significant at 0.01 levels with df 858, 545 and 855 respectively. Thus, math achievement scores of positive attitude, differ from those of average and unfavourable groups. It becomes clear that the students have positive attitude have more achievement in math than the average and negative attitude groups. Student having average attitude have more achievement in math than the negative group.

The analyses do not confirm the prediction hypothesised in this study for the present sample. A relationship between students attitude and math achievement has been demonstrated by this findings. Hence, the second hypothesis stating that, "there is no significant difference between attitude towards math of students and achievement in math" was rejected at 0.01 level of confidence. The graphical presentation of math achievement score of three groups is given in figure 5.3.
Table 5.2 Percentage of students having positive, average and negative attitude towards math

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Group</th>
<th>Number of students in each group</th>
<th>Percentage of students in each group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1127</td>
<td>Positive</td>
<td>280</td>
<td>24.84</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average</td>
<td>580</td>
<td>51.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative</td>
<td>267</td>
<td>23.69</td>
</tr>
<tr>
<td>Male</td>
<td>793</td>
<td>Positive</td>
<td>202</td>
<td>25.61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average</td>
<td>417</td>
<td>52.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative</td>
<td>175</td>
<td>22.10</td>
</tr>
<tr>
<td>Female</td>
<td>374</td>
<td>Positive</td>
<td>78</td>
<td>23.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average</td>
<td>168</td>
<td>50.51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative</td>
<td>87</td>
<td>26.04</td>
</tr>
</tbody>
</table>
Fig. 5.2 Distribution of students in each category on the basis of their attitude
Table 5.3 Summary of analysis of variance in respect to math achievement and math attitude of students

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>df</th>
<th>sum of squares</th>
<th>Mean square</th>
<th>F</th>
<th>Sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between group</td>
<td>2</td>
<td>12448.26</td>
<td>6224.13</td>
<td>78.56</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>within groups</td>
<td>1124</td>
<td>89048.76</td>
<td>79.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1126</td>
<td>101497.02</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.4 Comparison of mean achievement score on the basis of students having positive, average and negative attitude towards math

<table>
<thead>
<tr>
<th>Math attitude</th>
<th>N</th>
<th>Mean ach. score</th>
<th>SD</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P</td>
<td>A</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Positive(P)</td>
<td>280</td>
<td>25.58</td>
<td>10.64</td>
<td>x</td>
</tr>
<tr>
<td>Average(A)</td>
<td>580</td>
<td>16.60</td>
<td>8.46</td>
<td>8.23</td>
</tr>
<tr>
<td>Negative(N)</td>
<td>267</td>
<td>16.26</td>
<td>7.77</td>
<td>11.74</td>
</tr>
</tbody>
</table>

*Sig. at p<0.01 levels
Fig. 5.3 Graphical presentation of achievement for students having positive, average and negative attitude
5.1.3. Relationship between T.V. watching and math achievement of students.

The present study explores the time spent on television viewing of secondary school students and its impact upon their math achievement. The total sample was categorized into four groups of students on the basis of time spent on T.V. watching i.e. zero hour, less than one hour, 1 to 2 hours and more than 2 hours. The mean math scores of these groups were 17.77, 21.77, 20.68 and 19.19 respectively. The scores of these groups were put to analysis of variance. The results are contained in table 5.5. Analysis of variance of the mean scores of the four groups yielded F value which is significant at 0.01 level, with df 3, 1123 as the obtained value F was 8.86. This implied that there is significant over all difference in the means of these groups. Hence, the t-test was applied for further investigation.

When t-test was applied to compare each mean with every other means significant difference obtained between the means group A and B, A and C, B and D (t=5.44; P<0.01, df=660, t=4.18; P<0.01, df =777 and t=2.53; P<0.05, df=446 respectively). A perusal of table 5.6 shows that the mean score of only group A, has a significant difference with mean scores of groups B and C, which indicates that the students with zero hour watching TV have less mean achievement scores than those watching TV less than 1 hour and 1 to 2 hours. Students watching TV less than 1 hour also differ from those watching TV more than 2 hours i.e. students watching TV less than 1 hour have more achievement in math than the students watching TV more than 2 hours. In all cases students watching TV less than 1 hour and 1 to 2 hours have more achievement scores than those watching TV zero hour and more than 2 hours. Hence, the third hypothesis static that "T.V. watching of the students is not significantly
related to achievement in math” is partially rejected at 0.05 and 0.01 levels of confidence. Graphical presentation is given in fig. 5.4.

Table 5.5 Summary of analysis of variance in respect to math achievement and T.V. watching

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>df</th>
<th>sum of squares</th>
<th>Mean square</th>
<th>F</th>
<th>Sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between group</td>
<td>3</td>
<td>2346.831</td>
<td>782.28</td>
<td>8.86</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>with in groups</td>
<td>1123</td>
<td>99150.18</td>
<td>88.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1126</td>
<td>101497.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.6 t-value obtained from comparison of mean achievement score of four groups of students formed on the basis of T.V. watching

<table>
<thead>
<tr>
<th>Group</th>
<th>T.V. watching</th>
<th>N</th>
<th>Mean ach. score</th>
<th>SD</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>A</td>
<td>Zero hour</td>
<td>321</td>
<td>17.77</td>
<td>7.66</td>
<td>x</td>
</tr>
<tr>
<td>B</td>
<td>Less than 1 hour</td>
<td>341</td>
<td>21.77</td>
<td>9.65</td>
<td>5.44</td>
</tr>
<tr>
<td>C</td>
<td>1 to 2 hours</td>
<td>458</td>
<td>20.68</td>
<td>10.03</td>
<td>4.18</td>
</tr>
<tr>
<td>D</td>
<td>more than 2 hours</td>
<td>107</td>
<td>19.19</td>
<td>9.02</td>
<td>1.40</td>
</tr>
</tbody>
</table>

*Sig. at p<0.05 level, Sig. at p<0.01 levels
Fig. 5.4 Graphical presentation of mean achievement of four groups of students
5.1.4 Relationship between sport activities and math achievement of students.

The analysis of variance was employed to find out the influence of sports activities of students on math achievement. The total sample were categorized into three groups i.e. never, sometimes ad always on the basis of students participation in sports activities. The mean achievement scores of never, sometimes and always participation of students in sports activities were found to be 17.58, 20.13 and 21.57 respectively. The total sums of squares between and within means were computed. Analysis of variance of the math scores of the three group yielded F. value as 7.34 which is significant at 0.01 level with df=2, 1124. Table 5.7 shows that there is significant overall difference in the means of these groups. Hence, F-test was found significant therefore, t-test was applied for further investigations.

When t-test applied for further investigation, the mean scores, SD and t values are given in table 5.8. The mean scores in math achievement of the above three defined groups (never, sometimes and always) are 17.58, 20.13 and 21.57 respectively. From the trend it is quite clear that as the involvement of the students increases in the participation in activities, the achievement in math also increases accordingly. When t-test was applied to compare each mean with every other mean achievement scores, significant difference were obtained between all the three means. \((t=2.97, \ P<0.01, \ df=808; \ t=4.27, \ P<0.01, \ df=420; \ and \ t=2.26; \ P<0.05, \ df=1020; \ respectively)\). Hence, the fourth hypothesis stating that "sports activities of the students do not influence the achievement in math" is rejected at 0.01 and 0.05 levels of confidence. The graphical presentation is given in fig. 5.5.
Table 5.7 Summary of analysis of variance in respect to math achievement and sport activities of students

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>df</th>
<th>sum of squares</th>
<th>Mean square</th>
<th>F</th>
<th>Sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between group</td>
<td>2</td>
<td>1309.29</td>
<td>654.64</td>
<td>7.34</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>with in groups</td>
<td>1124</td>
<td>100187.72</td>
<td>89.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1126</td>
<td>101497.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.8 Comparison of mean achievement scores in math of three groups of students formed on the basis of participation in sport activities

<table>
<thead>
<tr>
<th>Group</th>
<th>Sports</th>
<th>N</th>
<th>Mean ach. score</th>
<th>SD</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>A</td>
<td>Never</td>
<td>105</td>
<td>17.58</td>
<td>7.93</td>
<td>x</td>
</tr>
<tr>
<td>B</td>
<td>Some times</td>
<td>705</td>
<td>20.13</td>
<td>9.72</td>
<td>2.97</td>
</tr>
<tr>
<td>C</td>
<td>Always</td>
<td>317</td>
<td>21.57</td>
<td>9.26</td>
<td>4.27</td>
</tr>
</tbody>
</table>

*Sig. at p<0.05 level and Sig. at p<0.01 levels
Fig. 5.5 Math achievement of three groups of student based on participation in sport activities
5.2 Relationship between familial factors (parental education, occupation, size of the family and parental assistance in solving math) and math achievement of students

5.2.1 Relationship between parental education and math achievement of children.

Parents play an important role in their children learning. Aside from being actively involved in their children education, parents also provide a home environment that can affect learning. Parents serve as a model for learning, determine the educational resource available in the home and hold particular attitudes and values towards education. Although, it is difficult to examine the home environment of each student, the parental education serve as an indicator of the values and resources with which parents create this environment.

For studying relationship between fathers education and their children achievement in math the data was categorized into three groups, i.e., illiterate, having received education upto class 12th, and degree levels and above, on the basis of their fathers education. The mean math scores of their children of these groups are 16.04, 17.55 and 27.11 respectively. The scores of these groups were put to analysis of variance. The results are given in table 5.9. Analyses of variance of the mean scores of the three groups give F-value as 164.96, which is significant at 0.01 level, with df =2, 1124. This implied that there is significant overall difference in the means of these three groups. Hence, t-test was applied for further investigation.

When t-test was applied for further investigation, the mean scores, SD and t-values are obtained and given in table 5.10. The mean achievement scores of children of illiterate fathers is 16.04, SD=6.99 and
in case of children of up to class 12th fathers education, the mean achievement scores is 17.55, SD=7.99 and in case of children of degree level and above fathers education is 27.11, SD=9.40. The calculated t-values are 2.11, 13.49 and 16.05 respectively, which are significant at 0.05 and 0.01 levels of confidence with df 783, 458, 1007 respectively. From the trend it is quite clear that as the father's education increases, the achievement in math score of their children also increases accordingly. The lowest mean scores in math is found of the children whose fathers are illiterate and on the other hand the highest scores in math achievement is found of the children whose fathers are highly educated. The graphical presentation is given in fig. 5.6.

For studying the relationship between mother's education and their children achievement in math, three groups of mothers i.e. illiterate, up to class 12th, degree level and above were formed on the basis of their education. The math achievement scores of children of these groups of mothers are 15.87, 19.55 and 27.12 respectively. The scores of these groups were put to analysis of variance and t-test. The results are contained in table 5.11 and 5.12 and graphical presentation is given in fig. 5.7.

Analysis of variance of the scores of the three groups yielded significant F value as 101.60 which is significant at 0.01 level with df=2, 1124. This implied that there is significant overall difference in the means of these groups. When t-test was applied to compare each mean with every other mean, significant difference was obtained in all the three groups and all t-values are found significant at 0.01 level of confidence with df 899, 461 and 888 respectively. From the trend it is quite clear that as the mother's education increases the achievement in math of their children also increases accordingly. The lowest mean scores in math is found of the children whose mothers are illiterate and on the other hand
the highest math achievement score is found of the children whose mothers are highly educated. The children whose mother's education was upto 12\textsuperscript{th}, is found in middle position in case of math achievement.

Hence, the fifth hypothesis stating that “parental education of the children is not significantly related to achievement in math” is rejected at 0.01 and 0.05 levels of confidence. The results indicate that parental education effects the math achievement of their children. Hence there is a positive relationship between the educational levels of the parents and their children performance in math.
Table 5.9 Summary of analysis of variance in respect to math achievement and father's education of children

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>df</th>
<th>sum of squares</th>
<th>Mean square</th>
<th>F</th>
<th>Sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between group</td>
<td>2</td>
<td>23031.69</td>
<td>11515.85</td>
<td>164.96</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>within groups</td>
<td>1124</td>
<td>78465.32</td>
<td>69.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1126</td>
<td>101497.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.10 Comparison of mean achievement scores in math on the basis of their father's education.

<table>
<thead>
<tr>
<th>Group</th>
<th>Father's education</th>
<th>N</th>
<th>Mean ach. score</th>
<th>SD</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>A</td>
<td>Illiterate</td>
<td>118</td>
<td>16.04</td>
<td>6.99</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Up to class 12</td>
<td>667</td>
<td>17.55</td>
<td>7.99</td>
<td>2.11</td>
</tr>
<tr>
<td>C</td>
<td>Degree level and above</td>
<td>342</td>
<td>27.11</td>
<td>9.40</td>
<td>13.49</td>
</tr>
</tbody>
</table>

*Sig. at p<0.05 level and Sig. at p<0.01 levels
Fig. 5.6 Presentation of math achievement on the basis of their father's education
Table 5.11 Summary of analysis of variance in respect to math achievement and mothers education.

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>df</th>
<th>sum of squares</th>
<th>Mean square</th>
<th>F</th>
<th>Sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between group</td>
<td>2</td>
<td>15540.02</td>
<td>7770.01</td>
<td>101.60</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>with in groups</td>
<td>1124</td>
<td>85956.99</td>
<td>76.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1126</td>
<td>101497.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.12 Comparison of mean achievement scores in math on the basis of their mothers education.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mothers education</th>
<th>N</th>
<th>Mean ach. score</th>
<th>SD</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>A</td>
<td>Illiterate</td>
<td>237</td>
<td>15.87</td>
<td>7.43</td>
<td>x</td>
</tr>
<tr>
<td>B</td>
<td>Up to class 12</td>
<td>664</td>
<td>19.55</td>
<td>8.83</td>
<td>6.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>C</td>
<td>Degree level and above</td>
<td>226</td>
<td>27.12</td>
<td>9.72</td>
<td>13.94</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10.34</td>
</tr>
</tbody>
</table>

*All t-value Sig. at p<0.01 level*
Fig. 5.7 Presentation of math achievement on the basis of their mother's education
5.2.2 Relationship between parental occupation and math achievement of their children.

Parental occupation may influence student performance in various ways for example, occupation related to income may determine access to learning opportunities and resources and so play a role in learning outcomes. The education and types of skills associated with different occupations and modeled by parents may motivate students to develop their own skills in particular ways. Parental occupation may also influence how students perceive the value of math learning, their beliefs about the usefulness of math and the learning environment at home. If occupation is considered as an indicator of parental skill, it appears that students whose parents worked in occupation with greater skill requirements also performed better in math. However, the large overlap between groups also indicates that there are still large differences within occupational categories.

To find out the relationship between fathers occupation and achievement in math of their children, the total sample of the students was categorized into four groups on the basis of fathers occupation i.e. professionals, businessman, agriculturist and others. Analysis of variance was employed to determine the significance of differences in math achievement scores of the children of their four groups of fathers. The total sum of squares between and with in the means of the children were calculated. The F ratio came out to be 36.82 and found to be significant at 0.01 level for df=3, 1123. This means that there were significant difference in the means of math achievement of the children of professional, businessman, agriculturist and others (table 5.13).

A glance at the table 5.14 denotes that the mean achievement scores of children of professional, businessman, agriculturist and others fathers were 25.72, 23.14, 16.95 and 19.33 respectively. t-test was
applied to compare each mean with every other mean, significant difference were obtained between all the means. All the 6ts were found significant at 0.05 and 0.01 levels. The df of these six groups were 383, 391, 571, 554, 734 and 742 respectively. From the trend it is quite clear that children of professional groups have highest score in math than other three groups and on the other hand children of low occupational status (agriculturist) have lowest scores in math than other three groups. Children of businessman have more achievement in math than the children of others and agriculturist and less achievement than the professional groups. Children of others group have less achievement than professional and businessman and more than agriculturist groups. The tendency that becomes clear from the study that father’s occupation effects the achievement of their children in math. The graphical representation is given in fig. 5.8.
Table 5.13 Summary of analysis of variance in respect to math achievement and fathers’ occupation

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>df</th>
<th>sum of squares</th>
<th>Mean square</th>
<th>F</th>
<th>Sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between group</td>
<td>3</td>
<td>9090.41</td>
<td>3030.14</td>
<td>36.82</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>with in groups</td>
<td>1123</td>
<td>92406.60</td>
<td>82.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1126</td>
<td>101497.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.14 Comparison of mean achievement scores in math on the basis of their fathers’ occupation.

<table>
<thead>
<tr>
<th>Group</th>
<th>Fathers occupation</th>
<th>N</th>
<th>Mean ach. score</th>
<th>SD</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>A</td>
<td>Professional</td>
<td>112</td>
<td>25.72</td>
<td>10.21</td>
<td>x</td>
</tr>
<tr>
<td>B</td>
<td>Businessman</td>
<td>273</td>
<td>23.14</td>
<td>10.18</td>
<td>2.25*</td>
</tr>
<tr>
<td>C</td>
<td>Agriculturist</td>
<td>281</td>
<td>16.95</td>
<td>6.71</td>
<td>8.40**</td>
</tr>
<tr>
<td>D</td>
<td>Others</td>
<td>461</td>
<td>19.33</td>
<td>9.33</td>
<td>6.03**</td>
</tr>
</tbody>
</table>

*Sig. at p<0.05 level and **Sig. at p<0.01 levels
Fig. 5.8 Presentation of math achievement on the basis of their father's occupation
For studying relationship of mothers occupation and achievement in math of their children, mothers were categorized into two groups i.e. housewife and working mothers. It is clear from table 5.16 that the numbers of children of housewife and working mothers were 1052 and 75 respectively. The mean achievement score of children of housewife mothers was 20.28, SD=9.29. In case of children of working mothers, the mean achievement score was 20.56, SD=11.98. The calculated t-value was 0.20 which was not found to be significant at 0.05 levels with 1025 df. This result clearly shows that there was no significant difference between the means achievement scores in math of children of housewife and working mothers. Graphical presentation is given in fig. 5.9.

Hence the sixth hypothesis stating that “parental occupation of the children is not significantly related to achievement in math” was partly accepted and partially rejected. Parental education and father's occupation influence the math achievement of their children but mother's occupation does not influence the math achievement of their children.
Table 5.16 Comparison of mean achievement scores in math between children of housewife and working mothers

<table>
<thead>
<tr>
<th>Mothers occupation</th>
<th>N</th>
<th>Mean achievement score</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>House wives</td>
<td>1052</td>
<td>20.28</td>
<td>9.29</td>
<td>.20</td>
<td>1025</td>
<td>Not</td>
</tr>
<tr>
<td>Working</td>
<td>75</td>
<td>20.56</td>
<td>11.98</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 5.9 Graphical presentation of math achievement scores of children belonging to housewives and working mothers
5.2.3 Relationship between family size and math achievement.

The total sample has been divided into two groups on the basis of their family size i.e. small family (4 members) large size (more than 4 members). The number of students belongs to small size and large size were 210 and 917 respectively as indicated by the table 5.17. The mean achievement of students of small family is 23.40 and SD=10.41. In case of large family, the mean achievement score of the students is 19.58 ad SD=9.13. The graphical presentation of these mean scores is given in fig 5.10. The statistically calculated t is 5.32 which is significant at 0.01 level with 1125 df. The result clearly indicates that math achievement of students of small size of family have greater achievement than the students of large family size. The graphical presentation of these mean scores is given in fig. 5.10.

The analysis do not confirms the prediction hypothesised in this study for the present sample. A relationship between family size of the students and math achievement has been demonstrated by these findings. Hence the seventh hypothesis stating that “family size of the children is not significantly related to achievement in math” was rejected. There is relationship between family size and students’ achievement in math.
Table 5.17 Comparison of math achievement of students according to their family size

<table>
<thead>
<tr>
<th>Family size</th>
<th>N</th>
<th>Mean achievement score</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>210</td>
<td>23.40</td>
<td>10.41</td>
<td>5.32</td>
<td>1125</td>
<td>Sig at .01 level</td>
</tr>
<tr>
<td>Large</td>
<td>917</td>
<td>19.58</td>
<td>9.13</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 5.10 Graphical Presentation of math achievement according to small and large family size
5.2.4. Relationship between parental assistance in solving math problems and math achievement.

Data was categorized into three groups on the basis of parental assistance in problem solving at home of their children, viz. never, sometime and always. Analysis of variance was applied for studying relationship between math achievement of children and their parental assistance. The mean math achievement of children who have never get any assistance, sometimes and always assistance in problem solving by their parents were 17.58, 20.95 and 20.48 respectively. When these means were examined by the analysis of variance, the calculated value of F is 8.92, which is significant at 0.01 with 2, 1124 df. Table 5.18 shows that there were overall significant between the means hence t-test was applied for further investigation.

The perusal of table 5.19 shows that the number of children whose fathers never assist, sometimes assist and always assist in problem solving of their children were 176, 640 and 311 respectively. The mean and SD of these groups were 17.58, 7.87, 20.95, 9.81 and 20.48, 9.43 respectively. When t-test was applied to compare each mean with every other means math achievement score, significant difference was found between the mean of never and sometimes assistance (t=4.76, P<0.01) df=814) between the means of never and always assistance (t=3.63 P<0.05, df=485). But no significant difference was found between the mean achievement of student of sometimes and always assistance of their fathers. From the result it is quite clear that the lowest math score is found of the children whose father never assist at home and highest math achievement score is found of the children whose fathers either sometimes or always assist in problems solving at home. Also, there is no significant difference between the means of sometimes and always
assistance in problem solving of their fathers. The graphical presentation of mean achievement scores is given in fig. 5.11.

The analysis do not confirms the prediction hypothesised in this study for the present sample. A relationship between parental assistance in solving mathematical problems of their children and achievement in math has been demonstrated by these findings. Hence the 8th hypothesis stating that “parental assistance in problem solving does not influence the math achievement of their children” was rejected. There is relationship between parental help in solving the problems at home and the achievement in math of students.
Table 5.18 Summary of analysis of variance in respect to math achievement and parental assistance of children

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>df</th>
<th>sum of squares</th>
<th>Mean square</th>
<th>F</th>
<th>Sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between group</td>
<td>2</td>
<td>1585.88</td>
<td>792.94</td>
<td>8.92</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>within groups</td>
<td>1124</td>
<td>99911.13</td>
<td>88.89</td>
<td>8.92</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Total</td>
<td>1126</td>
<td>101497.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.19 Comparison of math achievement of children according to their parental assistance

<table>
<thead>
<tr>
<th>Group</th>
<th>Parental involvement</th>
<th>N</th>
<th>Mean ach. score</th>
<th>SD</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>A</td>
<td>Never</td>
<td>176</td>
<td>17.58</td>
<td>7.87</td>
<td>x</td>
</tr>
<tr>
<td>B</td>
<td>Some times</td>
<td>640</td>
<td>20.95</td>
<td>9.81</td>
<td>4.76*</td>
</tr>
<tr>
<td>C</td>
<td>Always</td>
<td>311</td>
<td>20.48</td>
<td>9.43</td>
<td>3.63*</td>
</tr>
</tbody>
</table>

*Sig. at p<0.01 level
Fig. 5.11 Graphical Presentation of math achievement of children according to their parental assistance.
5.3 Relationship between institutional factors (school type, class size and school resources) and math achievement of students.

5.3.1 Relationship between school type and math achievement.

To find out the influence of school types on math achievement of the students, the total sample was categorized into four groups on the basis of the management of the schools i.e. CBSE, Govt., KVS, Minority managed. Analysis of variance was employed to determine the significance of difference in math achievement scores of the students of the said four groups of schools. The total sums of squares between and within the means of the students were calculated and is given in table 5.20. The calculated value of F is 37.81 which is significant at 0.01 level with df 3, 1123. The result shows that there were overall significant difference between the means hence t-test was applied for further investigation.

Further support to this conclusion, it is also provided by a test of significance of difference between the mean math scores of the four types of schools as given in the table 5.21. The fig 5.12 shows the mean score of math achievement of students of four types of schools.

The statistical method used in testing the major hypothesis was the t-test for the difference between the means of four groups. The t-values obtained by comparing each group mean math score with that of every other groups show that all the ts are found to be significant. Further, the table 5.21 shows that t-value between A and B group is 16.31 which is found significant at 0.01 level with df=488. The t-value between A and C group is 8.51 which is significant at 0.01 level with df 327. The t-value between A and D group is 9.61 which is significant at 0.01 level with df 680. The t-value between B and C is 9.41 which is significant at
### Table 5.20 Summary of analysis of variance in respect to math achievement and type of schools

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>df</th>
<th>sum of squares</th>
<th>Mean square</th>
<th>F</th>
<th>Sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>3</td>
<td>9494.41</td>
<td>3031.15</td>
<td>37.81</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>within groups</td>
<td>1123</td>
<td>92416.60</td>
<td>80.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1126</td>
<td>101911.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 5.21 Comparison of math achievement scores of students of four type of schools

<table>
<thead>
<tr>
<th>Group</th>
<th>School type</th>
<th>N</th>
<th>Mean ach. score</th>
<th>SD</th>
<th>t-value</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CBSE</td>
<td>187</td>
<td>31.28</td>
<td>9.45</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Govt. school</td>
<td>303</td>
<td>15.42</td>
<td>6.51</td>
<td>16.31**</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>KVS</td>
<td>142</td>
<td>25.49</td>
<td>7.87</td>
<td>8.51**</td>
<td>9.41**</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Minority managed</td>
<td>495</td>
<td>17.64</td>
<td>8.16</td>
<td>9.61**</td>
<td>2.51**</td>
<td>5.89**</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

*Sig. at p<0.05 level and **Sig. at p<0.01 levels
Fig. 5.12  Graphical Presentation of math achievement of students of different type of schools
0.01 level with df 443. The calculated t-value between B and D is 2.51 which is significant at 0.05 level with 796 df. The calculated t-value between C and D is 5.89 which is significant at 0.01 level with df 635.

It is clear from the table that all the ts are significant at 0.01 levels except the t-value between govt. and minority school students is found significant at 0.05 level.

The result clearly shows that students of CBSE schools have highest math scores than the other three groups, then student of KVS have higher math scores than Govt. and minority schools students but lesser than the CBSE school students. Minority students have higher math score then Govt. and lesser than CBSE, KVS schools students.

These analyses do not confirm the prediction hypothesized in this study for the present sample. A relationship between math achievement scores of student and type of schools has been demonstrated by the findings. Hence the 9th hypothesis stating that "type of schools do not significantly related to achievement in math of students" were rejected.

5.3.2 Relationship between school resources and math achievement

The resources in schools were categorized as good and poor. It is clear that good resource schools have good building, play ground, furniture and other resources as compare to the poor resource schools. The mean achievement scores and SD of students of good and poor resource schools were 31.28, 9.46, and 17.64, 8.16 respectively. The statistically calculated t-value is 16.27 which is significant at 0.01 level with 717 df. Table 5.22 and Fig. 5.13 show that the mean score of students of good resource schools is found to be significantly higher than the mean score of students of poor resource schools. A relationship between math achievement scores of students and school resources has
been demonstrated by the findings. Hence, the 10\textsuperscript{th} hypotheses stating that “school resources do not significantly relate to achievement in math of students” were rejected.
Table 5.22 Comparison of math achievement scores of students on the basis of their school resources

<table>
<thead>
<tr>
<th>Resource group</th>
<th>No. of schools</th>
<th>No. of students N</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>3</td>
<td>187</td>
<td>31.28</td>
<td>9.46</td>
<td>16.27</td>
<td>680</td>
<td>0.01</td>
</tr>
<tr>
<td>Poor</td>
<td>3</td>
<td>303</td>
<td>15.42</td>
<td>4.50</td>
<td>16.27</td>
<td>680</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Fig. 5.13 Graphical presentation of math achievement score and type of resources.
5.3.3 Relationship between class size and math achievement

As regards to class size i.e. number of students found in each class, the same was calculated in four types of schools and then compared with each other. These types of schools like CBSE, Govt., KVS and minority managed schools were found to differ on size of the class (table 5.23). The class size in CBSE schools was found to be 23 and in KVS schools size of the class 30 then this size was in Govt. schools, 40 as comparison to minority managed schools where it is very high i.e. 46. Further t-test was applied between the lowest and highest class size groups. Table 5.23 shows that there is significant difference in between these two groups. The mean scores makes it clear that the student of small size class achieved significantly higher score than the large class size (t=14.12, p<0.01, df=717). The graphical representation of means of these groups is given fig. 5.14. A relationship between math achievement scores of students and class size has been demonstrated by the findings. Hence the 11th hypothesis stating that “class size does not influence the achievement in math of students” was rejected.
## Table 5.23 Comparison of math achievement scores of students on the basis of class size

<table>
<thead>
<tr>
<th>group</th>
<th>Class Size</th>
<th>No. of schools</th>
<th>No. of students</th>
<th>Mean achievement score</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smaller</td>
<td>1:23</td>
<td>3</td>
<td>187</td>
<td>31.28</td>
<td>9.35</td>
<td>9.05</td>
<td>680</td>
<td>0.01</td>
</tr>
<tr>
<td>Larger</td>
<td>1:46</td>
<td>6</td>
<td>495</td>
<td>17.64</td>
<td>8.05</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fig. 5.14** According to class size graphical presentation of math achievement. High achievement is shown for smaller class size and low achievement for larger class size.

---

*Presentation......*
Table 5.24 Table of mean math achievement of the students and percentage of physical facilities available in various types of schools

<table>
<thead>
<tr>
<th>School Type</th>
<th>No. of students</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
<th>No. of Schools</th>
<th>Physical Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Excellent</td>
</tr>
<tr>
<td>CBSE</td>
<td>187</td>
<td>31.3</td>
<td>9.46</td>
<td>7</td>
<td>54</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Government School</td>
<td>303</td>
<td>15.4</td>
<td>4.51</td>
<td>2</td>
<td>30</td>
<td>3</td>
<td>00</td>
</tr>
<tr>
<td>KVS</td>
<td>142</td>
<td>25.7</td>
<td>9.13</td>
<td>13</td>
<td>91</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Minority Managed</td>
<td>495</td>
<td>17.6</td>
<td>8.16</td>
<td>1</td>
<td>46</td>
<td>6</td>
<td>00</td>
</tr>
<tr>
<td>Total</td>
<td>1127</td>
<td>20.3</td>
<td>9.65</td>
<td>1</td>
<td>91</td>
<td>14</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 5.25 Percentage table of teachers and students ratio in various types of schools and mean math achievement of the students of respective schools

<table>
<thead>
<tr>
<th>School type</th>
<th>No. of students</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Teachers</th>
<th>Students</th>
<th>Teacher Student Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>N</td>
<td>Ratio</td>
</tr>
<tr>
<td>CBSE</td>
<td>187</td>
<td>31.3</td>
<td>9.46</td>
<td>7</td>
<td>54</td>
<td>111</td>
<td>2600</td>
<td>1:23</td>
</tr>
<tr>
<td>Government School</td>
<td>303</td>
<td>15.4</td>
<td>4.51</td>
<td>2</td>
<td>30</td>
<td>76</td>
<td>3035</td>
<td>1:40</td>
</tr>
<tr>
<td>KVS</td>
<td>142</td>
<td>25.7</td>
<td>9.13</td>
<td>13</td>
<td>91</td>
<td>105</td>
<td>3174</td>
<td>1:30</td>
</tr>
<tr>
<td>Minority Managed</td>
<td>495</td>
<td>17.6</td>
<td>8.16</td>
<td>1</td>
<td>46</td>
<td>298</td>
<td>13600</td>
<td>1:46</td>
</tr>
<tr>
<td>Total</td>
<td>1127</td>
<td>20.3</td>
<td>9.65</td>
<td>1</td>
<td>91</td>
<td>590</td>
<td>22409</td>
<td>1:38</td>
</tr>
</tbody>
</table>
Table 5.26 Table of teachers’ qualification, teacher and students ratio, training of teachers and teaching experience and medium of instruction in respective schools.

<table>
<thead>
<tr>
<th>School Type</th>
<th>Teachers Qualification</th>
<th>Teacher Students Ratio</th>
<th>Training of Teachers</th>
<th>Teaching Experience</th>
<th>Medium of Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Graduate</td>
<td>Post Graduate</td>
<td>Physical Facility</td>
<td>Students</td>
<td>Teachers</td>
</tr>
<tr>
<td>CBSE</td>
<td>10</td>
<td>26</td>
<td>1</td>
<td>900</td>
<td>36</td>
</tr>
<tr>
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5.4 Discussion

The purpose of the present research was to determine the effects of personal, familial and institutional factors on academic achievement in math. These three variables were chosen for analysis because they are manipulable variables that have been identified as important influences on achievement in previous researches. Data from a large contemporary sample of high schools students were analyzed. F-test and t-test were used to determine the effects of these variables on academic achievement, while controlling for other relevant background influences.

The results of the analysis of data shows that the personal factors indices, gender, attitude, T.V. watching, sport activities, familial factors indices, parental education, occupation, family size, parental assistance and institutional factors indices, type of schools, school resources and class size, all had significant effect on math achievement scores in expected direction except gender and occupation of their mothers.

There were no significant differences in math achievement scores between boys and girls in the present study. The finding of this study is supported by Bronholt, Goodrow and Conney (1999), Ewers and Wood (1992); Skaalvik, (1990); Hilton and Berglund (1974). Awartani and Gray (1989) reported no significant differences between male and female students in math achievement. Ma (1995) studied a sample of high school seniors, based on algebra and geometry achievement. He found no gender differences in algebra but males significantly out performed females in geometry. Gender differences in achievement, especially math, have not been consistent and continue to be a much debated topic (Leder, 1992). Gender differences and the findings on gender differences in math achievement are not newly emerged fact. Long research history in this
area has demonstrated that male advantage in math achievement is a universal phenomenon (Beaton et al, 1996; Mullis et al., 2000). Researchers have shown that boys tend to score higher than girls on problems that include spatial representation, measurement, proportions as well as complex problems; whereas girls tend to score higher on computations, simple problems and graph reading (Beaton et al. 1999).

According to some research findings, the gender gap in math achievement increases during middle school and becomes more disturbing at the upper secondary level (Fennema et al. 1989; Fennema, 1985). Friedman (1989) noted that until age 10 either no differences between genders or favouring girls are observed. He observed that 12th grade boys outperformed girls, finally, other studies (Fox, Brody and Tobin, 1980) emphasized high math achievement being dominated by males. Leder (1992) has also reported the existence of gender differences in science subject in general as well as in math.

It is generally believed that student attitude towards a subject determines their success in that subject. In other words, favourable attitude result to good achievement in a subject. A student's constant failure in a school subject and math in particular can make him to believe that he can never do well on the subject thus accepting defeat. On the other hand, his successful experience can make him to develop a positive attitude towards learning the subject. This suggests that student's attitude towards math could be enhanced through effective teaching strategies. It has in fact been confirmed that effective teaching strategies can create positive attitude on the students towards school subjects (Bekee, 1987; Bealogun and Olarewaju, 1992; Akinsola 1994; Akale 1997, Alowojaiye 2000).

In general 24.84 percent students have favourable attitude towards math with 23.69 percent of students have negative attitude and
rest being termed as average. Generally, one fourth of the total sample have favourable attitude towards math. When the male and female students were further categorized into positive, average ad negative attitude, the trend of percentages in both the cases were found same as the total sample, Thus, it is evident from this analysis that the percentages of negative students though only 23 percent cannot be considered as flattering. The result of analysis also makes it clear that male and female students both have same trend as the total sample has.

It becomes quite clear that attitude towards math and achievement in it are positively related in this study, the higher the attitude of students towards math, higher the achievement in math of the students. Other studies lend support to this relationship. Ma (1997), observed that for trigonometry students, the attitudes that math was important and enjoyable were significantly associated with achievement in math. Jha (1992), Kumar (1980), Rech (1996) concluded that there is a positive and significant correlation between proper attitude towards math and achievement in it. The relationship between attitude towards math and ability in the subject has been found to be interactive and dynamic (Reyes, 1984). Increasing the level of math achievement may, in and of itself, actually result in more positive attitude. Pal (1989) observed that better attitude towards math ensures better achievement of the students in math at secondary level. Jayaraman (1989) found a significant relation between attitude towards learning math and achievement in math. Enemark and wise (1981) demonstrated that the attitudinal variables are significant indicators of math achievement. Steenkamp (1982) concluded that primary among the variables that determine AIM is ATM. These conclusions represent the view of a strong relationship between ATM and AIM, with correlations above 0.40 as supported by a number of researches (Kloosterman, 1991; Minato, 1983; Minato and Yanase, 1984;
Randhawa and Beamer, 1992). On the other hand, the research literature, however, has failed to provide consistent findings the relationship between attitude towards math and achievement in it. A number of researchers have demonstrated that the ATM-AIM correlation is quite low, ranging from zero to 0.25 in absolute value and they have concluded that the ATM-AIM relationship is weak and cannot be considered to be of practical significance (Abrego, 1966; Deighan 1971; Vachon, 1984; Wolf and Blixt, 1981). Robinson (1975) concluded that ATM accounts for, at best, 15% of the variance in AIM, indicating that the relationship has no useful implications for educational practice. Thus, academic achievement in math is functionality dependent on attitude of the students towards learning math. It indicates that students with favourable attitude towards math may perform better in achievement-test in math as compared to the students with unfavourable attitude. In the light of the above discussion it is evident that attitude of the learners are the important correlates of their academic achievement.

The results presented support the idea that T.V. watching brings some benefits for students. The result shows that watching T.V. for less than 1 hr to 2 hrs per day has increasingly positive affects on achievement of students. The student have no TV in their homes and not watching TV and also students who have TV in their homes and viewing more the 2 hrs per day have increasingly negative affects on achievement. Our results suggest that more time and no time spent watching TV have negative affects on the math achievement of high schools students. In general the academic performance of both, the more TV students and no TV students was found worse. Hence amount of time spent on viewing TV is the important criteria for performance of the students. This study is supported by Williams et al (1982) who have seen a positive effect for up to 10 hr of viewing TV per week and with more viewing having increasingly
negative effects on achievement. Using a national sample from the high school and beyond longitudinal survey, Keith, et al (1986) found a small negative relationship between achievement and amount of TV watching. However, the negative effect of TV watching is not found consistently (Gortmker, Salter, Walker and Dietz, 1990); suggesting the relationship may be weak and therefore sensitive to methodological variations. Indeed, Comstock (1991) concluded that the evidence indicates a modest causal contribution by television to lesser achievement. The findings of this study, along with findings of other researches (Lemish and Rice, 1986) suggest that students benefit from TV viewing. Nevertheless, even for young children, viewing should be probably be limited to the existing estimates of optional viewing time such as up to 2hrs a day. Television viewing has traditionally been assumed to lesser achievement (Keith, Reimers, Fehrman, Pottebaum and Aubey, 1986). Simply, television viewing displaces academic activities and reduces the amount of time available for completing homework and other academic activities, thereby reducing achievement. Cooper et al (1999) observed a significant negative association between achievement and television viewing (mean viewing was 1-2 hr per night).

Knowledge of how students spend their non school hours can help predict their performance in school. The results presented support the idea that participating in sports activities brings some benefits for students. The students who participate in sport activities present significantly better academic achievement in math. Along these lines Cooper and Valentine (1999) concluded that, generally, more time in extracurricular activities and other structured groups and less time in jobs and television viewing were associated with higher test scores and class grades. Lipscomb (2007) reported that athletic participation is associated with a 2 percent increase in math and science test scores. Using a national
data base, Lisella and Serwatka (1996) found that, in almost 50 percent of the cases, male student participation in extracurricular activities was associated with lower achievement levels. For female students, the results were mixed. In 23 of the 90 different analysis run, females who participated in extracurricular activities were found to have higher achievement levels than nonparticipating females. Eide and Ronan (2001) point out that participation can be both consumption and an investment. Extracurricular involvement provides short run investment returns on outcomes that are positively correlated with labour market success. Given their popularity, society ought to have a better understanding of the benefits these activities afford. Positive associations between after school pursuits and achievement have been observed. Students involved in extracurricular activities such as sports also tend to have good attitudes, positive self concept and higher achievement than do students not involved in these activities (Holland and Andre 1987). Gerber's (1996) results indicated the school-related extracurricular activities (e.g. sports, band, honor society) and outside-school activities (e.g. hobby groups, scouting, and 4-H) were related positively to math achievement, Marsh (1992) had similar findings with small but statistically significant positive correlations between activities (e.g. sports, drama clubs, etc.) and achievement.

In this study parental education is found to be an important factor of children achievement in math. Children from highly educated parents are likely to have significantly higher math achievement scores as compared to the children of less educated parents. This study is supported by Mehra, 1980; Shukla, 1994, and Kadriye, Tanya and Vanessa (2005). The path model for both sexes showed that educated mothers had strong indirect effects on their children math achievement (Campbell and Beuetry 1998). Schools that had more resources, had higher average
parent education on average had higher mean advanced math achievement (Schreiber, 2002). Wilkins and Ma (2002) found that parent education and home resources had a positive relationship with students initial status in all three content areas (Statistics, algebra and geometry). Latest results from the Programme for International Student Assessment (2004) for student achievement in mathematics. PISA 2004 found that there is a positive relationship between the educational level of the parents and student performance in mathematics, there is also considerable overlap in the performance of students from different educational background. Hence family background was also related to student performance in math. Students whose parents were university educated performed higher than those whose parents had no more than a high school education.

It has been found that father's occupation was related to academic achievement in math. The nature of father's occupation is important for their children math achievement. Children of professional groups (Engineer, doctor, businessman, administrator, educationists etc.) fathers have got highest math score than all other groups. Children of business man groups have got more math achievement than other two groups but less than the children of professional groups. The children of others group (Peon, Cooli, daily wagers etc.) have got more achievement than the children of agriculturist. The result shows clearly children of professional groups have got highest achievement and on the other hand children of agriculturist have got lowest achievement in math. This study suggests that the adult education programme if focussed on young mothers and fathers could be one approach to improve the students achievement in math.

It has been found that mother's occupation was not related to academic achievement in math. Children of housewife and working
mothers have been found equally good achievement in math. Although, this variable has been shown important variables in other studies (Bank and Finlayston, 1973). For example, Miline, Ginsburg, Myers and Rosenthal (1986) consistently found that mother's employment has a negative effect on both reading and mathematics achievement. In this regards Heyns and Catsambis (1986) pointed out that the effects of mother's employment are highly related to socioeconomic status of the families. In other words, they stated that by omitting students from lower socioeconomic background from the sample, also omit the positive effect of mother's employment on academic achievement.

The prevailing perception among educational researchers is that successful schools establish practices that foster greater communication with parents, encourage parents to assist children at home with their school work and planning and recruit parents to work as volunteers or participate in school governance. The argument is that these practices, in turn, lead to higher levels of schooling outcomes. The study of parental assistance in solving math problems at home of their children and their achievement in math revealed that parental assistance is related to the performance of their child in math, calls for parent involvement in schooling are not new. In the 1970s researchers such as Sarson (1971), Lightfoot (1978) and others suggested that parents should play a greater role in school governance because both they and their children are influenced by school decisions. Milne, Myers, Rosenthal and Ginsburg (1986), focused on issues such as the degree to which parents help with homework and the relationship between parent behaviours and student achievement. Astone and McLanahan (1991) suggested a positive association between parent involvement and student achievement. However, after analysing data from the longitudinal study of American youth, Madigan (1994) developed ten indicators of parent involvement
and found that parent help with homework and the provision of rewards for good grades sometimes had a negative effect on student achievement. Sui-chu and Williams (1996) found that of the four types of parent involvement they identified, student parent discussion in the home was the most powerful predictor of student academic achievement. Milne et al (1986) found negative effects of parents helping their children with homework and suggested that this finding was attributable to the fact that parents helped more if their children were not doing well at school. Muller (1993) too, reported negative effects for parents monitoring their eight graders homework or providing more after school supervision and significant negative effects for parents frequent contacts with school. The parental environment construct used by Fehrmann et al (1987), which consists of monitoring and supervision, was also positively related to children academic achievement. Further, the only type of parent involvement which was positively related to achievement was the home based type of parent involvement. For example the Coleman report (Coleman et al, 1966) as well as Mosteller ad Moynihan (1972) and Coleman (1975) reported that home based variables were at least as important as the school based variables in accounting for the total amount of student achievement variance. Researches are underway to explain the mechanism, how parental support has facilitating impact on academic success of the children, Parental support helps children to have a clear feedback about their progress. Consistent assistance benefits children to set and meet academic goals. However the type of parental support provided to the children should be appropriate to their age and grade levels.

This study also explored the relationships between students’ achievement in math and their size of the family. Children of smaller family have got significantly higher achievement in math than the
children of larger family, i.e. there is negative correlation between size of the family and achievement in math and as the family size increases the achievement decreases accordingly. For example, Zajonc (1976) has indicated that increased externality was associated with larger family size. Also, it has been reported that the number of children in the family had a significant negative effect on academic achievement (Iverson and Walberg, 1982; Hauser and Sewell, 1985). In all subjects, the scores of children living with single parents did not differ significantly from those of children living with two parents. Moreover, students living with no parents had lower reading and science scores than other students and this effect was mediated by lower family investment and involvement (Chiu and Ho, 2006). Small families typically have higher socioeconomic status, invest more in educational resources, spend more time with their children have larger social networks for their children to top on than larger families. The small families give their children more learning opportunities, exerted more presence, were more supportive, gave more help, provided more resources and hence raise their likelihood of higher academic achievement.

Now coming to different types of schools, another important variable of the study a definite relationship has been found to exist between this variable and math achievement of the students. Different type of schools, managed by different authority has different types of influences on performance of their students. In this way sample schools range from very good to poor in their performance. For instance CBSE schools are running on the lines of public schools and have very high reputations. In these study students of CBSE schools have got highest score than the students of other types of schools. The students of KVS also achieved significantly higher achievement math score than students of other types of schools but lesser than CBSE schools, students of
minority managed schools achieved significantly higher math score than the students of the Govt. Schools. In these way students of CBSE schools are high achiever and students of Govt. schools are low achiever in math. It is clear from the present studies that in India CBSE schools are privately managed and high status English medium schools where high socioeconomic background students are able to study. This shows high SES of school and high SES of students influence the achievement in math of the students. This is the reason that students of CBSE schools were found to be academically competent than those of all the students of other types of schools. Goldhabar (1996) found that private schools have no statistically significant advantage in the education on math and reading over public schools. Similarly a study conducted by White (1992) found that the difference in achievement in private and public schools is trivial in size and highly uncertain. The reasons of the variations in the results of the students conducted in west and in India may be because in the developed world both private and public schools operate with similar basic facilities available with them which is not true in case of India. The variations in the academic achievement of students in developed world is due to family background while as in developing world including India, school factors are largely responsible for variations in achievement levels of students. Heyneman and Loxely (1983), it was concluded that the factors determining learners achievement in developed world are different from that in developing world. It was found that home environment factors are more important and reliable factors in predicting learners’ achievement in the developed world where as school factors continue to be important in predicting learners’ achievement in the developing world.

When data was analysed to see the significant difference in math achievement scores on the basis of resources of the schools, it is found that students of good resources schools achieved significantly more
achievement score in math than the students of poor resources schools. It is clear that good resources schools have good building, play ground facilities and other such facilities as compare to poor resource schools. Overall, schools that had more resources, had higher average parent education and were larger (on the basis of full time teachers) on average had higher mean advanced mathematics achievement (Schreiber, 2002).

In a review of 377 studies, Hanushek (1989) observed no consistent pattern between the amount of money spent (e.g. teacher: student ratio or per pupil expenditure) and achievement, numerous studies in Hanushek's review had either significantly positive or negative results or non significant positive or negative results. He concluded that no strong or consistent relationship exists between school resources and student performance and that more resources would not yield performance gains for the students. Greenwald, Hedges and Laine (1996) performed a meta-analytic review of the studies from Hanushek's review and concluded that resources do have an influence on student achievement. Neither study focused on the impact of resources on student variables that could affect performance. On the other hand school facilities like building, separate classrooms, students reading places positively influence learner achievement (Arriagada 1983, Muammwenda, 1987, Urwick and Junaido, 1991, Varghese (1994), Jangira (1994), Govinda and Varghese (1993). Chubb and Moe who stated that money is not what makes some schools more effective than others. Better schools do not require lots of expensive equipment or huge new buildings or vast libraries. The performance problems of schools have little or nothing to do with inadequate funding and they can not be corrected by digging deep into the public purse. The results suggest that the conditions of schools which are not properly equipped with the necessary basic physical facilities and
educational facilities may be considered for improvement on priority basis.

This study also explored the relationships between students achievements in math and the size of the class. Students of smaller size class have got significantly higher achievement in math than the students of larger class i.e. there is negative correlation between size of the class and achievement in math. As the class size increases, accordingly the performance of the students are decreases. It has been found that class size was related to the achievement in math. This can be explained as, when the teacher pupil ratio is low (small class), the math performance is high and on the other hand, when the teacher pupil ratio is high (larger class) i.e., ratio of students with respect to teacher is high, the achievement in math of students is significantly low such findings corroborate with the results of Bastier Sigitha (1994), Padan (1988), Duraiswamy (1999) and Satvir and Saxena (1995). Angirist and Lavy (1999), Lee and Smith (1997), Monk (1987), Lee and Smith (1995), Jencks and Brown (1975), Krueger (1999). This study recommends that the appropriate pupil teacher ratio may be helpful in improving the math achievement.