CHAPTER – 4

DATA ANALYSIS AND INTERPRETATION

The data obtained from the subjects were systematically arranged and properly tabulated. The presentation of the data has reflected the measures of the selected research variables and their statistical distributions on the basis of which suitable statistical techniques were applied to analyze and find out necessary information to serve the objectives of the study. Keeping in mind the objectives of the present research study, it is essential to address whether there is any question of resemblance or difference existing between the so called Intelligent and not so Intelligent secondary school students or economically stable and not so stable group of students of Tripura state in terms of their Achievement in Mathematics.

For statistical significance, Mean, Standard Deviation, Homogeneity test were done. For analyzing the relationship among the variables, Pearson's Product Moment Correlation was done. For ascertaining the relative contribution of the different predictor variables to Achievement in Mathematics, the Step-wise Multiple Regression was done. For the analysis, 0.05 and 0.01 levels of

significance were considered. The processed data have been reported in different sections as follows.

The results are discussed in the following sections:

Section-4.1: Test of Homogeneity related to criterion variable among the students of different levels of Intelligence and Socio-Economic Status.

Section-4.2: Descriptive statistics and inferential statistics among all the variables.

Section-4.3: Statistics of Correlation between predictor variables and criterion variable.

Section-4.4: Predictive statistics between predictor variables and criterion variable.

4.1 TEST OF HOMOGENEITY

Table 4.1.1: Shows the Leven's Test of Equality of Error Variances of the total scores **obtained by the students of different levels of Intelligence in terms of the Achievement in Mathematics** ***(Dependent Variable).***

Leven's Test of Equality of Error Variances			
Dependent Variable: Achievement in Mathematics			
F	df1	df2	Sig.
2.21	1	388	(Not Sig)

***p < 0.01 level; *p < 0.05 level**

Table 4.1.1 shows the Leven's test of equality of variances of students of High and Low level of Intelligence taking Achievement in Mathematics as the dependent variable which reveals that Leven's test is insignificant F (1, 388) = 2.21 (p>0.05) indicating that the variances are not significantly different (i.e. they are similar and the homogeneity of variance assumption is tenable).

Table 4.1.2: Shows the Leven's Test of Equality of Error Variances of the total scores obtained by the students of different levels of SES in terms of the Mathematical Achievement (Dependent Variable).

Leven's Test of Equality of Error Variances			
Dependent Variable: Mathematical Achievement			
F	df1	df2	Sig.
2.56	1	388	(Not Sig)

p < 0.01 level; *p < 0.05 level

Table 4.1.2 shows the Leven's test of equality of variances of students of High SES and Low SES taking Achievement in Mathematics as the dependent variable which reveals that Leven's test is insignificant F (1, 388) = 2.56 (p>0.05) indicating that the variances are not significantly different (i.e. they are similar and the homogeneity of variance assumption is tenable).

Table 4.1.3: **Leven's Test of Equality of Error Variances**

Dependent Variable: Academic Achievement

F	df1	df2	Sig.
.558	5	384	.733 (Not Sig)

Table 4.1.3 shows that the error variance of the dependent variable is equal across all groups (different levels of Intelligence and different levels of SES)

4.2 ANALYSIS OF DESCRIPTIVE & INFERENTIAL STATISTICS

In the first phase of statistical analysis, the mean and standard deviation were calculated for all the specific groups on each of the variables under consideration.

4.2.1 Difference in Achievement in Mathematics between Secondary Level Students of High and Low Socio-Economic background along with the various other dimensions of SES.

Table 4.2.1.1: Shows the Mean (M) values, Standard Deviations (SD) & t value of the total scores obtained by the students of High and Low Socio-Economic Status in terms of the Achievement in Mathematics:

Variable	SES	Mean	SD	NO	t-value	Level of Significance
Achievement in Mathematics	High	21.69	6.1	193	7.497**	0.01
	Low	17.01	6.23	197		

p < 0.01 level; *p < 0.05 level

Table 4.2.1.1 shows the Mean, SD and t-value of the students of High & Low Socio-Economic Status with regard to their level of Achievement in Mathematics. It is evident that the mean Achievement in Mathematics of high SES group is 21.69 with SD 6.1 and that of the lower SES group is 17.01 & 6.23 respectively.

The table also indicates that the t-value 7.497 is significant at 0.01 level. Thus the result suggests that these two groups i.e. the High & Low SES differs significantly with respect to their level of Achievement in Mathematics. The High SES group is better than the Low SES group of students with regard to Achievement in Mathematics.

Table 4.2.1.2: Shows the Mean (M) values, Standard Deviations (SD) & t value of the total scores obtained by the students belonging to the family of 5 and more members and students of the family of 4 or less than 4 family members in terms of the Achievement in Mathematics:

Variable	No. of Family Members	Mean	SD	NO	t-value	Level of Sig
Achievement in Mathematics	Big Families (5 and above members in the family)	18.81	5.24	271	4.01**	0.01
	Small Family (Maximum 4 Members in the Family)	22.46	9.31	119		

p < 0.01 level; *p < 0.05 level

Table 4.2.1.2 shows the Mean, SD and t-value of the students of the families having 5 or more than 5 members (Big families) and that of families comprising of 4 or less than 4 members (Small

Families) with regard to their level of Achievement in Mathematics. It is evident that the mean Achievement in Mathematics of the students of big families is 18.81 with SD 5.24 and that of the small families is 22.46 and 9.31 respectively.

The table also indicates that the t-value 4.01 is significant at 0.01 level. Thus the result suggests that these two groups i.e the students coming from Big & Small families differ significantly with respect to their level of Achievement in Mathematics. The students of Small Families is well - off than the students of Big Families with regard to Achievement in Mathematics.

Table 4.2.1.3: Shows the Mean (M) values, Standard Deviations (SD) & t value of the total scores of the Achievement in Mathematics obtained by the students whose parents are graduate or more in academic qualification and students whose parents are non-graduates:

Variable	Educational Qualification of the Parents	Mean	SD	NO	t-value	Level of Sig
Achieve-ment in Mathe-matics	Graduate Parents	20.97	7.02	141	3.62**	0.01
	Non-Graduate Parents	18.43	5.94	249		

p < 0.01 level; *p < 0.05 level

Table 4.2.1.3 shows the Mean, SD and t-value of the students whose parents are graduate or more in academic qualification and that of students whose parents are non-graduates with regard to their level of Achievement in Mathematics. It is evident that the

mean Achievement in Mathematics of the students whose parents are graduate or more in academic qualification is 20.97 with SD 7.02 and that of the students whose parents are non-graduates is 18.43 and 5.94 respectively.

The table also indicates that the t-value 3.62 is significant at 0.01 level. Thus the result suggests that these two groups i.e. the students whose parents are graduate or more in academic qualification and students whose parents are non-graduates differ significantly with respect to their level of Achievement in Mathematics. The students whose parents are highly qualified are significantly better with regard to Achievement in Mathematics.

Table 4.2.1.4: Shows the Mean (M) values, Standard Deviations (SD) & t value of the total scores of the Achievement in Mathematics obtained by the students whose parents are in stable & secure Profession and students whose parents are not in stable profession:

Variable	Occupation of the parents	Mean	SD	NO	t-value	Level of Sig
Achieve-ment in Mathe-matics	Stable & Secure Profession	21.03	5.47	186	6.60**	0.01
	Unstable and Not – Secure Profession	17.6	4.74	204		

p < 0.01 level; *p < 0.05 level

Table 4.2.1.4 shows the Mean, SD and t-value of the students whose parents are having stable & secure profession and that of students whose parents are not having stable & secure profession

with regard to their level of Achievement in Mathematics. It is evident that the mean Achievement in Mathematics of the students whose parents are in stable profession is 21.03 with SD 5.47 and that of the students whose parents are not in secure profession is 17.6 and 4.74 respectively.

The table also indicates that the t-value 6.60 is significant at 0.01 level. Thus the result suggests that these two groups differ significantly with respect to their level of Achievement in Mathematics. The students whose parents are in secure profession are significantly better with regard to Achievement in Mathematics.

Table 4.2.1.5: Shows the Mean (M) values, Standard Deviations (SD) & t value of the total scores of the Achievement in Mathematics obtained by the students whose parents have adequate and fixed source of income and students whose parents do not have a fixed and secure source of income.

Variable	Source of Income	Mean	SD	NO	t-value	Level of Sig
Achieve-ment in Mathe-matics	Adequate & Fixed Source of Income	23.41	7.04	126	5.33**	0.01
	Inadequate and not Fixed Source of Income	18.34	11.64	264		

p < 0.01 level; *p < 0.05 level

Table 4.2.1.5 shows the Mean, SD and t-value of the students whose parents are having adequate & fixed source of income and that of students whose parents are not having a fixed source of income with regard to their level of Achievement in Mathematics. It

is evident that the mean Achievement in Mathematics of the students whose parents are having adequate and fixed source of income is 23.41 with SD 7.04 and that of the students whose parents are having inadequate source of income is 18.34 and 11.64 respectively.

The table also indicates that the t-value 5.33 is significant at 0.01 level. Thus the result suggests that these two groups differ significantly with respect to their level of Achievement in Mathematics. The students whose parents are having a fixed and adequate source of income are significantly better with regard to Achievement in Mathematics.

Table 4.2.1.6: Shows the Mean (M) values, Standard Deviations (SD) & t value of the total scores of the Achievement in Mathematics obtained by the students whose family monthly income is more than Rs. 20000/- and the students whose family income is below Rs. 20000/- per month.

Variable	Family Monthly Income	Mean	SD	NO	t-value	Level of Sig
Achieve-ment in Mathe-matics	More than Rs. 20000/-	22.93	7.11	142	4.20**	0.01
	Less than Rs. 20000/-	18.64	13.04	248		

p < 0.01 level; *p < 0.05 level

Table 4.2.1.6 shows the Mean, SD and t-value of the students whose family income is Rs. 20000/- per month and that of students whose family income is below Rs. 20000/- per month with regard to

their level of Achievement in Mathematics. It is evident that the mean Achievement in Mathematics of the students whose family income is above Rs. 20000/- per month is 22.93 with SD 7.11 and that of the students whose monthly family income is less than Rs. 20000/- is 18.64 and 13.04 respectively.

The table also indicates that the t-value 4.20 is significant at 0.01 level. Thus the result suggests that these two groups differ significantly with respect to their level of Achievement in Mathematics. The students whose monthly family income is more are significantly better in terms of Achievement in Mathematics.

Table 4.2.1.7: Shows the Mean (M) values, Standard Deviations (SD) & t value of the total scores of the Achievement in Mathematics obtained by the students residing in different categories of house.

Variable	House Categories	Mean	SD	N	t-value	Level of Sig
Achievement in Mathematics	Pucca House	23.46	12.04	181	3.18**	0.01
	Kachha House	20.09	8.16	209		

p < 0.01 level; *p < 0.05 level

Table 4.2.1.7 shows the Mean, SD and t-value of the students residing in different categories of house (Pucca and Kachha categories) with regard to their level of Achievement in Mathematics. It is evident that the mean Achievement in Mathematics of the students who dwell in pucca houses is 23.46 with SD 12.04 and

that of the students dwell in kachha houses is 20.09 and 8.16 respectively.

The table also indicates that the t-value 3.18 is significant at 0.01 level. Thus the result suggests that these two groups differ significantly with respect to their level of Achievement in Mathematics. The students who reside in pucca stable houses are significantly better in terms of Achievement in Mathematics.

4.2.2 Difference in Achievement in Mathematics between Secondary Level Students of High and Low Level of Intelligence.

Table 4.2.2.1: Shows Mean and SD values of Achievement in Mathematics of the students by categorising according to the different levels of Intelligence and Socio-Economic Status.

Level of Intelligence	Level of SES	Mean of Achievement in Mathematics	SD	N
High Level of Intelligence	High SES	23.07	5.64	117
	Low SES	21.37	4.98	35
	Total	22.68	5.53	152
Average Level of Intelligence	High SES	20.11	5.92	69
	Low SES	17.51	5.77	116
	Total	18.48	5.94	185
Below Average Level of Intelligence	High SES	14.28	6.77	7
	Low SES	12.43	5.34	46
	Total	12.67	5.51	53
Total	High SES	21.69	6.1	193
	Low SES	17.01	6.23	197
	Total	19.33	6.59	390

***Table 4.2.2.2: Shows F values from Two – Way Analysis of Variance (ANOVA) indicating the significance of Intelligence and Socio-Economic Status and their interaction on Achievement in Mathematics*.**

Source of Variance	df	Mean Square	F	Sig.
Between Levels of Intelligence	2	897.209	27.944**	.000
Between Levels of Socio – Economic Status (SES)	1	168.509	5.248*	.023
Interaction effect between Intelligence & SES	2	7.081	.221	.802 (Not Sig)

p < 0.01 level; *p < 0.05 level

Table 4.2.2.2 describes the F – values obtained from two – way analysis of variance (ANOVA) showing the significance of Intelligence, Socio-Economic Status and their interaction on Achievement in Mathematics. The result suggests that Achievement in Mathematics differs significantly among the students of 3 different levels of Intelligence. Besides significant differences are noted on Achievement in Mathematics among the students of different SES background. But Interaction effect between the students Intelligence and their respective SES has not been found to be significant with respect to Achievement in Mathematics.

4.3 CORRELATIONAL ANALYSIS

Table 4.3.1: Shows Pearson's Product Moment Coefficient of Correlation (r) between Achievement in Mathematics and Intelligence:

Variable	Intelligence	Level of Significance
	r	
Achievement in Mathematics	**0.58****	**0.01 level**

*****p < 0.01 level; *p < 0.05 level***

Table 4.3.1 shows the Pearson's Product Moment Coefficient of Correlation between intelligence of the students and their achievement in mathematics. The coefficient of correlation ***(r)*** is 0.58 which is significant at 0.01 level indicating a high level of correlation between these variables. The value indicates that Intelligence and Achievement in Mathematics is positively related to each other.

Table 4.3.2: Shows Pearson's Product Moment Coefficient of Correlation (r) between Achievement in Mathematics and Socio-Economic Status:

Variables	Achievement in Mathematics	Level of Sign
	r	
Over all SES	0.38**	0.01 level
Number of Family Members	0.22*	0.01 level
Educational Qualification of the Parents	0.39**	0.01 level
Occupation of the Parents	- 0.35**	0.01 level
Source of Income of the family	0.41**	0.01 level
Monthly Income of the family	0.41**	0.01 level
Land Area	0.039	Not Sig
House Category	0.20**	0.05 level

p < 0.01 level; *p < 0.05 level

Statistical analysis of the data using Pearson's Product Moment Coefficient of Correlation (Table 4.3.2) revealed that different dimensions of SES such as Number of Family Members, Educational Qualification of the Parents, Source of Income of the Parents, Monthly Income of the Family, Land Area, House Category as well as the total SES are positively correlated with the secondary level students' Achievement in Mathematics.

Most of the dimensions of SES (except Land Area and Number of Family members) are having statistically significant relationship with Individuals' Achievement in Mathematics, as all the values of co-efficient of correlations are significant at 0.01 level.

Land Area as a dimension of SES is not at all related with Individuals' level of Mathematical Achievement.

The table 4.3.2 also revealed that the co-efficient of correlation between House Category as a dimension of SES and Achievement in Mathematics is 0.20. Though these variables are positively related to each other, their strength of relationship is significant at 0.05 level.

Among all the dimensions of SES only one dimension is negatively related to achievement and that is occupation of the parents. The co-efficient of Correlation between occupation of the parents and achievement in mathematics is -0.35, which is significant at 0.01 level.

4.4 ANALYSIS OF PREDICTIVE STATISTICS

4.4.1 Regression Analysis to predict the role of the selected psycho-social variables in determining the Achievement in Mathematics of the Secondary level Students of Tripura.

Table 4.4.1.1: Stepwise Multiple Regression Analysis indicating the role of Intelligence, different dimensions of SES in predicting Academic achievement in Mathematics among the students:

Predictor Variables	R^2	Adjusted R^2	R^2 Change	ß	F Change	Level of sig
Intelligence	0.347	0.346	0.347	0.589**	206.45**	0.01
Intelligence Source of Income	0.465	0.462	0.118	0.511** 0.154**	18.735**	0.01
Intelligence Source of Income No. of Family Members (Family Type)	0.524	0.513	0.059	0.531** 0.333** 0.214*	10.181*	0.01
Intelligence Source of Income No. of Family Members (Family Type) Occupation	0.561	0.552	0.037	0.559** 0.346** 0.200* 0.157*	3.88*	0.05
Intelligence Source of Income No. of Family Members (Family Type) Occupation Category of House	0.579	0.572	0.018	0.562** 0.381** 0.189* 0.126* -0.97*	3.59*	0.05

p < 0.01 level; *p < 0.05 level

Table No. 4.4.1.1 suggested that at the first step of the stepwise multiple regression analysis R^2 is 0.347 (adjusted R^2 is 0.346) and R^2 change is 0.347. That means 34.7% of the variance in math academic achievement of the students can be explained by intelligence itself and the F- Change (df= 1,388) is 206.45 which is significant at 0.01 level. On the basis of *ß* coefficient (0.589, significance at 0.01 level) we can say that among all the predictor variables intelligence itself has a positive contribution in the development of math academic achievements. That means that intelligence act as a determinant factor and a predictor variable in students' mathematics academic achievement as the *ß* value and the R^2 value suggest.

At the 2nd step R^2 is 0.465 (adjusted R^2 is 0.462) and R^2 change is 0.118. Examination of the R^2 change indicates that nearly 11.8% of the variance in math academic achievements can be explained by addition of Source of Income of the family (as one of dimension of SES) in addition to intelligence and the F- Change (df-1,387) is 18.735 which is significant at 0.01 level. It suggest that family source of income has significant effect in predicting students math academic achievements beyond the effects of other significant variables of SES of the family. On the basis of *ß* coefficient (0.154, significant at 0.01 level) it might also be said that among the different dimensions/areas of SES, source of income has a positive

contribution towards development of individuals math academic achievement. The result thus suggests that intelligence and source of income of the family together contributes 46.5% of students' Mathematics Academic Achievement.

At the third step R^2 is 0.524 (adjusted R^2 is 0.513) and R^2 change is 0.059. Examination of the R^2 change indicates that nearly 5.9% of the variance in students' mathematics academic achievement can be explained by addition of Number of Family Members (Family Type) (as one of the dimensions/areas of SES) other than any other dimensions/areas of SES and intelligence. F-change (df=1,386) which is 10.181 which is significant at 0.01 level. That means the contribution of these particular variable is statistically significant to be considered. The ß coefficient for intelligence = 0.531 significant at 0.01 level, for source of income = 0.333 which is significant at 0.01level, and for Number of Family Members (Family Type) = 0.214 which is significant at 0.05 level indicate that intelligence, source of income of the family and Number of Family Members (Family Type) have positive contribution to the students' mathematics academic achievement. 52.4% variants of math academic achievements of the students can be attributed to combined effect of Intelligence, the Source of Income of the Family and Number of Family Members (Family Type).

At the 4th step it is evident that the R^2 is 0.561 (adjusted R^2 is 0.552) and R^2 change is 0.037. R^2 change indicates that around 3.7% of variance of students' math academic achievement can be explained by the addition of the occupation of the parents (as one of the dimensions/areas of SES) and the F-change (df=1,385) which is 3.88 significant at 0.05 level indicates that the contribution of this particular variable is statistically significant. The *ß* coefficients for intelligence = 0.559 significant at 0.01 level, for source of income = 0.346 significant at 0.01 level, for Number of Family Members (Family Type) = 0.200 significant at 0.05 level, for Occupation of the Parents = 0.157 significant at 0.05 level indicate that intelligence, source of income of the family, Number of Family Members (Family Type) and type of occupation of family members has a positive contribution towards to students' math academic achievement.

At the final step it is evident that the R^2 is 0.579 (adjusted R^2 is 0.572) and R^2 change is 0.018. R^2 change indicates that around 1.8% of variance of students' math academic achievement can be explained by the addition of the Category of House (as one of the dimensions/areas of SES) and the F-change (df=1,385) which is 3.59 significant at 0.05 level indicates that the contribution of this particular variable is statistically significant. The *ß* coefficients for intelligence = 0.562 significant at 0.01 level, for source of income = 0.381 significant at 0.01 level, for Number of Family Members

(Family Type) = 0.189 significant at 0.05 level, for Occupation of the Parents = 0.126 significant at 0.05 level indicate that intelligence, source of income of the family, Number of Family Members (Family Type) and type of occupation of family members has a positive contribution where as house category (as a dimension of SES) negative contribution towards to students' math academic achievement as the *ß* coefficients for Category of House is -0.97 which is significant at 0.05 level.

Regardless to say that nearly 57% to 58% variance of the achievement in Mathematics by the secondary level students of Tripura can be explained by the joint effects of the intelligence and four areas of SES (that is source of income, Number of Family Members or Family Type, types of occupation, house category).

It is observed that Intelligence and 4 dimensions of SES i.e. Source of Income, Number of Family Members (Family Type), Occupation and House category are the main common predictors of Students Achievement in Mathematics.