Effect of Socioeconomic status on performance in Mathematics among students of secondary schools of Guwahati city

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Abstract: *Socio-economic status' (SES) is a term used by social scientists and sociologists to describe the position of an individual in a hierarchical social structure which includes both the social and economic status. In looking more closely at why a remarkable number of students may be struggling for improvement in mathematics in comparison to other subjects, it is timely to consider, the SES factor. This study intends to investigate how parents' SES affects their children's performance in that subject. The study adopted a descriptive survey design and data was largely descriptive by nature. Data were collected using questionnaires for the students of 9th standard. These were administered on a sample of 384 students selected from 13 secondary and senior secondary schools of Guwahati city. The internal reliability and validity were examined. The formulae used for internal reliability were Split-half reliability and Cronbach Alpha. Data collected were coded and subjected to SPSS analysis which indicates overall that parents' socioeconomic status affects their children's performance in the subject.*
Keywords: *Socioeconomic status, mathematical performance.*

I. Introduction

'Socio-economic status' (SES) is a term used by social scientists and sociologists to describe the position of an individual in a hierarchical social structure. Socio-economic status includes both the social and economic status of an individual in the group. Sawrey and Telford [1] opined that children from higher socio-economic status are not only brilliant but they also get better opportunities for intellectual, physical and emotional developments. Studies have repeatedly established that SES affects student's outcomes [2, 3]. In [4] it has been revealed that the academic performance was influenced by socio-economic status of the children.'Socio-economic status' may include so many factors such as parental education, occupation, income etc. Velez, Schiefelbein and Valenzuella [5] concluded in their studies that socio-economic status measured by parents' education or occupational status is positively associated with achievement in most of the cases.

Extensive research in the sociology of education offers conclusive evidence of a positive relationship between family socio-economic status (SES) and the academic achievement of students [6, 7]. SES as the relative position of individuals or families within a hierarchical social structure, based on their access to, or control over, wealth, prestige, and power [8], although no strong consensus exists on the conceptual meaning of SES [9]. And, a single SES variable is operationalized through the components parental education, parental occupational prestige, and family income [8, 10, 11].

In society it is known to all that educational outcomes of children vary with the socio-economic background of their parents. Home is the first school of children. Home environment at influences a child's school education with his/her aspirations towards a good citizen for the future. As the children of today will be the nation builder of tomorrow, it is significantly essential to run the children's educational programmes very sincerely and effectively. Through scientific-designed and fruitfully implemented educational programmes children can be made equipped with necessary knowledge, skills and moral values. Family has also an important role in all-round development of the school children. Parents or guardians have to take a great responsibility in promoting societal knowledge, behavioral aspects, attitude etc. The facilities and environments provided to a student to study, is the basis for his success [12]. Socio-economic status can play both positive and negative role in the future life of a student [13].

Thus, to study the children's achievement in a particular subject, it is very much important to investigate their family background or in other words 'socio-economic status' of their family. The study on the effects of socio-cultural factors on psychological characteristics of individuals has been placed as an important in the contemporary psychological research, but, very few numbers of studies have been worked so far in this area. Khan and Jemberu [14] studied the influence of socioeconomic status on educational and occupational aspirations of high and low achieving adolescents.

In the present study, the effect of socio-economic status on performance in mathematics of secondary level students has been investigated.

II. Objectives

To analyze the socio-economic status of secondary school students.
- To test the association between socio-economic status and performance of students in mathematics
- To test the correlation between socio-economic status and performance of students in mathematics.
- To study the effect of socio-economic status of students of different category of schools such as provincialised under SEBA (Secondary Education Board of Assam), private under SEBA and private schools under CBSE (Central Board of Secondary Education) on their performance in mathematics.

III. Hypothesis

Different null hypotheses which we assumed for our investigation are-
1. There is no significant difference between mean 'socio-economic status' scores of students from different categories of schools.
2. There is no significant association between 'socio-economic status' and 'performance in mathematics' of students.
3. There is no significant correlation between 'socio-economic status' and 'performance in mathematics' of students.
4. There is no significant effect of 'socio-economic status' on 'performance in mathematics' of students from different categories of schools.

IV. Samples

In our study, for selection of samples, stratified random sampling technique has been adopted. The schools from which students of IX standard are considered as samples, have been stratified into three strata— provincialised schools under SEBA (Board of Secondary Education Assam), private schools under SEBA and private schools under CBSE(Central Board Of Secondary Educatiion) of Guwahati city. The samples from each stratum are taken through simple random sampling technique. The stratification is done to produce a gain in precision in the estimates of characteristics of the whole population. All the students of IX standard from private, govt., provincialiseed including SEBA and CBSE of the city formed the population of our study. At 95% confidence level with $\pm$ 5% level of precision, the estimated sample size from a total of 12531 was found to be 384. This sample size of 384 students from 13 selected schools are considered to be representative samples.

V. Tools

Socio-Economic Status (SES) scale questionnaire

To assess socio-economic status of the parents of the sample students under the study, the socio-economic status scale questionnaire was used. The questionnaire was designed fully on the basis of the socio-economic status scale, updated version developed by B. Kuppuswamy. In the studies Kumar N, et al [15]; Mishra, D.and Singh, H.P [16] it has been revealed that due to the steady inflation and consequent fall of the valuation of the rupee, economic criteria, income scale to be relevant, it should be considered during the period of study. Popular and widely used this Kuppuswamy scale is used in the study to measure the socio-economic status of an individual. In the study, the CPI-IW for October, 2015 was 269 (http://labourbureau.nic.in/indexes.htm). Three primary variables have been emphasized in this questionnaire – the education, and occupation of the head of a family and monthly income of the family. The modified family income for 2015 in the month of October was found as in the Table 3.4. The questionnaire was administered on the parents concerned. The range of score point is from 3 to 29. Based on the scores obtained by the parents, the families were classified in terms of socio-economic status (Table I).

Table-I: Modified family income per month (in Rs)

Score point	Modified (for the year 1998)	Modified (for the year 2007)	Modified (for the year 2008)	Modified (for the year 2009)	Modified (for the year 2010)	Modified (for the year 2011)	Modified (for the year 2012)	Modified for the year 2015(Oct) (CPI-269)
12	≥13500	≥19575	≥22410	≥25785	≥27675	≥28754	≥32050	≥ 41,488
10	6750-13499	9788-19575	11205-22409	12892-25784	13837-27674	14376-28753	16020 – 32049	20,744 -
6	5050-6749	7323-9787	8383-11204	9645-12891	10352-13836	10755-14375	12020 – 16019	15,558 -
4	3375-5049	4894-7322	5602-8382	6446-9644	6919-10351	7188-10754	8010 – 12019	10,372 -
3	2025-3374	2936-4893	3361-5601	3867-6445	4151-6918	4312-7187	4810 – 8009	6,223 -
2	676-2024	980-2935	1122-3360	1291-3866	1386-4150	1439-4311	1601 – 4809	2,095-
1	≤675	≤979	≤1121	≤1290	≤1384	≤1438	≤ 1600	≤ 2,094

Table-II: Classification of socioeconomic status (SES)

SES class	Score point
Upper class (UC)	26-29
Upper middle class (UMC)	16-25
Lower middle class (LMC)	11-15
Upper lower class (ULC)	5-10
Lower class (LC)	< 5

5.2 Reliability of ses questionnaire

The Cronbach Alpha for the questionnaire we used for our study was found to be 0.73, which is greater than 0.70 agreeing with the recommendation that for an instrument to be used, its internal co-efficient, Chronbach's alpha must be at least 0.70, [17].

5.3 Validity of SES questionnaire

In this case, the reliability coefficient is 0.73. Hence, the index of reliability is 0.85. The present index of reliability implies that the test measures true ability of the subjects to the extent of 85%. That means the validity of the questionnaire is 0.85.

Table-III: Parents' Demographic Characteristics

SES Factor	Category	Score point	SEBA Prov.		SEBA pvt.		CBSE pvt.		All schools	
			N	%	N	%	N	%	N	%
Father's education	Professional or Honours	7	_	_	10	9.9	19	12.1	29	7.55
	Graduate or Post Graduate	6	17	13.49	53	52.47	95	60.5	165	42.96
	Intermediate or Post High School Diploma	5	19	15.07	25	24.75	40	25.47	84	21.87
	High School Certificate	4	46	36.5	7	6.93	3	1.91	56	14.58
	Middle School Certificate	3	20	15.87	3	2.97	_	_	23	5.98
	Primary School Certificate	2	14	11.11	2	1.98	_	_	16	4.16
	Illiterate	1	10	7.93	1	0.99	_	_	11	2.86
Father's occupation	Profession	10	15	11.9	19	18.81	29	18.47	63	16.4
	Semi -Profession	6	20	15.87	15	14.85	31	19.74	66	17.18
	Clerical, Shop owner, Farmer	5	60	47.61	47	46.53	64	40.76	171	44.53
	Skilled Worker	4	15	11.9	8	7.92	15	9.55	38	9.89
	Semi Skilled Worker	3	10	7.93	9	8.91	17	10.82	36	9.37
	Unskilled Worker	2	6	4.76	3	2.97	1	0.66	10	2.6
	Unemployed	1	_	-	_	-	_	--	--	00
Family income	=28754	12	--	--	44	43.56	102	64.96	146	38.02
	14376-28753	10	5	3.96	31	30.69	41	26.11	77	20.05
	10755-14375	6	11	8.73	16	15.845	12	7.64	39	10.15
	7188-10754	4	23	18.25	6	5.94	2	1.27	31	8.07
	4312-7187	3	51	40.47	4	3.96	_	-	55	14.32
	1439-4311	2	31	24.6	--	--	_	-	31	8.07
	=1438	1	5	3.96	_	-	_	-	5	1.30

VI. Analysis And Interpretation

In the Table III of distribution of students from SEBA (Prov.), SEBA (Pvt.) and CBSE (Pvt.) it is revealed that 22.7% of SEBA (pvt.) and 26.7% students of CBSE (Pvt.) are from upper class. There is no student in the upper class from SEBA (Prov.) schools under the study. From upper middle class there are 9.52 % from SEBA (Prov), 67.3 % from SEBA (Pvt.) and 64.3 % from CBSE (Pvt.). Students distribution in lower middle class is 40.5 % from SEBA (Prov), 7.9 % from SEBA (Pvt.) and 8.9 % from CBSE (Pvt.). Similarly in upper lower class 41.3 % from SEBA (Prov), 1.9 % from SEBA (Pvt.), but no students from CBSE (Pvt.). Finally in lower class there was no student from SEBA (Pvt.) and CBSE (Pvt.) however, there is 8.7 % of students from SEBA (Prov). The association between the students of various categories of schools on SES was found to be significantly related (chi-square=237.061; df-8; sig. level 0.01).

Table-IV: Sample distribution on SES of different categories of school

SES	SEBA (Prov.)		SEBA(Pvt.)		CBSE(Pvt.)		Total		Chi-square
	N	%	N	%	N	%	N	%	
UC	_	_	23	22.77	42	26.75	65	16.93	
UMC	12	9.52	68	67.33	101	64.33	181	47.14	
LMC	51	40.48	8	7.92	14	8.92	73	19.01	237.061**
ULC	52	41.27	2	1.98	_	_	54	14.06	
LC	11	8.73	_	_	_	_	11	2.86	
Total	126	100.0	101	100.0	157	100.0	384	100.0	

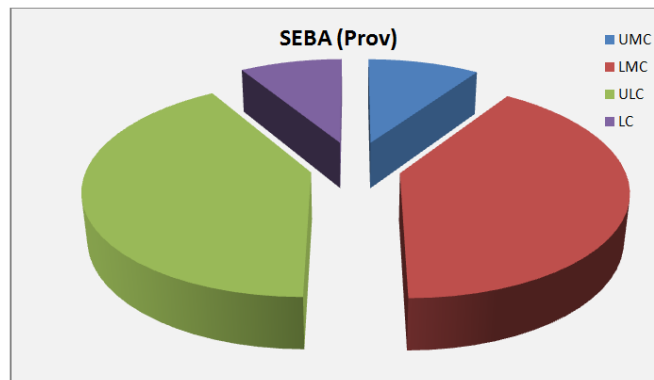**Fig 1:** Distribution of SEBA (Pvt.) students on SES on SES

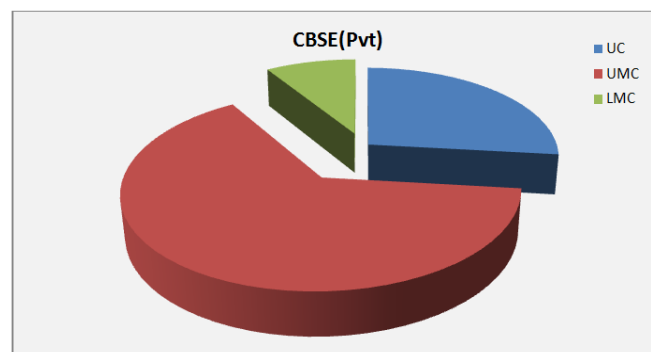**Fig 2:** Distribution of SEBA (Prov) students

Fig 3: Distribution of CBSE (Pvt) students on SES

ANOVA is run to examine if there is difference between mean 'socio-economic status' scores of students from different categories of schools. The Table-V reveals the result of one way ANOVA analysis. This analysis was performed on SES of the students of different categories of schools which are SEBA (Prov), SEBA (Pvt.) and CBSE(Pvt.). As found $p<0.001$ the test is significant.

Therefore, there is evidence to reject the null hypothesis of no difference in means, i.e. the students from three different categories of schools like SEBA (Prov), SEBA (Pvt.) and CBSE (Pvt.) schools differ significantly on their SES.

Table-V: One way ANOVA Types of Socio-Economic Status

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	136.320	2	69.110	178.512	0.000
Within Groups	159.264	381	0.403		
Total	295.414	383			

Table VI: Distribution of students on SES with performance level in mathematics

Class	Excellent		Very good		Good		Satisfactory		Unsatisfactory		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
UC	11	2.86	22	5.73	12	3.13	11	2.86	9	2.34	65	16.93
UMC	35	9.11	69	17.97	53	13.80	13	3.39	11	2.86	181	47.14
LMC	15	3.90	19	4.95	23	5.99	11	2.86	5	1.3	73	19.01
ULC	3	0.78	16	4.17	12	3.13	17	4.43	6	1.56	54	14.06
LC	_	_	_	_	_	_	3	0.78	8	2.08	11	2.86
Total	64	16.67	126	32.81	100	26.04	55	14.32	39	10.16	384	100

Table VII: Classification on performance level

Levels of performance	Scores
Excellent	80—100
Very good	60—79
Good	40—59
Satisfactory	30—39
Unsatisfactory	Below 30

Table VIII: Performance level, types of socioeconomic status, school category

School Category	Performance level	Types of socio-economic status					Total
		UC	UMC	MC	LMC	LC	
CBSE(Pvt.)	Excellent	5	20	3	0	0	28
	Very good	10	30	5	0	0	45
	Good	6	30	4	0	0	40
	Satisfactory	11	12	2	0	0	25
	Unsatisfactory	10	9	0	0	0	19
	Total	42	101	14	0	0	157
SEBA(Prov)	Excellent	0	4	5	1	0	10
	Very good	0	8	23	8	2	41
	Good	0	0	20	16	0	36
	Satisfactory	0	0	2	20	3	25
	Unsatisfactory	0	0	1	7	6	14
	Total	0	12	51	52	11	126
SEBA(Pvt.)	Excellent	4	18	3	1	0	26
	Very good	12	22	5	1	0	40
	Good	5	19	0	0	0	24
	Satisfactory	1	4	0	0	0	5
	Unsatisfactory	1	5	0	0	0	6
	Total	23	68	8	2	0	101

Table IX: Performance level, types of socio-economic status, school category

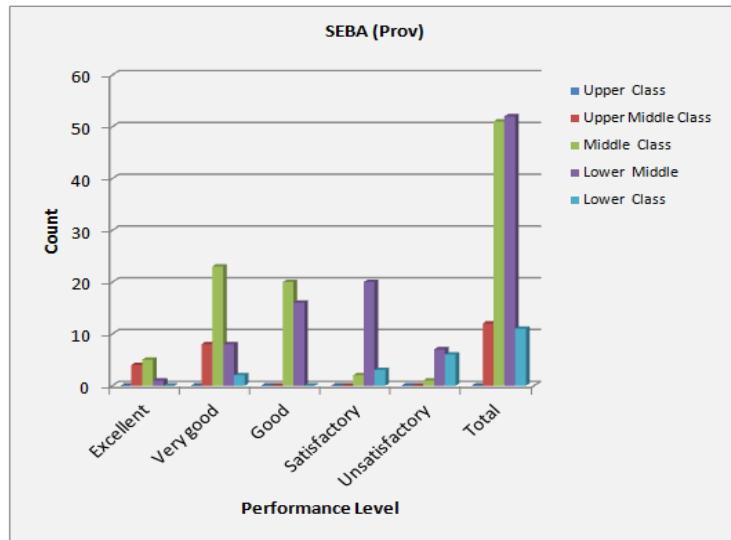| School category	Performance level	Types of socio-economic status					Total
		UC	UMC	MC	LMC	LC	
All the schools	Excellent	11	35	15	3	0	64
	Very good	22	69	19	16	0	126
	Good	12	53	23	12	0	100
	Satisfactory	11	13	11	17	3	55
	Unsatisfactory	9	11	5	6	8	39
	Total	65	181	73	54	11	384

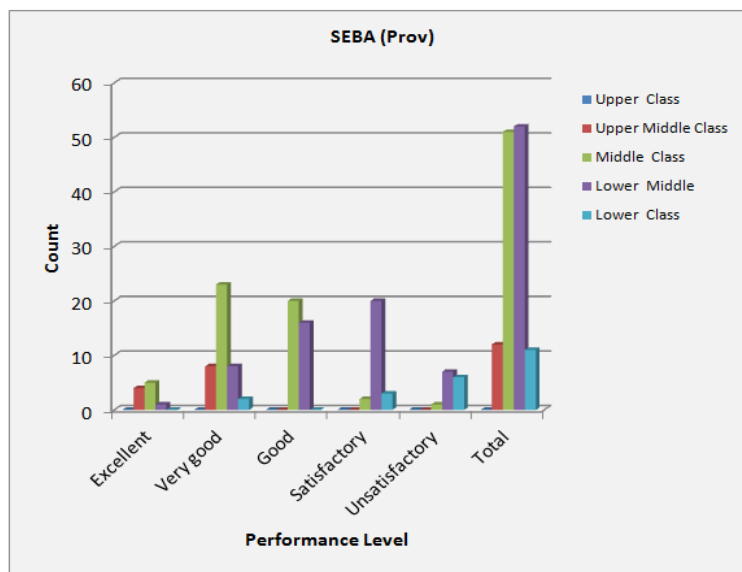**Fig 4:** Performance level and SES of CBSE (Pvt.)

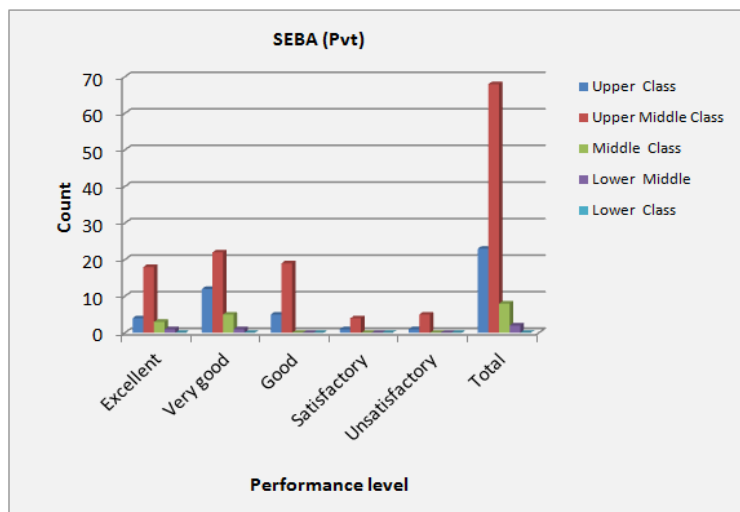**Fig 5:** Performance level and SES of SEBA (Prov)

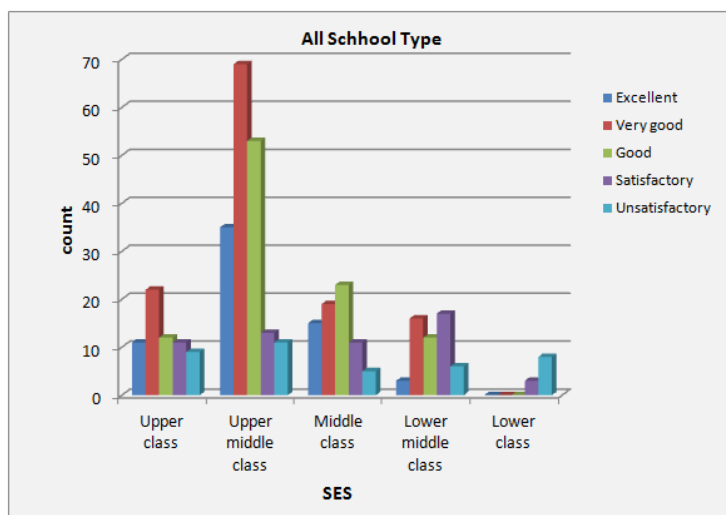**Fig 6:** Performance level and SES of SEBA (Pvt.)

Fig 7: Performance level and SES of all schools

Table X: Chi-square analysis

Category of School	Chi-square value	Significance (2 sided)
CBSE(Pvt.)	7.142	0.657
SEBA(Prov)	15.212	0.335
SEBA(Pvt.)	5.923	0.594
Over all	63.729	0.000

From the outputs we can reveal that the chi-square statistic for the students of CBSE was found 7.142 with *p*-value of 0.657 which is not significant. So, there is no evidence to reject the null hypothesis that there is no association between SES and students performance in mathematics in this group.

The chi-square statistic for the students of SEBA (Prov) was found 15.212 with *p*-value of 0.335 which is not significant revealing that there is no evidence to reject the null hypothesis that there is no association between SES and students performance in mathematics in this group.

The chi-square statistic for the students of SEBA(Pvt.) was found 5.923 with *p*-value of 0.594 which is not significant. It reveals that there is no evidence to reject the null hypothesis that there is no association between SES and students performance in mathematics in this group. But, overall the chi-square statistic is found to be 63.729 with a *p*-value of 0.000, which is significant. Therefore, there is evidence to reject the null hypothesis that there is no association between SES and students performance in mathematics in this group.

Table XI: Correlation of SES and performance in mathematics

Components of SES	r-value
Fathers educational qualification	0.198*
Fathers occupation	0.213*
Monthly family income	0.302*
SES	0.298*

* Significant correlation at the 0.01 level (2-tailed)

Table XI reveals that the socio economic status of the students' parents are positively correlated with the performance of the students in mathematics. In the components of SES like Fathers educational qualification, Fathers occupation and Monthly family income, the correlation was found to be positive with their children's performance in mathematics at 0.01level of significance.

Table XII: One way ANOVA Students' performance levels in mathematics

	Sum of squares	df	Mean square	F	Sig
Between groups.	66.025	4	14.031		
Within groups	520.305	379	1.304	11.518	0.000
Total	61.236	383			

ANOVA was performed on the students' performance in mathematics from all the five classes of family where p-value was found to be significant (Table- XII). Therefore, there is evidence to reject the null hypothesis of no difference in means, i.e., the students from the various classes differ significantly on their performance in mathematics.

VII. Findings

1. The socio-economic status of the students of three different categories of schools under the study is significantly different.
2. The socioeconomic status significantly affects students' performance in mathematics from different categories of schools under the study.
3. There is a significant relationship between the components of socioeconomic status such as father's income, occupation, monthly family income and students' performance in mathematics.

VIII. Conclusions

The study intends to observe the effect of socio-economic status of parents on their children's performances in mathematics. The study attained at a conclusion in this respect that the socio-economic status of parents affects children's performances in mathematics. Observation of the components of socio-economic status of parents leads to state that the components such as father's education, occupation and monthly family income also affect independently children's performance in mathematics.

So, the concerned policy makers should try to put an emphasis for the upliftment of the socio economic status of lower and lower middle classes so that the children are enriched in the subject. Parents also should be parally and effectively concerned for the all round improvement of their children. Moreover, as most of the students of government provincialised schools are from lower middle class, government should take effective initiatives in standardization of academic side with other facilities.

Acknowledgement

References

[1]. Telford, C.W. and Sawrey, J.M. **:** Educational Psychology, 2nd Edition, New Delhi, Prentice Hall Of India (private) Ltd (1964).
[2]. Jeynes, William H. **:** Examining The Effects Of Parental Absence On The Academic Achievement Of Adolescents: The Challenge Of Controlling For Family Income, Journal Of Family and Economic Issues (2002), 23(2).
[3]. Hochschild, Jennifer L. **:** Social Class In Public Schools, Journal Of Social Issues (2003). 59(4), 821-840.
[4]. Grewal, A. **:** An International Study Of Cognitive And Socioeconomic Correlations Of School Achievement, J. Psy. Res. (1985), 29(1):41-45.
[5]. Velz, E., Schiefelbein, E. & Valenzuella, J. **:** Factors Affecting Achievement In Primary Education, Washington, DC: Human Resources Development And Operations Policy, The world bank (working paper series) (1993).
[6]. Sirin, S. R. (2005). Socioeconomic status and academic achievement: A metaanalytic review of research. *Review of Educational Research, 75*(3), 417–453.
[7]. White, K. R. (1982). The relation between socioeconomic status and academic achievement. *Psychological Bulletin, 91*(3), 461-481.
[8]. Mueller, C. W., & Parcel, T. L. (1981). Measures of socioeconomic status: Alternatives and recommendations. *Child Development, 52*(1), 13-30.
[9]. Bornstein, M. H., & Bradley, R. H. (Eds.). (2003). *Socioeconomic status, parenting, and child development*. Mahwah, NJ: Lawrence Erlbaum Associates
[10]. Gottfried, A. (1985). Measures of socioeconomic status in child development research: Data and recommendations. *Merrill-Palmer Quarterly, 31*(1), 85–92.
[11]. Hauser, R. M. (1994). Measuring socioeconomic status in studies of child development. *Child Development, 65*(6), 1541–1545.
[12]. Sarmah, H. K. & Hazarika, B. B. **:** A Study On The Effect Of Socio-Economic Status On Interest In Mathematics Among Students Of Different Categories Of Guwahati, International Journal Of Statistics And Analysis (2013), Vol.3, No. 1, pp. 51-75.
[13]. Choudhari, V. S., Vaidya, Navalakha, N.G. and Mahapatra B.C. **:** Effect Of Teaching Strategies And Socioeconomic Status On Self Concept Of The Learner, Indian Psy. Review (1998), 50(4):216-223.
[14]. Khan and Jemberu **:** Influence Of Family Socio- economic Status On Educational And Occupational Aspirations Of High And Low Achieving Adolescents, J.Com.Guid. Res. 19(1):113-118.
[15]. Kumar N, Shekhar C, Kumar P, Kundu A.S. **:** Kuppuswamy's Socioeconomic Status Scale-Updating For 2007, Indian J Pediatr (2007), 74: 1131-2.
[16]. Mishra, D., Singh, H.P. **:** Kuppuswamy's Socioeconomic Status Scale-A Revision, Indian J. Pediatr (2003), 70:273-4.
[17]. Santos, J.R.A. **:** Cronbach's Alpha: A Tool For Assessing The Reliability Scales, Journal Of Extention 37(2), Retrieved 15th March, 2016 from http:// www.joe.org/joe/1999 April/ tt3.