



The Role of Home Environment and Mathematics Achievement for Students of Secondary Schools in Nagaon District

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ABSTRACT: This paper attempts to study the effect of home environment upon the formation of attitude of the students towards mathematics. We conducted a survey to identify the various factors in the home environment that can affect student achievement and to investigate the nature of their impact. We have tabulated certain data obtained from our survey, and conducted suitable analysis upon the same using Levene's test for equality of variances and t-test for equality of means. Our study reveals a positive correlation between the home environment and attitudes of the students towards mathematics. The paper concludes that a congenial home environment is an essential factor in moulding the appetite of the students towards mathematics which influences their overall academic achievement in the long run.

Keywords: Levene's test, Environment, t-test, mathematics, secondary school.

INTRODUCTION

Since time immemorial mathematics has been considered an integral part of any school curriculum; the reason for that being, expertise in mathematics is crucial not only for success at school level education, but also in being successful in one's chosen career, and in personal fulfillment. Mathematics enables a child to think and communicate quantitatively, solve problems, recognize situations where their aptitude can be applied and use appropriate technology to support their cause. It gives the child an instrument through which it may measure, analyze and explain a wide range of phenomena, make trend projections, or solve problems of personal interest in general.

Despite the importance of mathematics education it has increasingly been observed in recent times that the achievement of students in mathematics in all tiers of education is far from satisfactory. Hence it is necessary to study all the possible factors that affect achievement in mathematics. It has been found out that, the home environment and the socio-economic status of the family is a strong predictor of student achievement. This paper aims to point out the different variables in the home environment that determine the achievement of the student.

Review of related study: Several researchers have found out that the family environment and the socio-economic status (SES) of the students is another major factor contributing to their success in mathematics. The study of McConney and Perry ¹ has shown that both student and school SES play a role in determination of student outcome. They found that increases in school SES are consistently associated with substantial increases in achievement in mathematics and this phenomenon holds for all groups, regardless of their individual SES. Furthermore, their findings show that the association of school SES with math achievement persists even when subject-specific self-efficacy is taken into account.

According to Coleman et. al. ², the socio-economic status is a strong predictor of student achievement. Olatunde ³ surveyed 1722 senior secondary students selected from 36 schools from each of the senatorial Districts in Southwestern Nigeria. The findings revealed that majority of the students who had high achievement in mathematics lived with their father and mother and had the basic things needed in a house

for good education. The findings also revealed that the parents of most of these students lived mainly in the urban areas and had private businesses of their own or had investments ranging from stocks and shares to owning houses. It was concluded that with an environment conducive to education, students' academic achievement in mathematics should be better than students, who do not have such facilities.

Griffin ⁴ conducted a national survey on mathematics achievement at the end of primary school in Vietnam and found that lower achievement levels were persistently associated with low socio economic groups. Maqsud and Khalique ⁵ made exploratory efforts to identify the non-pedagogical factors for poor results of the students in mathematics and found out that several socio-personal variables such as social and economic background and school alienation were responsible for different levels of achievement in mathematics.

Caygill and Kirkham ⁶ conducted an in-depth study to find out the relationship between the socio-economic status and home education resources and achievement in mathematics. They found that students with a greater number of books in the home having higher achievement, on average, in mathematics. Similarly students having a calculator, a computer and an internet connection fared better pointing out that a good socio-economic status helps in greater mathematics achievement. According to them, the number of schools attended by a student was symptomatic of families moving for work and hence was an indicator of their socio-economic status. They found that students who changed schools more often had lesser achievement in mathematics than students who changed schools rarely or never at all.

Research has also shown that the educational qualifications of the parents also impact upon the achievement of the child in mathematics. Majority of the literature on parents' education pertains to the direct, positive influence on achievement (Jimerson, Egeland, & Teo ⁷, 1999; Kohn ⁸, 1963; Luster, Rhoades & Haas ⁹, 1989). It was also found that the expectations of the parents from their children varied according to their education and income levels. For example, Alexander, Entwisle and Bedinger ¹⁰ found that parents of moderate to high income and educational backgrounds held beliefs and expectations that were closer to the actual performance of the children than those of low income and low education families.

Research on parenting indicates that parental education enhances a warm and social climate at home which motivates the students in pursuit of education. Klebanov et al ¹¹ found that both mothers' education and the family income were important predictors of learning experiences at home. Davis-Kean¹² conducted a study on 868 8-12 year olds, divided equally across gender, in an attempt to find the impact of parental education on child achievement. She found out that parents' number of years of schooling was an important socioeconomic factor in determining the achievement of the children. Senler and Sungur ¹³ also found that parental education influences upon students' self-concept, task value beliefs, and achievement in science.

According to Reynolds ¹⁴, parental involvement can clearly be seen as a positive influence on academic achievement. Jeynes ¹⁵ classified parental involvement as overt or subtle and stated that both forms are crucial in understanding the trajectories in which parental involvement affects mathematics achievement. The relationship between overt parental involvement and academic achievement has recently been called into question (Jeynes, 2007) ¹⁶. As a result of this, recent research has examined the effects of subtle parental involvement (Jeynes, 2010) ¹⁷. These types of involvement include maintaining high expectations of one's children, communicating with children, and parental style.

It is generally observed that anxious students enjoy mathematics less, are less confident in their mathematical abilities and tend to steer away from these courses in higher education (Ashcraft ¹⁸; Hembree ¹⁹; Ho et. al. ²⁰). The primary reason for the increasing achievement in mathematics was reduction of anxiety (Vukovic et. al.) ²¹. The results indicated that parents' home support and expectations influenced children's mathematics achievement by reducing mathematics anxiety, particularly for the more difficult sections of mathematics. According to Wong and Hughes ²², the participation of supporting families was even more important in case of struggling students for the reduction of achievement gap with top grade students. Case et al ²³ also devised various strategies that the parents can inculcate in the children with Mathematics Learning Disability (MLD) like focusing on increasing malleable aspects of

executive functioning (e.g., attention), or by teaching children strategies to master intractable aspects of executive functioning (e.g., working memory).

The self concept or attitude of the students towards mathematics is also a determinant factor of the achievement in mathematics. Also the self concept is more of a cognitive component than an environmental one; there is no denying the fact that the home environment does its bit in shaping the attitude of the students towards education in general and mathematics in particular.

Most researchers have found that the attitude of the students towards mathematics play the single largest role in their development in the field. As a result of the information that the students obtain about mathematics from the family and the society as well as a result of their own prior connections with the subject, most students tend to develop a self-concept regarding their mathematical abilities. According to Gal and Ginsburg²⁴, most students are likely to have trouble due to non-cognitive factors, such as negative attitudes or beliefs towards the subject. These factors are usually picked up outside the classroom during the process of growing up of a child. Such factors can impede their learning, or hinder the extent to which students will develop useful mathematical intuitions.

Mohamed and Waheed²⁵ carried out a survey on secondary school children in Maldives and found out that more the personal confidence of the students and more their perceived usefulness of the subject, more will be their achievement in mathematics.

Leder²⁶ and Daskalogianni & Simpson²⁷ defined achievement implicitly and provided instruments for measuring the same. They observed that positive attitude is something which is perceived as pleasurable whereas negative attitude is something more commonly associated with failure and anxiety. Aiken²⁸ observed that for all learning in general, a positive attitude of the students is necessary. Since learning is a mental process, the psychological concept of the student about the subject may either facilitate or hinder the learning process depending on whether it is positive or negative.

Bruner²⁹ argued that the performance of a student in mathematics should not be viewed entirely in logical perspective but in social, ethical and psychological perspectives as well. He found out that the relationship a pupil has with mathematics is more of an autobiographical nature. There will be numerous events and situations involving mathematics in his life, some fragments of which might still be active in his memory. These events are extremely significant in determination of the current attitude of the student towards the subject. If the initial connections with the subject have been far from pleasant, the student might require more motivation than usual in order to pursue a further relationship with the subject.

In India, the home environment contributes to the achievement of the student in mathematics in India to an even greater degree than most other countries. This is due to the fact that social, cultural and economic differences have a wide range in India (Gakhar³⁰, 1983). Prabha³¹ found that the socio-economic variables like mother's education, father's education, profession, family income and caste impact heavily upon the achievement of the students in mathematics. The research showed that higher the educational qualification of the parents, higher was the achievement of the child in mathematics.

Singh³² explored the factors that contributed to the achievement in mathematics of a random sample of high school students in Orissa and found that there was a difference in the achievement in mathematics amongst students coming from different socio-economic backgrounds. Kumari³³ also observed that the students hailing from better family backgrounds had more interest and aptitude in mathematics. Rajput³⁴ opined that students whose parents were more educated and had better income were more motivated and had better academic achievement than students whose parents were less educated and had less income. Jabbal³⁵ researched upon school going children and found out that students from better socio-economic backgrounds were faster learners and developed better mathematical concept and thinking than the others. According to Selta³⁶, socio-economic factors along with general intelligence are responsible for the differential learning rates of students in modern day mathematics. It was established that a better socio-economic environment at home and was helpful for the development of the intelligence and personality of the student which in turn positively affected mathematics achievement. These differential rates were also responsible for the broad achievement gaps between the average performances of students from different backgrounds in higher stages of mathematics education.

Rationale of the current study: In Assam mathematics is taught as a compulsory subject in secondary school education. Mathematics is considered to be a dominant factor which plays a vital role in the development of science and technology as well as in almost all fields of study. Therefore in the present study the researcher has considered mathematics achievement as a pertinent field of study. Also from review of different literatures it is noted that attitude of the students towards mathematics and their home environment have influences on the academic achievement of the students. So it is very important to make a study on the present topic in the context of our own society.

The objective of the present study is to ‘investigate the difference of attitude of male and female students towards mathematics’.

MATERIAL AND METHODS

Design of the study: Descriptive method was thought to be appropriate to analyze the impact of attitude towards mathematics in the context of selected variables, which are gender and medium of instruction. The sample consisted of 500 students selected from 20 schools of Nagaon District. Random sampling method was adopted to select the sample. A questionnaire was constructed by the researcher which was reviewed by a few experts in the concerned field. The questionnaire was administered among the students selected for the study. Against each question there were five options, namely –strongly agree, agree neutral disagree and strongly disagree. After the data was collected the responses provided by the sample students were transformed into numerical values. Then the scores were placed for statistical tests of significances using statistical tools for testing the hypothesis for the investigator. The methods of analysis used were SD, t- test and Karl Pearson’s product Moment.

RESULTS AND ANALYSIS

The following tables show the different values of Mean, Standard Deviation (SD), Standard Error Mean (SEM), Mean Difference (MD) and Degrees of Freedom (Df).

Table 1: Positive attitude of boys of Assamese Medium School in case of home environment.

N=25

Mean	37.71
SD	6.391
SEM	1.278

Test Value = 25					
t	Df	Sig.(2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
29.502	24	.000	8.207	34.19	40.87

Table 2: Positive attitude of girls of Assamese Medium School in case of home environment.

N=25

Mean	37.08
SD	7.832
SEM	1.566

Test Value = 25					
t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
23.672	24	.000	13.408	34.73	39.98

Table 3: Positive attitude of boys of English Medium School in case of home environment.

N=25

Mean	39.59
SD	7.316
SEM	1.463

Test Value = 25					
t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
27.06	24	.000	12.53	36.79	42.23

Table 4: Positive attitude of girls of English Medium School in case of home environment.

N=25

Mean	42.12
SD	6.125
SEM	1.225

Test Value = 25					
t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
34.384	24	.000	7.736	39.47	45.38

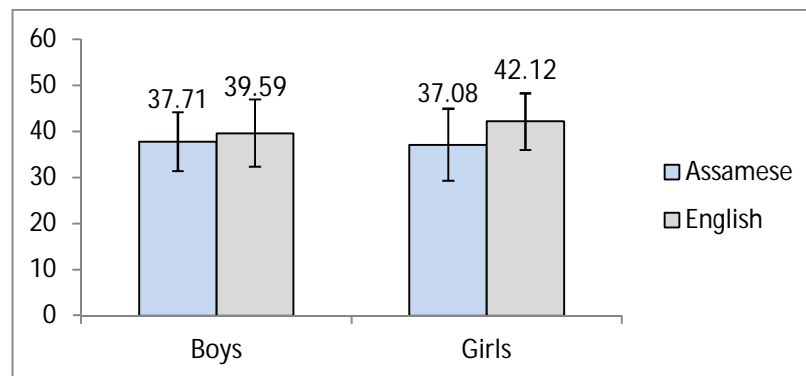


Figure 1: Impact of home environment on mathematics achievement of students of Assamese and English medium schools.

Table 5: Co-relation of positive attitude between total boys and total girls of Assamese and English medium combined.

N=25	Assamese and English medium combined	Total Girls	Total Boys
Girls	Pearson Correlation	1	.794
	Sig. (2-tailed)	-	.000
Boys	Pearson Correlation	.794	1
	Sig. (2-tailed)	.000	-

Here the Correlation is significant at the 0.05 level (2-tailed).

Table 6: Co-relation of positive attitude between boys and girls of Assamese Medium School.

N=25	Positive attitude for Assamese Medium	Girls	Boys
Girls	Pearson Correlation	1	.863
	Sig. (2-tailed)	-	.000
Boys	Pearson Correlation	.863	1
	Sig. (2-tailed)	.000	-

Here the Correlation is significant at the 0.05 level (2-tailed).

Table 7: Co-relation of positive attitude between Boys and Girls of English Medium School.

N=25	Positive attitude for English medium	Girls	Boys
Girls	Pearson Correlation	1	.807
	Sig. (2-tailed)	-	.000
Boys	Pearson Correlation	.807	1
	Sig. (2-tailed)	.000	-

Here the Correlation is significant at the 0.05 level (2-tailed)

Table 8: Co-relation of positive attitude between boys and girls, taken together, of Assamese Medium School with that of English medium school.

N=25

Correlations		Assamese Medium	English Medium
Assamese Medium	Pearson Correlation	1	.731
	Sig. (2-tailed)		.000
English Medium	Pearson Correlation	.731	1
	Sig. (2-tailed)	.000	

Here the Correlation is significant at the 0.05 level (2-tailed).

Table 9: Negative attitude of boys of Assamese Medium School in case of home environment.

N=25

Mean	34.72
SD	6.132
SEM	1.226

One-Sample Test

Test Value = 25					
t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
28.311	24	.000	6.409	31.86	37.14

Table 10: Negative attitude of girls in Assamese Medium School in case of home environment.

N=25

Mean	32.76
SD	7.23
SEM	1.446

One-Sample Test

Test Value = 25					
t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
22.656	24	.000	10.104	29.68	35.22

Table 11: Negative attitude of boys in English Medium School in case of home environment.

N=25

Mean	38.35
SD	4.89
SEM	.978

One-Sample Test

Test Value = 25					
t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
39.21	24	0.053	0.863	35.74	39.96

Table 12: Negative attitude of girls in English Medium School in case of home environment.

N=25

Mean	37.61
SD	6.42
SEM	1.284

One-Sample Test

Test Value = 25					
t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
29.29	24	.071	8.32	35.26	40.03

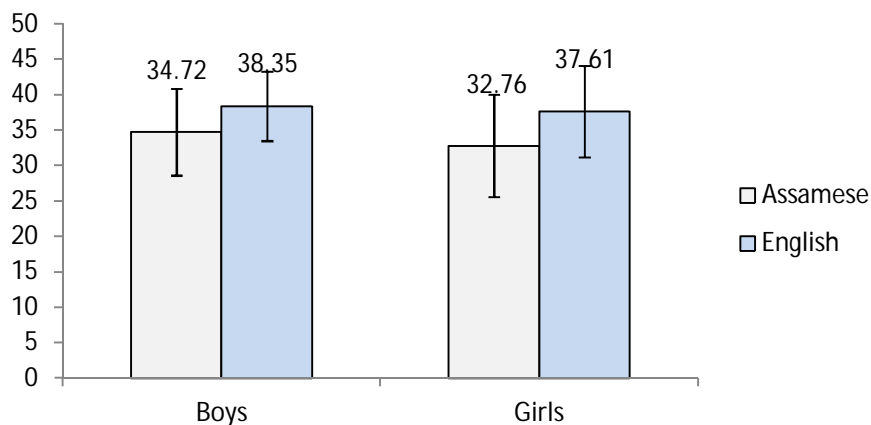


Figure 2: Impact of home environment for negative attitude of students in Assamese and English medium schools

Table 13: Co-relation of negative attitude between girls and boys of Assamese Medium School.

N=25	For negative attitude	Girls	Boys
Girls	Pearson Correlation	1	.857
	Sig. (2-tailed)	-	.417
Boys	Pearson Correlation	.857	1
	Sig. (2-tailed)	.417	-

Table 14: Co-relation of negative attitude between girls and boys of English Medium School.

N=25	For negative attitude	Girls	Boys
Girls	Pearson Correlation	1	.941
	Sig. (2-tailed)	-	.637
Boys	Pearson Correlation	.941	1
	Sig. (2-tailed)	.637	-

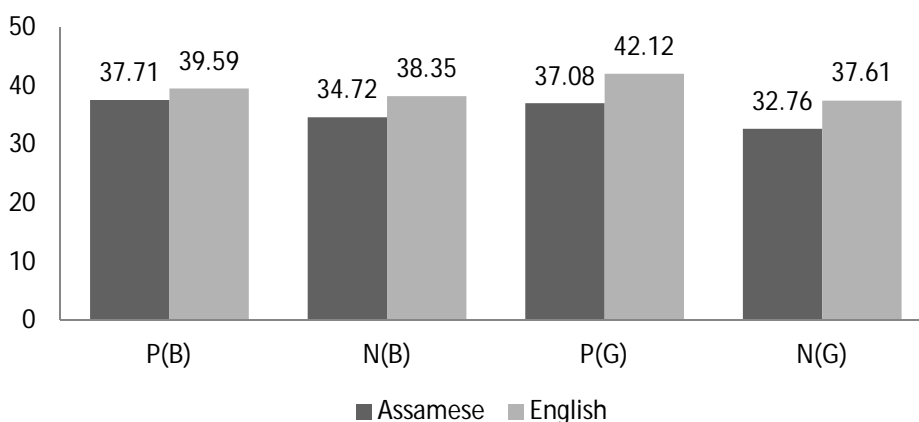
Table 15: Co-relation of negative attitude of girls of Assamese and English Medium Schools.

N=25	Negative attitude	Girls of Assamese medium Schools	Girls of English Medium Schools
Girls of Assamese medium Schools	Pearson Correlation	1	.371
	Sig. (2-tailed)	-	.684
Girls of English Medium Schools	Pearson Correlation	.371	1
	Sig. (2-tailed)	.684	-

Table 16: Co-relation of negative attitude of boys of Assamese and English Medium Schools.

N=25		Boys of Assamese medium Schools	Boys of English Medium Schools
Boys of Assamese Medium Schools	Pearson Correlation	1	.485
	Sig. (2-tailed)		.501
Boys of English Medium Schools	Pearson Correlation	.485	1
	Sig. (2-tailed)	.501	

Figure 3: Average of home environment for gender and attitude in Assamese & English Medium Schools.



P(B) = Positive attitude of boys in case of home environment

N(B) = Negative attitude of boys in case of home environment

P(G) = Positive attitude of girls in case of home environment

N(G) = Negative attitude of girls in case of home environment

CONCLUSION

The study obtained relevant data and correlated the data to obtain evidence regarding the impact of home environment on achievement in mathematics. It was found that there is a positive correlation of home environment with academic achievement. Correlation is also observed in case of comparison of English and Assamese medium schools.

In today's technologically driven society, the cultivation of an all round intuition in mathematics is deemed very important. Children, in their period of growth, undergo several changes, not just academically but also socially. So it is necessary to develop a positive home environment to facilitate the growth of a sense of purpose and confidence in the students.

Parents should also support their children in their endeavors and provide them with all the help possible. Positive home environment with positive attitudes of parents and students are key factors for successful learning of mathematics. However, in most cases, there is a limit to which parents can cater to the children's needs. Hence it is recommended that the school structure is also designed such that they are fully equipped to assist a learner who is from a deprived home environment.

Mathematics education is an area worthy of extensive research. It is in the best interest of the society that more scholars come forward with their contributions and help carry on the golden heritage of mathematics that has continued since time immemorial.

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