Identification Of Some Of The Factors In The Formation Of Attitude Towards Mathematics

Ranjana Chowdhury, Amitabha Barua
Department of Computer Application Assam Engineering College Guwahati 781013, Assam

Abstract
This paper reveals the results of the investigation carried out to study some sort of possible relationship that might occur in case of formation of attitude towards mathematics and to find the factors that are responsible for the purpose . The investigation mainly deals with "attitude - factors" related to parents together with the medium of instruction and also considering "sex- factors" as another one . For this purpose, a sample of two hundred secondary school students have been chosen so as to study such relation where the variables are chosen above – type of " attitude factors" together with the others mentioned above .The correlation technique and " t- statistics" are playing key role in our investigation . and thereby we estimate direct and indirect influence of independent variables on the dependent one .Interestingly, we find the direct effect on the formation of attitude towards mathematics.
Key words: Attitude –factors Statistical Correlation / t- test

1. Introduction

We all know that from the time of antiquity mathematics has been playing a vital role in upgrading human culture and civilization in addition to developing science and technology. Its use in expanding human knowledge and thought is immense. For over all uplift of the human society, the mankind needs skilled and trained persons in mathematics.   Mathematics has through the ages, produced men of quality. **E.T.Bell**, in his books Men of Mathematics, observes- "As a group the great mathematicians have been men of all round ability, vigorous, alert, keenly interested in many things outside mathematics.   .

However, now a day instead of getting increasingly interested in learning mathematics, our school students have been found lacking in aptitude to be As such it has become the necessity of the hour to identify the causes responsible for large scale failures in the subject. Otherwise within a short span of time, skilful and trained persons in mathematics will vanish from our country. It will then be a disaster for us.

A number of researchers in India and abroad have investigated into the relationship between the effective and the cognitive domains of teaching and learning mathematics. National Council of Teachers of Mathematics (1989) and National Research Council have urged educationists of the country to incorporate effective factors in the cognitive domain of school children, [1,4,5,6,10] .

It appears sometimes that brilliant students possess a good attitude towards learning mathematics. But the same has not yet been fully and scientifically established. It is also observed that researchers in India and abroad give much emphasis on the relationship between attitude towards mathematics (ATM) and achievements in mathematics (AIM).

2. Significance of Study
Some of the studies in this area are mentioned below:

Pinkrah's, in the year 1989 studied about pupils ''Attitude towards understanding mathematics'' and revealed that, enjoyment with mathematics and liking of mathematics were stronger determinants for learning the subject with less difficulty.

Armstrong, in the year 1993 conducted a descriptive study of the ''interrelationship of parent, teacher and student attitude towards mathematics and school achievement of selected eight grade students in the Inglewood Unified School District.'' A significant relationship was found between attitude towards mathematics of students and parents, but not of students and their mathematics teachers.

Pal, A. in the year 1989 considered ''the dependence of achievement in mathematics on four variables of the effective dimension viz. (i) self concept, (ii) anxiety, (iii) attitude and (iv) academic motivation''.

He formulated 56 hypotheses with these variables and classified the students into urban, semi-urban and rural and male and female groups. He found the regression equation to predict the performance in mathematics as a linear combination of the four affective variables.

Chel in the year 1990 in his study examined ''the problem of underachievement in compulsory mathematics in Madhyamic Examination of West Bengal''. He found the following causes responsible for underachievement:

(i) Gaps in knowledge of mathematics concepts.

(ii) Difficulties in understanding mathematical language.

(iii) Lack of openness and flexibility in teaching.

(iv) Difficulties in mathematization of verbal problems and interpretation of mathematical results.

(v) Abstract nature of mathematics.

(vi) Fear and anxiety on the part of the students.

The study suggests greater motivation of the students for learning mathematics, removal of fear of mathematics and clearer presentation of subject based on the need of the children.

Rosaly, A., in the year 1992 had studied on ''the relationship between attitude of students towards mathematics and achievement.'' The investigator showed the following major   findings:

(i)The attitude of high school students towards learning mathematics and their achievement in mathematics were related.

(ii)Urban girls had a more positive attitude towards mathematics. Similarly, urban boys had a more positive attitude towards mathematics than rural boys.

(iii)Girls were higher than boys in their achievement in mathematics.

(iv)Urban girls were higher than rural boys in mathematics .

Hariharan, D., in the year 1992 studied on ''the attitude of high school students towards home work and their achievement in mathematics.''

The following were showed in his thesis:

(i)Girls were higher than boys in their attitude towards home work.

(ii)Urban students were students were higher than rural students in their attitude   towards home work.

(iii)Private school attitude students were higher than the government school   students in their attitude towards home work.

It is observed that though achievement in mathematics seems to be positively related to attitude towards mathematics. But little effort has been made to investigate how that attitude is formed.

Mohammad Miyan in a trend report Survey of Research in Mathematics Education edited by Buch remarks "Though attitude towards mathematics seems to be positively related to achievement, no effort has been made to investigate how that attitude is formed" .   We through this study want to identify some of the factors responsible for formation of attitude towards mathematics and select the following topic for the present study.

Tapia, M., Marsh II, George E., **in the year 2004** in the Academic Exchange Quarterly, Vol. 8, and Issue 2 studied about "An instrument to measure mathematics attitudes." This research paper to reports of the development of a new instrument to measure students' ATM, and to determine the underlying dimensions of the instrument by examining the responses of 545 students. The data represent all grade levels and subject of the secondary mathematics curriculum. This reliability coefficient alpha was ·97. A maximum likelihood factor analysis with a varimax rotation yielded four factors; self-confidence; value of mathematics; enjoyment of mathematics; and motivation. Psychometric properties were sound and the instrument. Attitude toward Mathematics Inventory (ATMI), can be recommended for use in the investigation of students' ATM

Pierce, R., Stacy, K., Borkortsas, A., **in the year 2005** studied about "A scale for monitoring student's attitudes to learning mathematics with technology." This paper presents a model of how technology use can enhance mathematics achievement, a review of other instruments and a psychometric analysis of the MTAS. It also reports the responses of 350 students from six schools to demonstrate the power of the MTAS to provide useful insights for teacher and researchers. 'Attitude to learning mathematics with technology' had a wider range of scores from other variables studied. For boys, this attitude is correlated only with confidence in using technology, but for girls the only relationship found was a negative correlation with mathematics confidence. These difference need to be taken into account when planning instruction, [2, 3, 4, 7, 8, 9] ..

It is observed that though achievement in mathematics seems to be positively related to attitude towards mathematics, but little effort has been made to investigate how that attitude is formed.

3. Problems of the Investigation:

In this study we want to identify some of the factors responsible for formation of attitude of the pupils in secondary stage towards mathematics in relation to **1.** home environment, **2.** father's attitude towards mathematics, **3.** mother's attitude towards mathematics, **4.** pupils achievement in mathematics in school internal examinations, **5.** medium of instruction, **6.** class environment, **7.** some social factors, **8.** sex.

Objective of the Study:

1. To enquire into the relationship between attitude towards mathematics and achievement in mathematics.

2. To investigate into the relationship between home environment and attitude towards mathematics.

3. To identify relationship between father's attitude towards mathematics and pupil's attitude towards mathematics.

4. To identify relationship between mother's attitude towards mathematics and pupil's attitude towards mathematics.

5. To investigate the relationship between attitude towards mathematics and pupils of Assamese and English medium schools.

6. To establish a relationship between classroom environment and attitude towards mathematics.

7. To establish a relationship between pupils belief about mathematics and attitude towards mathematics.

8. To study the attitude towards mathematics as a function of sex.

Hypotheses:

We formulate the following hypotheses for the present study–

H1 :There is no significant relationship between attitude towards mathematics and achievement in mathematics of the pupil.

H2 : There is no significant relationship between home environment and development of attitude towards mathematics.

H3 :There is no significant relationship between father's attitude towards mathematics and pupil's attitude towards mathematics.

H4 :There is no significant relationship between mother's attitude towards mathematics and pupil's attitude towards mathematics.

H5 :There is no significant difference between the attitude towards mathematics of pupils of English and Assamese medium schools.

H6 :There is no significant difference between the classroom environment and attitude towards mathematics.

H7 :There is no significant relationship between attitude towards mathematics and their belief about mathematics.

H8 :There is no significant relationship between attitude towards mathematics and sex of the pupils.

4. Research Design and Methodology:

a. Sampling

(i) Sampling space: The study will be conducted in Greater Guwahati of Assam.

(ii) Sample: The sample consists of students of standard VIII, their respective parents and guardians.

b. Selection of samples

We intend to use normative survey method for the present study. For this purpose it is targeted to select a sample of 250 boys and 250 girls from both English and Assamese medium secondary schools from the population of standard VIII of secondary schools of Greater Guwahati of Assam.

c. Tools to be used in the collection of data

To measure the variables undertaken and to collect the data for the study, the researcher intends to use the following tools.

(i) Attitude scale towards mathematics to measure the attitude towards mathematics of the pupil.

(ii)To enquire about the home environment and parent's attitude towards mathematics.

From the parents a questionnaire is constructed in the following steps.

To know the status of parents & their (a) occupation, (b) educational qualification, (c) attitude towards mathematics. It is for guardians also for home environment.

(iii)To enquire about the classroom environment a questionnaire on classroom environment is constructed.

(iv)To assess achievement in mathematics each pupil, data will be collected from the records of school annual examinations for promotion from standard VIII to standard IX.

5. System of Analysis of Data:

In order to draw fruitful outcomes and derive effective measures, the data are analysed by using sophisticated statistical methods and formulae, viz., skewness, kurtosis, correlation, regression analysis, normal distribution, binomial distribution, etc. and their graphical representation. For validity and consistency, we use Hypothesis testing theory, Estimation theory, and Non-parametric tests. Linear & non-linear programming, numerical analysis & computation will be another useful tool for our effective investigation.

Software Used:

SPSS (Statistical Package for Social Science), Version 13.0

6. RESULTS & DISCUSSIONS

1(a) Positive attitude of Boys in Assamese Medium Schools

	N	Mean	Std. Deviation	Std. Error Mean
Boys	25	36.56	7.736	1.547

	Test Value = 25				95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Assamese Medium Boys student	7.472	24	.000	11.56	8.37	14.75

In the above table the level of Significance (LOS) is 5%. Since, here calculated value of $|t| > t_{0.05}$ (=2.26), so it is highly significant. Thus the Assamese medium boys have a positive attitude in the subject mathematics.

(b) Positive attitude of Girls in Assamese Medium Schools

	N	Mean	Std. Deviation	Std. Error Mean
Girls	25	35.52	6.001	1.200

	Test Value = 25					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Assamese Medium Girls student	8.765	24	.000	10.52	8.04	13.00

In the above table the level of Significance (LOS) is 5%. Since, here calculated value of $|t| > t_{0.05}$ (=2.26), so it is highly significant. Thus the Assamese medium girls have a positive attitude in the subject mathematics.

© Positive attitude of Boys in English Medium Schools

	N	Mean	Std. Deviation	Std. Error Mean
Boys	25	37.44	6.185	1.237

	Test Value = 25					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Englis Medium Girls student	10.401	24	.000	14.32	11.48	17.16

In the above table the level of Significance (LOS) is 5%. Since, here calculated value of $|t| > t_{0.05}$ (=2.26), so it is highly significant. Thus the English medium boys have a positive attitude in the subject mathematics.

(d) Positive attitude of Girls in English Medium Schools

	N	Mean	Std. Deviation	Std. Error Mean
Girls	25	39.32	6.884	1.377

	Test Value = 25					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
English Medium Boys student	10.056	24	.000	12.44	9.89	14.99

In the above table the level of Significance (LOS) is 5%. Since, here calculated value of $|t| > t_{0.05}$ (=2.26), so it is highly significant. Thus the English medium girls have a positive attitude in the subject mathematics.

(e) Medium wise t-Test for positive attitude

One-Sample Statistics (sample size each case 100)

	N	Mean	Std. Deviation	Std. Error Mean
Assamese Medium	25	72.08	12.997	2.599
English Medium	25	76.76	12.778	2.556

One-Sample Test

	Test Value = 50					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Assamese Medium	8.495	24	.000	22.08	16.72	27.44
English Medium	10.471	24	.000	26.76	21.49	32.03

And it is also clear that the English medium students have better positive attitude than Assamese medium students
(f) Sex wise t-Test for positive attitude

One-Sample Statistics (sample size each case 100)

	N	Mean	Std. Deviation	Std. Error Mean
Girls	25	74.84	11.721	2.344
Boys	25	74.00	13.669	2.734

One-Sample Test

	Test Value = 50					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Girls	10.596	24	.000	24.84	20.00	29.68
Boys	8.779	24	.000	24.00	18.36	29.64

And it is also clear that the girls have better positive attitude than boys
(g) t-Test of all boys and girls for positive attitude
One-Sample Statistics (sample size 200)

	N	Mean	Std. Deviation	Std. Error Mean
TOTAL	25	148.84	24.951	4.990

One-Sample Test

	Test Value = 100					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
TOTAL	9.787	24	.000	48.84	38.54	59.14

In the above table the level of Significance (LOS) is 5%. Since, here calculated value of $|t| > t_{0.05}$ (=2.26), so it is highly significant.
2(a) Co-relation between Boys and Girls of Assamese Medium School in case of positive attitude

	Mean	Std. Deviation	N
Girls	35.52	6.001	25
Boys	36.56	7.736	25

Correlations

		Girls_a	Boys_a
Girls	**Pearson Correlation**	1	.787(**)
	Sig. (2-tailed)		.000

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	N	25	25
Boys	**Pearson Correlation**	.787(**)	1
	Sig. (2-tailed)	.000	
	N	25	25
** Correlation is significant at the 0.01 level (2-tailed).			

In the above table, we observed that the correlation coefficient is 0.787, which is highly positive. So, we may say that there is a relationship between them.

(b) Co-relation between Boys and Girls of English Medium Schools in case of positive attitude

	Mean	Std. Deviation	N
Girls	39.32	6.884	25
Boys	37.44	6.185	25

Correlations

		Girls_e	Boys_e
Girls	**Pearson Correlation**	1	.911(**)
	Sig. (2-tailed)		.000
	N	25	25
Boys	**Pearson Correlation**	.911(**)	1
	Sig. (2-tailed)	.000	
	N	25	25
** Correlation is significant at the 0.01 level (2-tailed).			

In the above table, we observed that the correlation coefficient is 0.911, which is highly positive. So, we may say that there is a relationship between them.

© Co-relation of Girls between of Assamese Medium and English Medium Schools in case of positive attitude

	Mean	Std. Deviation	N
Assamese Medium	35.52	6.001	25
English Medium	39.32	6.884	25

Correlations

		GIRLS_A	GIRLS_E
Assamese Medium	**Pearson Correlation**	1	.653(**)
	Sig. (2-tailed)	.	.000
	N	25	25
English Medium	**Pearson Correlation**	.653(**)	1
	Sig. (2-tailed)	.000	.
	N	25	25
** Correlation is significant at the 0.01 level (2-tailed).			

In the above table, we observed that the correlation coefficient is 0.653, which is highly positive. So, we may say that there is a relationship between them.

(d) Co-relation of Boys between of Assamese Medium and English Medium Schools in case of positive attitude

	Mean	Std. Deviation	N
Assamese Medium	36.56	7.736	25

English Medium	37.44	6.185	25

Correlations

		BOYS_A	BOYS_E
Assamese Medium	**Pearson Correlation**	1	.927(**)
	Sig. (2-tailed)	.	.000
	N	25	25
English Medium	**Pearson Correlation**	.927(**)	1
	Sig. (2-tailed)	.000	.
	N	25	25
** Correlation is significant at the 0.01 level (2-tailed).			

In the above table, we observed that the correlation coefficient is 0.927, which is highly positive. So, we may say that there is a relationship between them

(e) Correlations between Assamese and English medium school in case of positive attitude
Descriptive Statistics

	Mean	Std. Deviation	N
Assamese medium	72.08	12.997	25
English medium	76.76	12.778	25

Correlations

		TOTAL_A	TOTAL_E
Assamese medium	**Pearson Correlation**	1	.874(**)
	Sig. (2-tailed)	.	.000
	Sum of Squares and Cross-products	4053.840	3484.480
	Covariance	168.910	145.187
	N	25	25
English medium	**Pearson Correlation**	.874(**)	1
	Sig. (2-tailed)	.000	.
	Sum of Squares and Cross-products	3484.480	3918.560
	Covariance	145.187	163.273
	N	25	25
** Correlation is significant at the 0.01 level (2-tailed).			

In the above table, we observed that the correlation coefficient is 0.874, which is highly positive. So, we may say that there is a relationship between them

(f) Correlations between boys and girls of Assamese and English medium schools in case of positive attitude
Descriptive Statistics

	Mean	Std. Deviation	N
Total girl	74.84	11.721	25
Total boys	74.00	13.669	25

Correlations

		TOTAL_G	TOTAL_B
Total girl	**Pearson Correlation**	1	.931(**)
	Sig. (2-tailed)	.	.000
	Sum of Squares and Cross-products	3297.360	3580.000
	Covariance	137.390	149.167
	N	25	25
Total boys	**Pearson Correlation**	.931(**)	1
	Sig. (2-tailed)	.000	.
	Sum of Squares and Cross-products	3580.000	4484.000
	Covariance	149.167	186.833
	N	25	25
** Correlation is significant at the 0.01 level (2-tailed).			

In the above table, we observed that the correlation coefficient is 0.931, which is highly positive. So, we may say that there is a relationship between them

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