

Some Determinants for Achievement in Mathematics at the Higher Secondary Level: A Case Study at the Purba Medinipur District, West Bengal

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Abstract

Students' mathematical achievements in higher secondary school have an influential effect on their performance in college and their future careers. Somehow there appears to be a lack of consciousness amongst the common people towards the factors for better academic achievement in mathematics. In the Indian context, there are several factors like socio-economic condition of the students, gender discrimination etc. which have profound influence in mathematical achievement of the students. So here in this study – an attempt has been made to address some of those key determinants that may influence the achievement of Mathematics amongst the Higher Secondary students of West Bengal, with a special reference to the Purba Medinipur District.

Keywords: Mathematical achievement, higher secondary school, gender, determinant, Purba Medinipur District.

1.1 Introduction

Achievement is a vital factor for every organism living in this world. The sense of achievement brings joy, happiness, feeling of success and enthusiasm to everyone which stands as an influencing factor for further actions and efforts. Every human long and tries to reach the achievement in all the endeavors. As rightly said by Albert Camus "Every achievement is servitude. It compels us to a higher achievement". So achievement is an indispensable factor in everyone's life.

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“Mathematics is a key science for the future, through both its fundamental development and its enabling role for science, engineering, and technology. This is illustrated by dramatic advances in communications, bioinformatics, the understanding of uncertainty and dealing with large data sets”. (Lemaire, 2003, p.1)

Aristotle defined mathematics as “the science of quantity”, and this definition prevailed until the 18th century. Carl Frieddrich Gauss (1777-1855) referred to mathematics as “the Queen of the sciences”. Benjamin peirce (1809-1880) called mathematics “the science draws necessary conclusions”. Albert Einstein (1879-1955) stated that “as far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality”.

Students’ mathematical achievements in higher secondary school have an influential effect on their performance in college and their future careers. Educators have relied on many sources of information and focused on various factors that might affect student’ mathematics achievements, including students’ own backgrounds, peer environment, parental involvement.

1.2 Emergence of the Problem

An extensive study on review of related literature has been done by the authors for the selection of the problem. No full-fledged study on the determinants for achievement in Mathematics at Higher Secondary level with special reference to Purba Medinipur district, West Bengal had been found. Review of related literature with regards to the problem undertaken for investigation has indicated that there is a lack of studies in this area. No study has been found in which variables like parental involvement in learning mathematics and type of school etc. have been included in mathematics achievement at higher secondary level especially in Purba Mediniur district.

Nowadays mathematics knowledge is necessary for higher secondary school students but somehow there is a lack of consciousness towards the achievement of mathematical knowledge. In the Indian context, there are several factors like socio-economic condition of the students, gender discrimination etc. which influence the mathematical achievement of the students. So here in this study - only those key factors have been addressed that influence the achievement of mathematics in higher secondary students of West Bengal.

1.3 Objectives of the Study

The principal objectives of the proposed study are as follows:

- To find the effect of gender on Mathematics achievement of Higher Secondary school students.
- To study the effect of parental involvement in learning Mathematics in the achievement of Higher Secondary school students.

- To find the effect of students' attitude towards Mathematics on achievement in Mathematics of Higher Secondary school students.
- To study the effect of the neighborhood on Mathematics achievement of Higher Secondary school students.
- To ascertain the impact of the type of school on the achievement in Mathematics among Higher Secondary school students.

1.4 Hypothesis of the Study

On the basis of the stated objectives above, the following research hypotheses have been proposed for the study:

Ho1: There is no statistically significant relationship between gender and achievement in mathematics of higher secondary school students.

Ho2: There is no statistically significant relationship between parental involvement in learning mathematics and achievement in mathematics of higher secondary school students.

Ho3: There is no statistically significant relationship between students' attitude towards mathematics and achievement in mathematics of higher secondary school students.

Ho4: There is no statistically significant relationship between the neighborhood and mathematics achievement of higher secondary school students.

Ho5: There is no statistically significant relationship between the type of school and achievement in mathematics among the higher secondary school students.

1.5 Delimitations of the Present Study

To make the study precise and intensive and to complete it within a reasonable time it seems necessary to delimit the study in the areas mentioned below.

- The study will be delimited to the higher secondary schools of Purba Medinipur district under the West Bengal Council of Higher Secondary Education (WBCHSE).
- The size of the sample will be delimited to the 100 students studying mathematics in higher secondary classes only.
- Only the Bengali medium secondary schools under the West Bengal Council of Higher Secondary Education (WBCHSE) were considered in the present study.

2. Methodology

The materials and methods used for collecting and analyzing the data in the present study may be explained under the following headings.

2.1 Population of the Study

In the present study, population consisted of higher secondary students of (both boys and girls) the Purba Medinipur district, West Bengal which was selected purposively. The authors have

selected only the school under the West Bengal Council of Higher Secondary Education (Bengali Medium) situated in the Purba Medinipur district.

2.2 Sample of the Study

For collection of samples - two co-ed schools, one boy's school and one girls' school were chosen randomly using lottery method. Students were selected by simple random sampling technique. The final sample constituted of 100 students out of which 62 were boys and 38 were girls.

The selected schools were (A) Baita Mahendranath High School (B) Egra S.M Girls' High (H.S) School (C) Egra J.L High (H.S) School (D) Naipur Santi Sudha Institution.

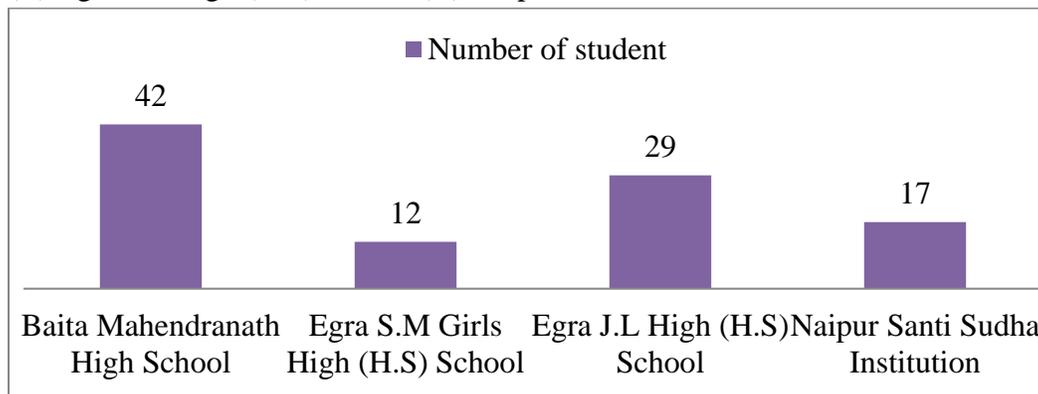


Figure 1: Graphical representation of the Sample Size

2.3 Variables:

The following variables have been studied:

2.3.1 Independent Variables:

- Parental involvement in learning mathematics
- Neighborhood
- Gender
- Students' attitude towards mathematics
- Type of school

2.3.2 Dependent Variable:

Achievement in Mathematics of the Higher Secondary students.

2.3.3 Extraneous Variable:

Students pre-existing knowledge in Mathematics.

2.4 Method of the Study

The present study is descriptive in nature. Survey method was used in the proposed study.

2.5 Tool used for the Study

The authors used questionnaire as a tool for collecting data in the proposed study. Adaptation and modification of questionnaire was done by the M.Ed. trainee along with her supervisor.

2.6 Data Collection Procedure

The questionnaires were distributed among the sample students and they were instructed to fill them properly. After responses were made, the questionnaires were collected.

2.7 Statistical Techniques Used

- T-test was used to test the to show the significance difference between gender and achievement in mathematics, parental involvement and achievement in mathematics, students' attitude and achievement in mathematics, neighborhood and achievement in mathematics, type of school and achievement in mathematics.
- ANOVA was used to show the significance difference between category of school and achievement in mathematics.

3. Results & Discussion

For the present study, results were presented on the basis of analysis of data and its interpretation under the following headings:

3.1 Relationship between Gender and Mathematics Achievement

Ho1: *There is no statistically significant relationship between gender and achievement in Mathematics of Higher Secondary school students.*

Table-1: Relationship between gender and achievement in Mathematics of Higher Secondary school students

	Male	Female
Mean	52.79	51.87
Variance	59.45	46.98
N	62	38
Df	98	
T Value	0.60	
Level Of Significance At 0.05 Level	Not Significant	

In order to find out whether there is any significant difference between gender and achievement in mathematics of higher secondary students of Purba Medinipur district, 't' value was calculated. The 't' ratio was found to be 0.60 at 0.05 level of significance and it is presented in Table -1. The 't' value is less than table value. Hence the stated hypothesis is accepted. It is inferred that there is no significant difference between gender and achievement in mathematics of higher secondary school students of Purba Medinipur district.

3.2 Relationship between Parental involvement and Mathematics Achievement

Ho2: *There is no statistically significant relationship between parental involvements in learning Mathematics and achievement in Mathematics of Higher Secondary school students.*

Table-2: Relationship between parental involvement and achievement in mathematics of higher Secondary school students

	Parental Involvement	Mathematics Achievement
Mean	7.75	52.44
Variance	3.04	54.39
N	100	100
Df	198	
t value	-58.97	
Level of significance at 0.05 level	Significant	

In order to find out whether there is any significant difference between parental involvement and achievement in mathematics of higher secondary students of Purba Medinipur district, 't' value was calculated. The 't' ratio was found to be 58.97 at 0.05 level of significance and it is presented in table 2. The 't' value is greater than table value. Hence the stated hypothesis is rejected. It is inferred that there is significant relationship between parental involvement and achievement in mathematics of higher secondary school students of Purba Medinipur district.

3.3 Relationship Between Students' Attitude and Mathematics Achievement

Ho3: *There is no statistically significant relationship between students' attitude towards Mathematics and achievement in mathematics of higher secondary school students.*

Table-3: Relationship between students' attitude and achievement in Mathematics of Higher Secondary school students.

	Students' Attitude	Mathematics Achievement
Mean	23.96	52.44
Variance	6.02	54.39
N	100	100
df	198	
t value	36.64	
Level of significance at 0.05 level	Significant	

In order to find out whether there is any significant difference between students' attitude and achievement in mathematics of higher secondary students of Purba Medinipur district 't' value was calculated. The 't' ratio was found to be 36.64 at 0.05 level of significance and it is presented

in Table - 3. The 't' value is greater than table value. Hence the stated hypothesis is rejected. It is inferred that there is significant relationship between students' attitude and achievement in mathematics of higher secondary school students of Purba Medinipur district. This finding, goes hand in hand with the common perception.

3.4 Relationship Between Neighbourhood and Mathematics Achievement

Ho4: *There is no statistically significant relationship between the neighborhood and Mathematics achievement of Higher Secondary school students.*

Table-4: Relationship between students' attitude and achievement in mathematics of higher secondary school students.

	Neighbourhood	Mathematics Achievement
Mean	20.73	52.44
Variance	29.09	54.39
N	100	100
df	198	
t value	34.71	
Level of significance at 0.05 level	Significant	

In order to find out whether there is any significant difference between neighbourhood and achievement in mathematics of higher secondary students of Purba Medinipur district, 't' value is calculated. The 't' ratio found to be 34.71 at 0.05 level of significance and it is presented in table 4. The 't' value is greater than table value. Hence the stated hypothesis is rejected. It is inferred that there is significant relationship between neighbourhood and achievement in mathematics of higher secondary school students of Purba Medinipur district.

3.5 Relationship between Type of School and Mathematics Achievement

Ho5: *There is no statistically significant relationship between the type of school and achievement in mathematics among the higher secondary school students.*

Table-5: Relationship between type of school (rural and urban) and achievement in mathematics of Higher Secondary school students.

	Rural	Urban
Mean	53.17	50.13
Variance	52.57	55.33
N	76	24
df	98	
t value	1.78	
Level of significance at 0.05 level	Not significant	

In order to find out whether there is any significant difference between type of school (rural and urban) and achievement in mathematics of higher secondary students of Purba Medinipur

district, 't' value is calculated. The 't' ratio found to be 1.78 at 0.05 level of significance and it is presented in table 5. The 't' value is less than table value. Hence the stated hypothesis is accepted. It is inferred that there is no significant relationship between type of school (rural and urban) and achievement in mathematics of higher secondary school students of Purba Medinipur district.

Table-6: ANOVA result category of school (Girls' School, Boys' School and Co-Education School) and achievement in Mathematics of Higher Secondary school students

Category of school	Girls' School	Boys' School	Co-Education School
Mean	53.75	54.03	51.39
Variance	76.20	46.18	53.34
N	12	29	59
F value	1.48		
At 0.05 level of significance	Not Significant		

In order to find out whether there is any significant difference between category of school (Girls' School, Boys' School and Co-Education School) and achievement in mathematics of higher secondary students of Purba Medinipur district, 'F' value is calculated. The 'F' ratio found to be 1.48 at 0.05 level of significance and it is presented in table 6. The 'F' value is less than table value. Hence the stated hypothesis is accepted. It is inferred that there is no significant difference between category of school (Girls' School, Boys' School and Co-Education School) and achievement in mathematics of higher secondary school students of Purba Medinipur district.

4.1 Major findings of the study

The major findings from this study are written below:

- There is no significant relationship between gender and achievement in mathematics of higher secondary school students of Purba Medinipur district.
- There is significant relationship between parental involvement and achievement in mathematics of higher secondary school students of Purba Medinipur district.
- There is significant relationship between students' attitude and achievement in mathematics of higher secondary school students of Purba Medinipur district.
- There is significant relationship between neighbourhood and achievement in mathematics of higher secondary school students of Purba Medinipur district.
- There is no significant relationship between type of school (rural and urban) and achievement in mathematics of higher secondary school students of Purba Medinipur district.

- There is no significant relationship between category of school (Girls' School, Boys' School and Co-Education School) and achievement in mathematics of higher secondary school students of Purba Medinipur district.

4.2 Significance of the Study

The study will provide information to the Mathematics teacher about the different factors to achieve the concept of mathematics among students. It helps them understand the challenges faced by the students in understanding mathematics that makes them perform poorly. This study will add to the world of knowledge information about study habits that enhance understanding of mathematics.

4.3 Educational Implications

Every scientific research bears some educational implication. The present research study, applied in nature, also has some important educational implications which are as follows:

- From the finding of the study, teacher can know the student's attitude towards achievement in mathematics, if the student has no interest to learn mathematics then teacher can motivate him/her individually.
- The present study indicates the contribution of parents in this regard is very much essential. So parental involvement in learning mathematics is necessary.
- Mathematics teacher can remove some of the wrong attitudes in pupils towards mathematics, develop confidence in them tapping their abstract abilities.
- From the present study teacher can know the cooperativeness and collaborativeness of students with their friends and neighbors which may improve their achievement in mathematics.
- The present study indicates that in case of achievement in mathematics male and female doesn't matter. So teacher should not gender bias and also they should consider each and every student as a learner.

4.4 Limitations of the Study

The limitations of present research work were as follows:

- The first and foremost limitation was time constrains which was one of the major cause to delimit the study.
- Being a full time and regular student of M.ED course under the WBUTTEPA, the academic commitments other than the dissertation hindered the present researcher to undertake the study in its full-fledged form.

4.5 Suggestion for further Studies

The present study for dissertation work of M.Ed. course was confined to so many limitations like time constraints, selection of sample, incorporation of other desired variables etc. Therefore, the authors think to make the study a more full-fledged one and also to generalize the findings, the following steps may be taken:

- The sample may be collected from a wider range of population.
- Self-made standardized tools should be used to collect data.
- Sophisticated statistical techniques may be used to analyze the data.
- Above all, to depict a lively view of the study, a pilot project may be taken.

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Bibliography

Adekola, B.O. (2016) Influence of Teachers' Qualification, Age, and gender on Effective Teaching of English Language. Journal of Educational Focus. 6: 97-99.

Ali, N. (2016) A study on attitude towards mathematics of secondary students in the district of Burdwan. Golden Research Thoughts. 6 (3): 1-4.

Barman, P. (2016) Teaching effectiveness of secondary school teachers in the district of Purba Medinipur, West Bengal. Journal of Humanities and Social Science. 2(7): 50-63.

Bhowmik, M. & Banerjee, B. (2016) A study on the relationship between achievement in mathematics and attitude towards mathematics of secondary school students. International Journal of Education & Multidisciplinary Studies. 04 (03) : 402-408.

----- (2015). Co-relational study on anxiety and achievement in mathematics of secondary school students' in Jangal – Mahal of West- Bengal, India. Basic Research Journal of Education Research and Review. 4(8) : 113- 118.

Hooda, M. & Devi, R. (2017) Type of School, Locality and Gender as Determinant of Achievement in Mathematics among Secondary School Students. International Journal of Advanced Research in Management and Social Sciences. 6 (11) : 79 - 91.

Kimani, G. N. Kara, A.N., & Njagi, L.W. (2013) Teachers factors influencing students academic achievement in secondary schools in nyandarua country, Kenya, International Journal of Educational and Research, Vol.1, No.3, 1-14.

Kundu, A. & Ghose, A. (2016) The relationship between attitude towards and achievement in mathematics among higher secondary students. International Journal of Multidisciplinary Research and Development.3 (6) : 69-74.

Mohd, N.,Mahmood,T.F.R.,&Ismali,M.N., (2011), Factors that Influencing in Mathematics Achievement, International Journal of Academic Research, Vol.3 No.3 , 49-54.