Influence of School and Students Factors on Mathematics Achievement

SADIA MAHMOOD* AND TAHIRA KHATOON**

ABSTRACT

This study examined the effects of school type, gender and mathematics anxiety on mathematics achievement. The population consists of 863 males and 789 females from 15 secondary schools of Uttar Pradesh (India). The Mathematics Achievement Test and Mathematics Anxiety Scale were used for data collection, while stepwise multiple regression, ANOVA, t-test and correlation techniques were used for statistical analysis. The results of the analysis showed that among the three independent variables, school type had the greatest influence on mathematics achievement (46%), mathematics anxiety comes second in order while gender showed no significant influence. Moreover, the students of Missionary and A.M.U. schools had highest mathematics achievement, while students of Government and Government Aided schools had lowest achievement scores, moreover scores of students of Muslim and Hindu Managed schools slide in between the range of highest and lowest achievement. Further males reported more mathematics achievement than females and students with low mathematics anxiety had highest achievement scores. Findings also reveal a significant negative correlation (–0.48) between mathematics achievement and mathematics anxiety.

* *Research Scholar,* Department of Education, Aligarh Muslim University, Aligarh 202 002

** *Associate Professor,* Department of Education, Aligarh Muslim University, Aligarh 202 002

Introduction

Mathematics is an important subject in secondary school because it is associated with more academic and career opportunities (Akinsola and Tella, 2003). Ironically, this subject is the basis for scientific, industrial and technological advancement of any country. But it is very sad to note that the performance by the secondary school students are not up to the mark and student's general impression is that it is a dreadful subject. Thus, mathematics learning and student's performance in mathematics receive considerable attention from educators, teachers and parents. It is therefore important to identify which particular school and student's factors influence student mathematics achievement most significantly, in order to help them improve and make substantial academic progress.

The student's educational outcome and academic success is greatly influenced by the type of school they attend. Crosnoe, Johnson and Elder (2004) suggested that school sector (public or private) and class size are two important structural components of schools. Private schools tend to have both better funding and smaller class sizes than public schools. The additional funding of private schools leads to more access to resources, which have shown to enhance academic achievement. The relative social class of a student body also effects academic achievement. Student from low socio-economic backgrounds who attend poorly funded schools do not perform well compared to students from higher social classes (Eamon, 2005).

Gender, touted to be a significant contributor for mathematics achievement has not been consistent and continue to be a much debated topic (Leder, 1992). Friedman (1989) noted that until age 10 either no differences between genders or differences favouring girls are observed. For the middle school years, some researchers favoured girls (Tsai and Walberg, 1983) and some favoured boys (Hilton and Berglund, 1974); other researches showed no difference (Fennema and Sherman, 1978; Abiam and Odok, 2006). Friedman (1989) observed that in five of seven studies 12th grade boys outperformed 12th grade girls, with the remaining two studies showing no differences between them. Boys outperformed girls with a difference of about one fifth of one standard deviation from TIMSS population third data (Schreiber, 2002). Further, general consensus seems to indicate that females tend to perform better than males in computation and males tend to perform better than females in problem solving (Hyde et. al., 1990).

Another significant contributor duly acknowledged in literature for mathematics achievement is mathematics anxiety. High and low levels of mathematics anxiety greatly determine student's achievement level in mathematics. Studies pertaining to anxiety and achievement have found that these two variables share a negative relationship with each other (Richardson and Suinn, 1972; Hembree, 1990; Engelhard, 1990). In the past, researchers have reported that students with lower level of mathematics achievement tend to have higher levels of mathematics anxiety (Cooper and Robinson, 1989; Morris, Davis and Hutchings, 1981). This negative relationship also appears at the elementary and the secondary school levels (Chui and Henry, 1990; Lee, 1992; Meece, Wigfield and Eccles, 1990). Hembree (1990) reports an average correlation of –0.34 for school students, concluding that mathematics achievement is highly constrained by mathematics anxiety and that reduction in mathematics anxiety is consistently associated with improvement in achievement. However, it should be noted that the observations of Hunsley (1987) using multiple regression and those of Hadfield and Maddux (1988) using analysis of variance, did not indicate a significant relationship between the two. Frary and Ling (1983) found that higher levels of mathematics anxiety are related to lower levels of mathematics achievement among university students.

Purpose of the study

The purpose of the study is to investigate the relationship, if any between a set of independent variables i.e. school type (managed by different authorities), gender and mathematics anxiety with mathematics achievement (dependent variable).

Hypotheses

In keeping with objectives of the study, the following research hypotheses are formulated as well as tested against empirical data:

H_1: *There is no significant amount of variance in mathematics achievement accounted for by school type, gender and mathematics anxiety.*

H_2: *There is no significant difference in the mathematics achievement of the students of different types of school having different types of management.*

H_3: *There is no significant difference in the mathematics achievement of male and female students.*

H_4: *There is no significant difference in the mathematics achievement of the students having different levels of anxiety.*

Methodology

The current work is a descriptive study investigating the role of independent variables such as school types, gender and mathematics anxiety on the dependent variable mathematics achievement. The population in this study consists of 1652 pupils of which 863 (52.24%) are male and the rest 789 (47.6%) are female students from 15 Secondary Schools of Western Uttar Pradesh, the largest state in terms of population of India. These schools are broadly categorised on the basis of their management. For instance, Missionary schools are prestigious English medium co-education schools managed by Christian missionaries having very high reputations in society. This is the reason that pupils in these schools belong to well-to-do families with high socio-economic status (SES). A.M.U. Schools managed by world famous Aligarh Muslim University are English Medium single sex schools, where pupils in Class IX and X are from high socio-economic strata and are admitted through all India based competitions. Government and Government Aided schools are Hindi medium single sex schools run by Government directly or indirectly through aids, and are widely known among general public for their poor management by Government machineries. Tuition fees in these schools are very meager and generally, pupils from low socio-economic strata of the society flog these schools. The schools run by Hindu and Muslim trusts through local managements are termed as Hindu or Muslim Managed schools respectively. These schools can be seen as somewhere in between Christian missionaries and A.M.U. schools on one hand and Government and Government Aided Schools on other hand.

Tools Used

Mathematics Achievement Test (MAT)

- Mathematics Achievement Test developed by investigators is a 50 questions multiple objective type test, with four options A to D and is based on three cognitive levels that is knowledge, understanding and application. There is one correct answer for each question. The test items are scored manually, each correct answer scored one mark while a wrong answer scored zero. The level of achievement of a student is taken as students total test score. Student's achievements are categorised into low, medium, good and excellent group.

Mathematics Anxiety Scale (MAS)

Mathematics Anxiety Scale (MAS) developed by investigators is a 16-item instrument of which 11 are worded positively and 5 worded negatively. The instrument uses a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). Mathematics anxiety score is calculated by adding the individual scores of all the items together whose possible range can be between 16-80. Low score on the MAS indicate a high level of mathematics anxiety that is the reason the sign is reversed. Student anxiety levels are categorised into low, moderate and high level of anxiety in accordance with average anxiety scores obtained. According to investigators, this scale has split-half reliability of 0.89. The inner consistency coefficient determined by the alpha correlation, which is a generalised form of 20 formulas of Kudar Richardson, is 0.91. Another consistency test of the scale is performed by item total correlations technique. Item total score correlations are between the range of 0.30 – 0.52 of all items with total test.

Pearson Product Moment Technique is used to assess the correlation between mathematics achievement and mathematics anxiety scores. t-test is utilised for testing the difference between mean scores of mathematics achievement and types of school, gender and mathematics anxiety. F-test is applied for determining the significant difference among the groups. For determining the combined affect of independent variables on dependent variable multiple regression is used. Data analysis is performed on computer with SPSS 14 software package and the significance level is taken 0.05, 0.01 and 0.001 for all statistical tests.

Results and Analysis

Table 1 shows that the achievement groups are categorised on the basis of percentage scores in test. The four groups therefore formed are, Low achievement group (0-49%), Medium (50-69%), Good (70–89%) and Excellent (90% and above). An examination of mentioned table shows that the students' population percentages in low, medium, good and excellent achievement groups are 33.89 per cent, 29.61 per cent, 22.64 per cent and 13.86 per cent respectively. In male sub-group, this translates into 16.70 per cent, 14.65 per cent, 11.14 per cent and 9.74 per cent, while in female sub-group it is 17.19 per cent, 14.95 per cent, 11.50 per cent and 4.12 per cent respectively. Thus, the medium and good achievement groups together comprise of a little more than half of population of students (52.25%),

Table 1 : Population Distribution According to School Type and Gender among Different Achievement Groups

Schools	*Gender*	*Low*		*Medium*		*Good*		*Excellent*		*Total*	
		N	%	*N*	%	*N*	%	*N*	%	*N*	%
Government	Male	82	4.96	20	1.21	3	0.18	2	0.12	107	6.47
	Female	103	6.23	28	1.69	0	0	0	0	131	7.92
Government	Male	109	6.60	59	3.58	11	0.67	0	0	179	10.85
Aided	Female	86	5.21	56	3.39	11	0.67	0	0	153	9.27
Hindu	Male	24	1.45	37	2.24	23	1.39	19	1.15	103	6.23
Managed	Female	20	1.21	48	2.90	30	1.82	11	0.66	109	6.59
Muslim	Male	41	2.48	55	3.33	47	2.85	17	1.03	160	9.69
Managed	Female	27	1.63	43	2.60	51	3.09	28	1.69	149	9.01
Missionary	Male	6	0.36	36	2.18	38	2.30	40	2.42	120	7.26
	Female	16	0.97	25	1.51	54	3.26	21	1.27	116	7.01
A.M.U.	Male	14	0.85	35	2.12	62	3.75	83	5.02	194	11.74
	Female	32	1.94	47	2.85	44	2.66	8	0.48	131	7.93
Total	Male	276	16.70	242	14.65	184	11.14	161	9.74	863	52.23
	Female	284	17.19	247	14.95	190	11.50	68	4.12	789	47.76
Grand Total		560	33.89	489	29.61	374	22.64	229	13.86	1652	100

while the low achievement group constitute one third (33.89%) of total population. Further only 13.86 per cent of total population is observed in excellent achievement group, in which males are a little more than double of that of females. As expected, the largest population of low achievers is found in Government and Government Aided schools. Whereas, A.M.U. schools have the largest number of excellent achievers, in this particular population of excellent achievers, the population percentage of males is four times greater in comparison to females.

To test null hypothesis 1, stepwise multiple regression prediction equations are generated using mathematics achievement as the criterion variable and school type, gender and mathematics anxiety scores as the predictor variables, shown in Table 2. The prediction equation which contained all independent variables is significant ($R = 0.65$, $R^2 = 0.42$, $F = 398.85$, $P < 0.001$). The coefficients of multiple determination indicated that these variables combined accounted for 42 per cent of the variability in mathematics achievement. The standardised beta weights indicated that the relative contributions of these variables in predicting mathematics achievement are, the school type contributed 46 per cent (beta = 0.46, t = 23.09, P<0.001), gender contributed only 0.8 per cent (beta = 0.008, t = 0.44, P <not sig) and mathematics anxiety scores contributed 33% (beta =–0.33, t = 16.72, P < 0.001). The school type scores are best predictor of mathematics achievement, mathematics anxiety scores are second in order and gender comes last in sequence.

Table 2 : Stepwise Multiple Regression Analysis for predicting Mathematics Achievement using School type, Gender and Mathematics Anxiety

Multiple Regression Equation 1

Criterion Variable	*Multiple R*	*R^2*	*Adjusted R^2*	*Standard Error*	*df*	*F*	*P*
Mathematics Achievement	0.65	0.42	0.42	9.02	3,1648	398.85	< 0.001

Multiple Regression Equation 2

Predictor Variables	*B*	*Std Error*	*β*	*t*	*P*
School Type	3.13	0.14	0.46	23.09	< 0.001
Gender	0.20	0.45	0.008	0.44	< not sig
Mathematics anxiety	–0.34	0.02	–0.33	16.72	< 0.001

One-way ANOVA is performed as shown in Table 3 to ascertain whether there is any difference in student's level of mathematics

achievement according to their school types. Results show that students level of mathematics achievement differed significantly according to different types of school (df = 5, 1646, F = 88.73, P < .001). Further t- test was used to determine the direction of these differences.

Table 3 : Analysis of Variance of Achievement Scores on the Basis of School Types

Source of Variation	*df*	*Sum of*	*Mean Squares*	*F Square*	*P <*
Between groups	5	88234.50	17646.90	88.73	0.001
Within groups	1646	327366.9	198.89		
Total	1651	415601.4			

Table 4 shows that students of Government schools have significantly low mathematics achievement scores (M=16.34, SD = 8.30) than those of other five groups. Students of Government Aided schools have significantly lower mean achievement score (M = 20.55, SD = 8.46) than the Hindu, Muslim, Missionary Managed and AMU school students. Similarly students of Hindu and Muslim Managed schools have significantly lower achievement score (M = 30.38, SD = 9.69; M = 31.52, SD = 10.03) than Missionary and AMU students. The students of Missionary and AMU Managed schools have almost similar mean mathematics scores (M = 35.78, SD = 9.47 and M = 35.90, SD = 10.02 respectively).

Table 4 : Comparison of Mean Achievement Scores of Different Types of School

Types of School		*N*	*M*	*SD*	*T*					
					1	*2*	*3*	*4*	*5*	*6*
Government	1	238	16.34	8.30						
Government Aided	2	332	20.55	8.46	6.02***					
Hindu Managed	3	212	30.38	9.69	16.33***	12.65***				
Muslim Managed	4	309	31.52	10.03	18.97***	15.17***	1.30			
Missionary	5	236	35.78	9.47	23.88***	20.37***	5.96***	5.03***		
A.M.U.	6	325	35.90	10.02	11.29***	10.32***	2.98**	3.77***	0.07	

**P < 0.01, ***P < 0.001

Computation of the mean and SD for male and female sub-samples of each school level (Table 5) shows that male students have significantly higher mean achievement scores (M = 36.98, SD = 9.85

and M = 38.43, SD = 9.50) in Missionary and A.M.U. schools than the female students (M = 34.53, SD = 8.95 and M = 28.95, SD = 9.62). Significant sex difference is not observed in Government, Government Aided and Hindu and Muslim Managed schools.

Table 5 : Sexwise Comparison of the Achievement Scores by School Types

School Type	*Group*	*N*	*M*	*SD*	*df*	*t*
Government	Male	107	17.07	8.79	236	1.24
	Female	131	15.75	7.67		
Government	Male	179	20.10	8.42	330	1.08
Aided	Female	153	21.08	8.05		
Hindu	Male	103	30.49	10.80	210	0.15
Managed	Female	109	30.28	8.58		
Muslim	Male	160	31.19	9.92	307	1.79
Managed	Female	149	32.15	9.91		
Missionary	Male	120	36.98	9.85	234	1.99*
	Female	116	34.53	8.95		
A.M.U.	Male	194	38.43	9.50	323	8.78***
	Female	131	28.95	9.62		

*P < 0.05, ***P < 0.001

For a comparative study of gender difference in mathematics achievement, data is presented in Table 6. The result shows a significant difference between mathematics achievement scores of males and females (t = 3.85, df = 1650, P < .001). More specifically, male students scored significantly higher (M = 29.26, SD = 12.36) than females (M = 27.03, SD = 11.09).

Table 6 : Comparison of Mean Achievement Scores of Male and Female students

Group	*N*	*M*	*SD*	*df*	*t*	*P<*
Male	863	29.26	12.36	1650	3.85-***	.001
Female	789	27.03	11.09			

***P < 0.001

In order to determine if there are any relationships between the achievement scores of the students and their anxiety levels, Pearson Product Moment Correlation is applied. A significant negative coefficient of correlation is found between achievement scores and mathematics anxiety (r = – 0.48), which indicates that as mathematics achievement score increases, anxiety score decreases accordingly.

Table 7 : Analysis of Variance of Mathematics Achievement Scores on basis of Mathematics Anxiety

Source of Variation	*df*	*Sum of Squares*	*Mean Square*	*F*	*P<*
Between groups	2	55927.896	27963.95	128.21	0.001
Within groups	1649	359673.5	218.12		
Total	1651	415601.4			

F-test when applied (Table 7) reveals that the mean achievement scores of Low, Medium and High anxiety groups students are significantly different (df = 2, 1649, F = 128.21, P < 0.001). Further, t-test is applied in an aim to show among which group of students the mentioned difference exists. As shown in Table 8, students with High anxiety in mathematics have significantly lowest mean achievement scores (M = 21.54; SD = 10.69) than the other two anxiety groups. Similarly, those students with medium mathematics anxiety have significantly low mean achievement score (M = 25.10, SD = 10.47) than low anxiety group (M = 35.84; SD =10.46). This result shows that higher achievement consistently accompanies reduction in mathematics anxiety.

Table 8 : Comparison of Mathematics Achievement Scores on Basis of Mathematics Anxiety

Mathematics Anxiety Group	*N*	*M*	*SD*	*t*		
				1	*2*	*3*
High (51-80)	296	21.54	10.69			
Medium (35-50)	743	25.10	10.47	4.91***		
Low (16-34)	613	35.84	10.46	11.52***	17.65***	0

***P < 0.001

Table 9 : Genderwise Comparison of the Achievement Scores on the Basis of Mathematics Anxiety

Mathematics Anxiety	*Group*	*Gender*	*N*	*M*	*SD*	*df*	*t*
High	(51-80)	Male	108	20.53	9.38	294	1.31
		Female	188	22.22	11.41		
Medium	(35-50)	Male	391	25.19	10.90	10.90	0.25
		Female	352	24.99	9.96	9.96	
Low	(16-34)	Male	364	36.23	10.95	611	3.18***
		Female	249	33.54	9.30		

*P < 0.001

Further, on doing genderwise comparison of mathematics achievement scores on the basis of mathematics anxiety (Table 9), it is evident that there is a significant difference in the mean scores of male and female students of Low anxiety group (M = 36.23, SD =10.95 and M = 33.54, SD = 9.30 respectively) showing females have less mathematics achievement compared to males in this group. Whereas there is no significant difference found in the male and female students of High and Medium anxiety groups.

Discussion

On the basis of population distribution the result indicates, that the Medium and Good achievement group together comprise of a little more than half of the population of students (52.25%) while the Low achievement group has one third (33.89%) of total population, further only 13.86 per cent of total population is observed in excellent achievement group, in which male population is more than double that of females. In comparison to other schools, the largest population of low achievers is found in Government and Government Aided Schools.

The variables under study in the present investigation are school types, gender and mathematics anxiety. The findings in relation to the first hypothesis revealed that the combination of school type and mathematics anxiety predicted the mathematics achievement of the students (42%). School type has the greatest influence on their mathematics achievement (46%), this is followed by mathematics anxiety and gender shows no significant influence on mathematics achievement.

On comparing the mathematics achievement on the basis of type of management of schools, the study reveals that the mean achievement scores vary on a continuum of low (Government and Government Aided, 16.34 & 20.55) to high (Missionary and A.M.U., 35.78 & 35.90), with Hindu and Muslim Managed sliding in between (30.38 & 31.52). In fact greatest influence of school type on mathematics achievement was well supported by the study of Fuller (1987) where the researcher showed that the inclusion of developing countries such as India, Chile or South Africa actually changed the strength and direction of school-related factors on student achievement from little or non-existent to a strong and positive relationship. Similarly, as Werf, Creemers, Jong and Klaver (2000) suggested, in Western countries, large differences in student achievement were noted between students from different socio-economic backgrounds. However, in developing countries such

differences were much smaller. Han (2009) in his study reported similar results, where school quality and size were correlated with mathematics achievement and independent schools were seen to have higher mathematics achievement compared to public schools. Further, Kingdon (1999), Govinda and Varghese (1993) found that private unaided schools are better quality and strongly associated with higher achievement.

The disparity among different types of school can be due to significant disparity of socio-economic status of students which again can be visualised on the same continuum of low (Government and Government Aided) to high (Missionary and A.M.U.), with Hindu and Muslim managing somewhere in between. Coleman et. al. (1966) and Jencks (1972) concluded that schools bear little influence on student's achievement and home background has much more powerful influence. Coleman (1966) also reported that the social composition of the student was highly related to student's achievement. Thus the disparity in the results of school types can be attributed to the known fact that students of high socio-economic status (Missionary and A.M.U. in this study) can indulge in home coaching, enriched home environment such as tutorials disks and video programme, good library, computer facilities, good friend circle and better state of mental health. While students of low socio-economic status (Government and Government Aided in this study) can only hope for such luxuries.

Another interesting result coming from the analysis of this particular variable, i.e. types of school, is that female students of Missionary and A.M.U. managed schools have significantly low level of mathematics achievement in comparison to their male counterparts. While female and male students of Government and Government Aided schools and Hindu and Muslim Managed schools show no significant difference which can be nothing but just a trend.

The gender based results of this study show female as less achievers in mathematics compared to their male counterparts. This result is consistent with findings of many empirical studies showing that boys tend to outperform girls in mathematics achievement (Battista, 1990; Fennema and Carpenter, 1981; Wood, 1976). In contrast, Opdenakker et. al. (2002), reports that proportion of girls was positively related to mathematics achievement. Further, Anderson et. al. (2006) reported that relationship between student gender and mathematics achievement was weak and mixed. In the mathematics content domain males tend to do better than females and in mathematics problem domain females tend to do better than male.

This study finds a negative correlation between mathematics achievement and mathematics anxiety, which is consistent with previous studies on mathematics achievement and anxiety (Dutta and Dutta, 1994; Hembree, 1990; Karimi and Venkatesan, 2009; Ma, 1999; Reglin, 1990; Satake and Amato, 1995; Woodard, 2004; Zakaria and Nordin, 2007). There is significant corresponding relationship among the three sub-groups of mathematics anxiety and mean achievement (High 21.54, Medium 25.10 and Low 35.84). This indicates that high anxiety will result in academic drop down of scores while on other hand low anxiety will lead to academic boost. This result is corroborated by various researches on the subject of mathematics achievement and mathematics anxiety. For example, Lafferty (1996) and Miller (1991) working on the samples of elementary school students find that those with higher achievements in mathematics have lower degree of anxiety towards mathematics, while Norwood (1994), Ma and Xu (2004) and Yuksel-Sahin (2004) find the same results working on the sample of high schools and university students.

In conclusion, this study give evidence that the type of management has strong correlation with mathematics achievement, Missionary and A.M.U. Managed ones show high level of achievement in comparison to other types of schools. In general the study also provides evidence for the fact that males have more mathematics achievement than the female counterparts and not only that males of particular type of management (Missionary and A.M.U.) have more achievement in comparison to the same sex students. Last but not the least there is very significant negative correlation (–0.48) between mathematics achievement and mathematics anxiety.

Suggestion

The fundamental problem that arises from this study and other like this is how we can make an increment in mathematics achievement of students so that they can be a success in all spheres of life. The variables effecting mathematics achievement in this study are school types, gender and mathematics anxiety. A cursory glance at Table 4 and 5 hints at a latent variable that might be contributing towards mathematics achievement. From the previous studies it is well known that the socio-economic status both helps and deters mathematics achievement level among students. The students from Missionary and A.M.U. managed schools have fairly high socio-economic status, this contributes to the reason of high achievement by these students

compared to the low achievement by students of Government and Government Aided Schools who fall on very low level of socio-economic strata. This might suggest that all the students of high socio- economic status enjoy same level of mathematics achievement due to their background and surrounding but in reality, it is not the case. Female students show disparity from their male counterparts in high socio-economic status grouping of Missionary and A.M.U. schools. Therefore, the question arises what is the latent effect, which is manifesting itself under various forms cutting across socio-economic status groupings.

The latent variable can be the network effect. Network effect is used extensively in social science from psychology to business studies. Network theory posits that the network in which we are in effects us in variety of way. Educationist working on network theory have proportioned that a students network usually consists of his family, friends community and school. If we apply this line of thinking in our present study, we will immediately find that the network of students from schools like Missionary and A.M.U. is far higher than the network of students from Government and Government Aided Schools. Again, the females of Missonary and A.M.U. schools have significantly less mathematics achievement from their male counterparts. This could be due to the fact that in spite being formally in the same network males and females in these schools do not enjoy the same "network effect".

This phenomenon is not hard to pin down as theorists have long proportioned that it is not only the network but also the forms of relationships; quality of interactions within the relationships; and the effects, which have the moderating, effect on those inside a network (Astone et. al, 1999). Applying these three dimensions to our present school context, we can infer that male and female in our settings might not be having same "forms of relationship" in schools like Missionary and A.M.U. Another factor could be that males have more activated relationships than females. For example, males might be asking and interacting more with their teachers and parents while females might not be so open and hesitant to ask or interact more with other members of their network. Therefore, the quality of relationships and interactions vary among males and females, and relationships with different qualities will eventually, to various degrees, increase or decrease mathematics achievement among them.

If this is the case, then what explains the effect that there is no significant difference among low achieving males and females of single sex Government and Government Aided schools and moderate male

and female achievers in co-educational Hindu and Muslim Managed schools. One reason could be that both the males and females of Government and Government Aided single sex schools are at lowest level of mathematics achievement and co-educational Hindu and Muslim Managed schools are found in middle position in case of achievement therefore any gender effect arising due to network effect cannot change the results much.

Now we are in far better position to suggest practices, procedures and other routines that might help low achievement students cutting across school type and gender. To start with, since it has become clear that one of the lateral reasons could be that even in high socio-economic status females are not enjoying the network benefit of their high socio-economic network. This phenomenon since deals with informal settings should also be dealt more informally by creating environment where females feel free to increase their interaction level with other non-female members of their networks. This environment can be created by educating both the teachers and parents of female students and making them aware of the special needs of female students as well as encouraging females to have healthy, more frequent and quality relationship with their male counterparts. This could mean assigning high achiever males mentoring responsibility towards their low achiever female counterparts.

While in the case of school effect where we find Government and Government Aided School students far ahead low achiever than others, it needs lot of extra effort on the part of both the management of these schools as well as some kind of social responsibility initiative shown by schools like A.M.U. and Missionary. A closer interaction between these schools could possibly create both formal as well as informal channels of network at all levels from the management, teachers as well as students. Frequent interaction and special mathematics meets among these different background students can help Government and Government Aided schools students appreciate the beauty of mathematics and possibly help boosting the achievement.

Moreover, teachers must re-examine traditional teaching methods that often do not match the students learning styles and teaching skills need to be productive in society. Lessons must be presented in a variety of ways. Mathematical concepts should be taught through play acting, cooperative groups, visual aids, CAI (Computer Aided Instruction). Teachers and parents should be made aware of the use of technology such as software programming for learning and doing

mathematics and use of various mathematical CD's. Parents should also maintain an active role when encouraging their children to incorporate mathematics into their daily routine. Parents and teachers can also help students realise, that myths such as the general feeling that mathematics aptitude is genetic and mathematics is a male domain, is simply not true.

REFERENCES

Abiam, P. O. and Odok, J. K. 2006. Factors in students' achievement in different branches of secondary school mathematics. **Journal of Education and Technology,** 1(1), 161-168.

Akinsola, M. K. and Tella, A. 2003. Effectiveness of individualistic and cooperative teaching strategies in learning and cooperative teaching strategies in learning geometry and problem solving in mathematics among junior secondary schools in Nigeria. **Personality Study and Group Behaviour,** 23, 95-105.

Anderson, J. O., Rogers, W. T., Klinger, D. A., Ungerleider, C., Glickman, V. and Anderson, B. 2006. Student and school correlates of mathematics achievement: models of school performance based on pan-Canadian student assessment. **Canadian Journal of Education,** 29(3), 706-730.

Astone, N. M., Constance, A. N., Schoen, R. and Kim, Y. J. 1999. Family demography, social theory, and investment in social capital. **Population and Development Review,** *25,* 1-31.

Battista, M. T. 1990. Spatial visualisation and gender differences in high school geometry. **Journal for Research in Mathematics Education,** 21, 47-60.

Chui, L. H. and Henry, L. L. 1990. Development and validation of the mathematics anxiety scale for children. **Measurement and Evaluation in Counselling and Development,** 23, 121-127.

Coleman, J. S. 1966. **Equality of Educational Opportunity Study (EEOS).** Inter-University Consortium for Political and Social Research (ICPSR) 06389-v3

Cooper, S. E. and Robinson, D. A. G. 1989. The influence of gender and anxiety on mathematics performance. **Journal of College Student Development,** 30, 459-461.

Crosnoe, R., Johnson, M. K. and Elder, G. H. 2004. Intergenerational bonding in school: The behavioural and contextual correlates of student-teacher relationships. **Sociology of Education,** 77, 60-81.

Dutta Roy, B. and Dutta Roy, D. 1994. Mathematics preference, anxiety and achievement motivation. **Psychological Studies,** 39(1), 34-36.

Eamon, M. K. 2005. Social-demographic school, neighbourhood and parenting influences on academic achievement of Latino young adolescents. **Journal of Youth and Adolescence,** 34(2), 163-175.

ENGELHARD, G. 1990. Mathematics anxiety, mother's education and the mathematics performance of adolescent boys and girls: Evidence from the United States and Thailand. **Journal of Psychology,** 124, 289-298.

FENNEMA, E. AND CARPENTER, T. P. 1981. Sex related differences in mathematics achievement and related factors: A further study. **Journal of Research in Mathematics Education,** 9, 189-203.

FENNEMA, E. AND SHERMAN, J. 1978. Sex-related differences in mathematics achievement and related factors: A further study. **Journal of Research in Mathematical Education,** 9, 189-203.

FRARY, R. B. AND LING, J. L. 1983. A factor-analytic study of mathematics anxiety. **Educational and Psychological Measurement,** 43, 985-993.

FRIEDMAN, L. 1989. Mathematics and the gender gap: A meta analysis of recent studies on sex differences in mathematics tasks. **Review of Educational Research,** 59(2), 185-213.

FULLER, B. 1987. What school factors raise achievement in the third word? **Review of Educational Research.** 57(3), 255-292.

GOVINDA, R. AND VARGHESE, N. V. 1993. Quality of primary schooling in India: A case study of Madhya Pradesh, Paris: International Institute for Educational Planning, and New Delhi: National University of Educational Planning and Administration (NUEPA).

HADFIELD, O. D. AND MADDUX, C.D. 1988. Cognitive style and mathematics anxiety among high school students. **Psychology in the Schools,** 25(1), 33-46.

HAN, S. 2009. School quality, school characteristics and mathematics achievement in South Korea and Hong Kong. Paper presented at the annual meeting of the 53rd Annual Conference of the Comparative and International Educational Society. **(www.allacademic.com/meta/p298579-index.html)**

HEMBREE, R. 1990. The nature, effect and relief of mathematics anxiety. **Journal for Research in Mathematics Education,** 21(1), 33-46.

HILTON, T. L. AND BERGLUND, G. W. 1974. Sex differences in mathematics achievement–a longitudinal study. **The Journal of Educational Research,** 67, 232-237.

HUNSLEY, J. 1987. Cognitive processes in mathematics anxiety and test anxiety: the role of appraisals, internal dialogue and attributions. **Journal of Educational Psychology,** 79(4), 388-392.

HYDE, J. S., FENNEMA, E. AND LAMON, S. J. 1990. Gender differences in mathematics performance: a meta analysis. **Psycho Bull,** 107(2), 139-155.

JENCKS, C. S. 1972. **Inequality: A Reassessment of the Effect of Family and Schooling in America.** New York: Basic Books.

KARIMI, A. AND VENKATESAN, S. 2009. Mathematics anxiety, mathematics performance and academic hardness in high school students. **International Journal of Education Science,** 1(1), 33-37.

KINGDON, G. G. 1999. How much do schools matter to pupil achievement in India? **Journal of Educational Planning and Administration.** 12(1), 5-25.

LAFFERTY, J. F. 1996. The links mathematics text, students' achievement and students' mathematics anxiety: A comparison of the incremental development and traditional texts. **Proquest Dissertations and Theses,** 56(08).DAI-A. (Publication No. AAT9537085)

LEDER, G. C. 1992. Mathematics and gender: Changing perspective. In D. A. Grouws (Ed), **Handbook of Research on Mathematics Teaching and Learning,** 597-622. New York: Mcmillan.

LEE, B. Y. 1992. The effects of learner control and adaptive information in mathematics computer assisted instruction on achievement and task-related anxiety (Doctoral dissertation Florida Institute of Technology, 1991). **Dissertation Abstracts International,** 52, 3236A.

MA, X. 1999. A meta-analysis of the relationship between anxiety towards mathematics and achievement in Mathematics. **Journal for Research in mathematics Education,** 30(5),520-540.

MA, X. AND XU, J. 2004. The causal ordering of mathematics achievement: a longitudinal panel analysis. **Journal of Adolescence,** 27(2), 165-179.

MEECE, J. L., WIGFIELD, A. AND ECCLES, J. S. 1990. Predictor of mathematics anxiety and its influence on young adolescents' course enrollment intentions and performance in mathematics. **Journal of Educational Psychology.** 82(1), 60-70.

MILLER, S. F. 1991. A study of the relationship of mathematics anxiety to grade level. Gender intelligence, and mathematics achievement. **Proquest Dissertations and Theses,** 52(04) DAI (Publication No. AAT 9127651)

MORRIS, L. W., DAVIS, M. A. AND HUTCHINGS, C. H. 1981. Cognitive and emotional components of anxiety: Literature review and a revised worry-emotionality scale. **Journal of Counselling and Clinical Psychology,** 35, 332-337.

NORWOOD, K. S. 1994. The effects of instructional approach on mathematics anxiety and achievement. **School Science and Mathematics,** 94, 248-254.

OPDENAKKER, M. C., DAMNE, J. V., FRAINE, B. D., LANDEGHEM, G. V. AND ONGHENA, P. 2002. The effect of schools and classes on mathematics achievement. **School Effectiveness and School Improvement,** 13(4), 399-427.

REGLIN, G. L. 1990. The effects of individualised and cooperative computer assisted instruction on mathematics anxiety for prospective teachers. **Journal of Research On Computing In Education,** 22(2), 404-414. Retrieved February 2, 199, from EBSCO database.

RICHARDSON, F.C. AND SUINN, R.M. 1972. The mathematics anxiety rating scale: psychometric data. **Journal of Counselling Psychology,** 19, 551-554.

SATAKE , E. AND AMATO, P.P. 1995. Mathematics anxiety and achievement among Japanese Elementary School Students. **Educational and Psychological Measurement,** 55, Issue 6.10000-1007.

SCHREIBER, J. B. 2002. Institutional and student factors and their influence on advanced mathematical achievement. **Journal of Educational Research,** 95(5), 274-286.

TSAI, S. L. AND WALBERG, H. J. 1983. Mathematics achievement and attitude productivity in junior high school. **The Journal of Educational Research,** 76, 267-272.

WERF, V., CREEMERS, G. B., JONG, R. AND KLAVER, E. 2000. Evaluation of school improvement through an educational effectiveness model. The case of Indonesia's PEQIP Project. **Comparative Education Review,** 44(3).

WOOD, R. 1976. Sex difference in mathematics attainment at GCE ordinary level. **Educational Studies,** 2, 141-160.

WOODARD, T. 2004. The effects of Mathematics anxiety on Post-Secondary development students as related to achievement, gender, and age. **Inquiry,** 9(1), spring 2004.

YUKSEL-SACHIN, F. 2004. Orta ogretim *ogrencilerinin ve* universite ogrencilerinin matematik korku duzeyleri (Levels of the mathematics worry of high school students and high school students and university students). **Egitim Bilimleri ve Uygulama Dergisi,** 3(5), 57-74.

ZAKARIA, E. AND NORDIN, M. N. 2007. The effects of mathematics anxiety on matriculation students as related to motivation and achievement. **Eurasia Journal of Mathematics, Science and Technology Education. 2008,** 4(1), 27-30.