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Effects of Parental Involvement on Secondary School Students' Mathematics achievement in Assam, India

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ABSTRACT

The purpose of this study is to explore the effects of parental involvement on secondary school students' academic achievements in mathematics. The population consists of all 9th grade students enrolled in secondary schools situated in Karbi Anglong district of Assam. The sample survey method is chosen for the present study. Participants in this study are 900 students studying in 30 secondary schools. Students are studying in class nine in both urban and rural areas in Karbi Anglong district of Assam. There were 460 male students and 440 female students in the survey, 449 male parents and 551 female parents. Regarding cast and community 576 students are from Schedule Tribe, 54 from Schedule Cast and 270 from general category. Out of 900 student participants, 400 studied in rural area and 500 in urban areas. 443 students were from government / govt. aided schools and 457 were from private schools. Two research instruments are developed for the study, one for accessing Parental Involvement in their teenagers' education and the second one to access Mathematical Achievement of students. The collected data are analyzed with the Statistical Package for the Social Sciences version 22.

1. Introduction

Achievements in Mathematics of secondary school students have an influential impact on their performances in higher studies and their future careers. The knowledge of mathematics is indispensable for a wide variety of professions. A number of factors are associated to the performances of school students' Mathematics learning. Parent involvement has a broad research base revealing many evidences to the many potential benefits it can offer in education (Gonzalez-DeHass et. al., (2005). Continuous researches have been done by different researchers and have found that parental involvement is highly correlated to school students' academic achievement in mathematics (Epstein, 1991; Keith, 1991; Christenson et. al., 1992; Galloway & Sheridan, 1994; Ma, X., 2001; McDonnall et. Al. 2010; Wilder , 2013). There is a strong positive relationship between parental involvement and school students' academic achievements (Barnard, 2004; Bower, 2011; Desimone, 1999; Hill & Craft, 2003; Hara & Burke, 1998; Marcon, 1999; Stevenson & Baker, 1987; Christenson et al., 1992; Singh et al., 1995). Despite the prevailing circumstances of cognitive ability, affective inspiring attitudes and cardinal resources that school students use to learn mathematics impact on their achievement (Rodríguez et. al., 2017). According to many researchers, (Akimoff, 1996; Deford, 1996; Edwards, 1995; Mendoza, 1996; Chen & Gregory, 2010; Task-Tate & Cunningham, 2010; Jeynes, 2016; Hood & Lovette, 2002), parental involvement is a critical factor for school students' academic achievements (Akimoff, 1996; Deford, 1996; Edwards, 1995; Mendoza, 1996; Chen & Gregory, 2010; Task-Tate & Cunningham, 2010; Jeynes, 2016; Hood & Lovette, 2002). Gray (1996) established that those students had better achievement that had parental support for mathematic activities without any gender difference.

Parental involvement means parents interaction with their child's school heads or teachers, communication with their children regarding different school activities. NCLB Act (2001) of United States of America parental involvement is "the participation of parents in regular, two-way, meaningful communication involving student academic learning and other school activities". Hoover-Dempsey and Sandler (1997) developed a model summarizing the factors influencing parental involvement at five levels (**Punter**, et. al., 2016). According to them, the decision to become involved, the choice of type of involvement, how involvement influences school outcomes, tempering or mediating variables and student outcomes are five important levels of parental involvement.

2. Review of Literature

In 2009, Nancy E Hill and Diana F. Tyson published a meta-analytic paper on parental involvement in middle school to assess strategies that enhances academic performances. In that paper they found that parents' support on academic activities is positively correlated with achievement. They also found that parental helping in students' home is negatively associated with academic achievements. Singh et al. (1995) carried a research on the effects of parental endeavor for 8th-grade students' education, parent-child communication about school, facilities at home, and parents' involvement in school oriented activities. They applied structural equation modeling method and established that educational expectation of parents was the strongest variable related positively to academic achievements. Fan, X. & Chen, M.(2001) carried out a meta analysis on the effects of parental involvement on students' academic achievements. That study revealed that parents' aspiration-expectation was the strongest factor responsible for children's academic achievements in school whereas, parental home control had the feeble relationship with students'

academic achievement. Fan, X. (2001), Somers. et al. (2008), in their studies of high school students and their families, found that parents' educational aspirations was one of the most strongest variable related to students' academic performance and accelerate their educational growth despite their socioeconomic conditions.

According to McNeal (1999) parental involvement influences their child's academic achievements through home based involvements, school-based involvements and communicating with the school. The academic achievements of those students' are higher whose parents have high academic predictions for their children and, develop and sustain communication with them about the activities of their schools (Castro et.al., 2015).

Fernández-Alonso, R. et. al (2017) found that student's belief of family involvement simulate an important aspect in academic achievements and parents' controlling behaviour exhibits a negative effect on their performances. Shumow et al. (2004) concluded that parents' involvement in school was positively correlated to how skilled students feel during class, their grade attainment and long term academic expectations. Parental expectation have appeared as a variable in many parental involvement studies carried out by different researchers of the world and generally the found that there is a strong correlation with students' academic achievements (Fan & Chen, 2001; Jeyens, 2007; Wilder, 2014). The findings of the study undertook by a Malaysian researcher Zakaria(2013) revealed that "interaction and communication, parenting practices, leisure, openness and acceptance" were the predictive factors and had a positive relationship with parental involvement in education of secondary school students. In a study, Pena (2000) found that parents' school involvement positively correlates school environment and classroom learning. Shumow et al. (2004) concluded that parents' involvement in school was positively related to how skilled students feel during class, their grade attainment and long term academic expectations. Parental expectation have appeared as a variable in many parental involvement studies carried by researchers of different parts of the world and generally the found that there is a strong relationship with students' academic achievements.

McDonnall, et. al (2010) found that parental involvement at school is positively correlated with students' mathematics achievement and parental involvement at home was negatively associated with students' mathematics achievement. According to research work done by Cai . J. etc. al. (2016) , parental involvement is a significant predictor of student mathematics achievement. There exists a strong positive reciprocal influence between parents' mathematics value and students' mathematics achievement in school level (Hong, 2010). The results of the research work done by Vukovic. et al. (2013) indicated that parental involvements influence children's mathematics achievement by reducing mathematics anxiety. Galindo (2012) found that schools' efforts to communicate with and engage families predicted greater family involvement in school and higher levels of student achievement in mathematics. Powell et. al. (2012) indicated that parents' home-based involvement is related to mathematics achievement. According to the findings of Kloosterman et al. (2011), school-based parental involvement positively correlates students' mathematics achievement at the beginning of primary school, but the impact gradually decreases in later years. Dumont et al.(2012) conducted a research work on 8th grade students and found that parents' interference and conflict with their children impacts negatively , but parental support and parental competence positively related to Mathematics achievement.

3. Hypothesis

The following null hypotheses are hereby stated:

H_1 : There is no significant difference between the parental involvement and Mathematics achievement

H_2 : Parental involvement is not a significant factor in the Mathematics achievement of students studying in Government/ Government Aided schools and private Schools.

H_3 : Parental involvement is not a significant factor in the Mathematics achievement of students studying in rural area schools and urban area Schools.

4. Methodology

a) **Selection of sample:** The sample survey method is chosen for the present study. For this purpose a sample of 30 different schools was selected. Participants in this study were 900 secondary school students studying in class nine in both urban and rural areas in Karbi Anglong district of Assam. There were 460 male students and 440 female students in the survey, 449 male parents and 551 female parents. Regarding cast and community 576 students are from Schedule Tribe, 54 from Schedule Cast and 270 from general category. Out of 900 student participants, 400 studied in rural area and 500 in urban areas. 443 students were from government / govt. aided schools and 457 were from private schools.

b) **Research Instruments:** Two research instruments were developed for the study. The first questionnaire was developed to access Parental Involvement (PI) in their teenagers' education. There were two parts in PI scale. Part-A for demographic information of the respondents and the part B-relates to their involvements with education. Part-B of PI scale was scored on a 1-7 Likert-type scale. '1' for 'very strongly disagree'(VSD) and '7' for very strongly agree(VSA). The second questionnaire consists of 20 objective questions of school Mathematics to access Mathematical Achievement (MA) of students. A panel of experts carefully reviewed both the instruments and made necessary adjustments.

c) **Reliability Test:** The instruments were pilot tested on a sample of 120 students and for reliability test Cronbach's alfa were evaluated. The reliability index for PI instrument was found as 0.754. The reliability index for MA instrument was .703. According to

Nunnally, J. C. (1978) both the instruments have acceptable level of reliability.

d) **Factor Analysis:** For validity of research instruments, factor analysis test were done. For PI instrument Kaiser-Meyer-Olkin (KMO) value was 0.788 and for MA instrument KMO value was 0.715.

e) **Analysis of data:** The collected data were analyzed with the Statistical Package for the Social Sciences (SPSS) version 22.

5. Results

The Table – 1 reflects the demographic pattern of the respondents of the present study.

Table – 1

Sample Demographic Data. N=900

Parameter	n	%
Gender (Students)		
Male	460	51.1
Female	440	48.9
Gender (Parents)		
Male	449	49.9
Female	551	50.1
Cast & Community		
ST	576	64.0
SC	54	06.0
General	270	30.0
Domicile		
Rural	400	44.4
Urban	500	55.6
School Authority		
Government	443	49.2
Private	457	50.8
Parents' Education level		
No formal Education	73	08.1
Completed L P School	205	22.8
Completed M E School	188	20.9
Completed High School	266	29.6
Completed Higher Secondary School	138	15.3
Completed Bachelor Degree	26	02.9
Completed Master Degree	4	00.4
Parents' Occupation		
No Job	541	60.1
Own Job	182	20.2
Private Job	128	14.3
Government Job	49	05.4

The one-way analysis of variance (**ANOVA**) was used to determine whether there were any statistically significant differences exist between the means of two or more variables. SPSS (Version 22) is applied on the collected data.

6. Hypothesis H_1

Parental Involvement scale was divided into five factors. Parents Communication with Schools/teachers Factor (CSF), Communication with Teenager Factor (CTS), Personal Development Factor (PDF), Helping with Homework Factor (HHF), and Attitude towards Mathematics Factor (AMF) were the subdivided factors. We calculated the average of the corresponding scores of CSF, CTS, PDF, HHF and AMF to get the scores of PI. There were four items in CSF, five items in CTF, five items in PDF, five items in HHF and four items in AMF as shown in table 02.

Table – 2

Items	Descriptions
CSF1	I contact my teenager's school to get information
CSF2	I regularly attend parent teacher meet at school.
CSF3	I talk to the teachers about my teenager's progress in Mathematics.
CSF4	I contact teachers or school authority for checking attendance of my teenager.
CTF1	I ask my teenager how his/her day was at school.
CTF2	I talk with my teenager about what their life will be like after they complete school education.
CTF3	I talk with my teenager about possible careers they are interested in.
CTF4	I often talk with my teenager about the importance of mathematics to get a better job.
CTF4	I often encourage my teenager to do well in mathematics.
PDF1	I maintain clear rules at home that my teenager should obey.
PDF2	I limit my teenager's T V watching and mobile operating time at home.
PDF4	I teach my teenager how to perform home-living skills.
PDF4	I encourage my child to look at both sides of an issue.
PDF5	I encourage my teenager to be independent in his/her activities.
HHF1	I advice my teenager to do homework regularly, especially in Mathematics.
HHF2	I help my teenager in doing his/her homework, especially in Mathematics.
HHF3	I provide outside tutorial assistance for my teenager in Mathematics.
HHF4	I advice my teenager to practice Mathematics regularly.
AMF1	I think that mathematics is very important in day to day life.
AMF2	I think that mathematics will help my child to get a better job.
AMF3	I think studying mathematics is useful in professional life.
AMF4	I think private couching in mathematics is important for my child's progress

To examine the relation between CSF and Mathematics Achievements of teenagers, ANOVA analysis was applied using SPSS (version 22). The results are shown in the table 3 below.

Table – 3

ONEWAY Achievement by CSF/MISSING ANALYSIS
ONEWAYANOVA
Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	161.797	11	14.709	1.370	.182
Within Groups	9535.732	888	10.738		
Total	9697.529	899			

In the above analysis table we observe that the significance value is 0.182 (i.e. p = 0.182 which is greater than 0.05, and therefore, the relation between CSF and Mathematics Achievement is not statically significant.

The relationship between Communication with Teenager Factor (CTS) and Teenagers Mathematics Achievement is reflected in the table No: 04

Table- 04

ONEWAY Achievement by CTF/MISSING ANALYSIS
ONEWAYANOVA
Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	286.167	15	19.078	1.792	.032
Within Groups	9411.362	884	10.646		
Total	9697.529	899			

The above analysis Table: 04 show that the significance value is 0.032 (i.e. p = 0.032 which is below 0.05, and therefore, the relation between CTF and Mathematics Achievement is statically significant.

The relationship between Personal Development Factor (PDF) and Teenagers Mathematics Achievement is reflected in the Table No: 05

Table- 05

ONEWAY Achievement by PDF/MISSING ANALYSIS
ONEWAYANOVA
Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	444.958	14	31.783	3.040	.000
Within Groups	9252.571	885	10.455		
Total	9697.529	899			

The above analysis Table: 05 reflect that the significance value is 0.000 (i.e. p = 0.000 which is below 0.05, and therefore, the relation between PDF and Mathematics Achievement is highly significant.

The effect of Helping with Homework Factor (HHF) and Teenagers Mathematics Achievement is reflected in the Table No: 06

Table: 06

ONEWAY Achievement by HHF/MISSING ANALYSIS
ONEWAYANOVA
Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	196.119	10	19.612	1.835	.051
Within Groups	9501.410	889	10.688		
Total	9697.529	899			

Table: 06 reflect that the significance value is 0.051 (i.e. p = 0.051 which is slightly higher than 0.05, and therefore, the relation between HHF and Mathematics Achievement is statistically not significant.

The relationship between Parents, Attitude towards Mathematics Factor (AMF) and Teenagers Mathematics Achievement is reflected in the Table No: 07

Table: 07

ONEWAY Achievement by AMF/MISSING ANALYSIS
ONEWAYANOVA
Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3640.751	4	910.188	134.497	.000
Within Groups	6056.778	895	6.767		
Total	9697.529	899			

In the above analysis Table – 07 we observe that the significance value is 0.000 (i.e. p = 0.000 which is smaller than 0.05, and therefore, the relation between AMF and Mathematics Achievement is highly significant.

The following Table – 08 reflects the effect of Parental Involvement (Composite effect of CSF, CTF, PDF, HHF & AMF) on Students' Mathematics Achievement in school education.

Table: 08

ONEWAY Achievement by PI/MISSING ANALYSIS
ONEWAYANOVA
Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	898.485	57	15.763	1.508	.010
Within Groups	8799.044	842	10.450		
Total	9697.529	899			

Table – 08 shows that the significance value is 0.010 (i.e. p = 0.010), which is much smaller than 0.05. Therefore, there exists statistically significant relationship between Parental Involvement (PI) in the school Mathematics education of their teenagers and Achievement in Mathematics of teenagers.

Table: 09

ONEWAY Achievement by School_Authority/MISSING ANALYSIS
ONEWAYANOVA
Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	61.462	1	61.462	5.728	.017
Within Groups	9636.067	898	10.731		
Total	9697.529	899			

Significance value is 0.017 (i.e. p = 0.017), which is less than the 0.05 level. Therefore, there exist a significant relationship between the authority of school and the mathematics achievement of students and therefore we may reject the null hypothesis H_2.

Oneway ANOVA was conducted to determine if Mathematics Achievement scores differed as a function of school location (urban or rural). The Table 09 shows the relationship between Mathematics Achievement and school location.

Table: 10

ONEWAY Achievement by Domicile/MISSING ANALYSIS
ONEWAYANOVA
Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	120.213	1	120.213	11.272	.001
Within Groups	9577.315	898	10.665		
Total	9697.529	899			

Significance value is 0.001 (i.e. p = 0.001), which is less than the 0.05 level. Therefore, there exist a significant relationship between the location of the school and the mathematics achievement of students.

This rejects the null hypothesis H3 and can accept its alternative hypothesis that there exists a significant relationship between school location and Mathematics achievements.

7. Discussion and conclusion

In this study the researchers sought to investigate the relationship between parental involvement and academic achievements of students in mathematics. Results from the study show that there exists no significant relationship between parents' communication with school or teachers regarding students' education and mathematics achievement of students (i.e. p = 0.182 > 0.05). Mathematics achievement of teenagers and their parents' communicant with them are significantly related (i.e. p = 0.032 < 0.05. Personal Development Factor if highly correlated with mathematics achievement as the analysis shows that p = 0.000 < 0.05. Parents Attitude towards Mathematics is a significant factor related to mathematics achievement of school students (p = 0.000 < 0.05 . On the other hand parents helping in home work have no effect on mathematics achievement p = 0.051 > 0.05. Table 10 reflects the overall effect of parental involvement on mathematics achievement of students. There exists a significant statistical significance between the variables of parental involvement and students' mathematics achievement.

The study establishes the positive relation between school locations (rural or urban) and students' mathematics achievements p=0.001 which is less than the 0.05 level. Mathematics achievement also depends on the type of authority (government/private) of schools p = 0.017 < 0.05.

We can conclude that, parental involvement is significantly related to mathematics achievement of school students. School location and type of proprietorship of school are another two factors significantly related to mathematics achievement of school students.

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