

# CORRELATES OF MATHEMATICS ACHIEVEMENT OF MALE ADOLESCENTS

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## ABSTRACT

*Students' achievement in mathematics depends upon many factors. This study was based on a survey of secondary school students about their mathematics achievement, parental involvement, classroom environment, attitudes towards mathematics. Sample of the study was 464 male Adolescents selected randomly from private and government schools of Chandigarh. Classroom environment Scale developed by Moos and Trickett (1987) and Parental Involvement Scale and Mathematics Achievement test developed and standardized by the investigator and a scale prepared and standardized by the investigator to examine the attitudes of students towards mathematics at secondary school level were used. Bivariate Correlation coefficients between criterion variable of achievement in mathematics and other predictor variables under study were calculated. Multiple Correlation and Multiple Regression techniques were employed for predicting the contribution of three variables to the variance in achievement in mathematics.*

**Keywords:** Mathematics achievement; parental involvement; classroom environment; attitudes towards mathematics.

Adolescence is a time of optimism and idealism. It is a time of dream regarding the future prospects and a time when a great number of adolescent people formulate choices that have vital bearing on the rest of their life. Adolescence is the period when the person becomes able to analytically formulate hypotheses and test them and create rational evaluation. Adolescence is a middle phase from childhood to adult age, where biological, social and cognitive changes occur rapidly. Physical division and the establishment of physical independence from the parents mark the adolescent's conversion to adulthood. Even then parents appear to be playing a very vital role in molding their children's nature, personality, vocation and expansion in education. According to The U.S Department of Education, adolescents do significantly better in school when their parents are regularly involved in their educational endeavors (Coconi, 2014).

Various demographic, social, economical and educational factors that are related to students' math

achievement continue to be of great concern to the educators and researchers. A growing body of research provides additional factors which could have an impact on students' achievement such as gender, family structure, parents' educational level, socio-economic status, parent and student attitudes toward school, and parent involvement (Campbell, Hombo and Mazzeo, 2000; Epstein, 1991; Fennema and Sherman, 1986; Fluty, 1997). As mathematics is the gatekeeper of many careers, good performance in mathematics is needed at all levels of school education. In spite of all this importance given to mathematics in the society, there exist low levels of mathematics attainment of students at every level of the education. This has given many educators/stakeholders a high level of concern (Ajayi, Lawani, and Adeyanju, 2011). Its knowledge is essential for the understanding of various other subjects and living life better. Mathematics being an important and compulsory subject in the school curriculum remains a potential area of research work.

Sarahkathryn (2005) explored the factors

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associated with the mathematics achievement of six tenth-grade African American students. Using observations and interviews, six African American students were followed through their tenth grade year in mathematics class. The students' success in mathematics was found to be linked to self-confidence, self-motivation, parental influence and school mathematics placement and assessment practices, teacher support and expectations, and classroom procedures and practices.

Strayhorn (2010) examined the role of schools, families and psychological variables on math achievement of Black high school students. Results showed that locus of control, gender, parental involvement and teacher perceptions and opportunity to learn influences Black students' mathematics achievement.

Kleanthous and Williams (2010) studied perceived parental influence on students' mathematical achievement, inclination to mathematics and dispositions to study further mathematics, among 563 students in Cyprus. It was found that perceived parental influence had a statistically significant effect on students' inclination to mathematics, but it did not have a statistically significant effect on students' mathematics achievement and dispositions to study further mathematics in higher education.

Chimuanya (2013) investigated the students' social classroom learning environment and attitude as correlates of their achievement in mathematics and observed that the students appraised their mathematics classroom learning environment as being social; the students have a positive attitude towards mathematics; there is a significant relationship between students' social classroom learning environment and achievement in mathematics; no significant relationship exists in students' attitude towards mathematics and their achievement in mathematics; teacher support subscale was found to be the most prevailing factor in social classroom learning environment; significant difference exists in urban students' responses and rural students' responses to social classroom learning environment; no significant difference exists in urban

students' responses and rural students responses in attitude towards mathematics; and urban students' performed better in mathematics than rural students.

### Hypotheses

1. There exists a significant positive relationship of achievement in mathematics with parental involvement of ninth class male adolescents.
2. There exists a significant positive relationship of achievement in mathematics with the classroom environment of ninth class male adolescents.
3. There exists a significant positive relationship of achievement in mathematics with the attitude towards mathematics of ninth class male adolescents.
4. Significant variance towards achievement in mathematics of ninth class male adolescents is contributed by parental involvement, classroom environment and attitude towards mathematics.

### Design of Study

A systematic procedure to collect data, which helps to test hypotheses of the study under investigation, was adopted. The method was essentially a descriptive survey method.

### Sample

In the present study, 464 male students of 9<sup>th</sup> grade were selected randomly from 10 private and 10 government schools located in Chandigarh. Two-stage random sampling techniques were employed.

### Results

Data were collected from 464 respondents and were analyzed through SPSS by applying statistical measures i.e. Bivariate Correlation coefficients between criterion variable of achievement in mathematics and other predictor variables under study were calculated. Multiple Correlation and Multiple Regression techniques were employed for predicting the contribution of three variables to the variance in achievement in mathematics.

**Table 1**  
**Correlation of Achievement in Mathematics**  
**with Different Dimensions of Parental**  
**Involvement of Ninth Class Male**  
**Adolescents (N=464)**

| Variables                                 | Achievement in Mathematics |
|---|----------------------------|
| <b>Dimensions of Parental Involvement</b> |                            |
| General welfare                           | 0.209**                    |
| Monitoring                                | 0.331**                    |
| Psychological autonomy                    | 0.221**                    |
| Leisure time activities                   | 0.274**                    |
| Academic growth                           | 0.381**                    |
| Parental involvement (total)              | 0.423**                    |

\*\* Significant at 0.01 level

\* Significant at 0.05 level

Entries made in Table 1 show that achievement in mathematics of male adolescents has positive and significant relationships with different dimensions of parental involvement i.e. general welfare, monitoring, psychological autonomy, leisure time activities, academic growth and total parental involvement.

A positive and significant correlation between achievement in mathematics and general welfare dimension of parental involvement indicates that the more the parents fulfill the requirements of their children, and make sacrifices to keep them happy, the higher is their achievement in mathematics. A positive and significant correlation of the monitoring dimension of parental involvement with mathematics achievement of male adolescents, suggests that the more parents monitor the whereabouts of their children, the type of friends they have, the higher is the achievement in mathematics of male adolescents.

Results recorded in Table 1 show a positive and significant correlation between mathematics achievement of male adolescents and psychological autonomy dimension of parental involvement. It suggests that the higher the freedom is given to adolescents to make decisions in their work, the higher is their achievement in mathematics. This table further shows a significant and positive relationship of leisure time activities and the dimension of parental involvement with mathematics achievement of male adolescents. It suggests that the more the parents are involved in the recreational activities of

their children, the higher is their achievement in mathematics.

The positive correlation of academic growth dimension of parental involvement with mathematics achievement of male adolescents indicates that the more adolescents are given rewards for showing good performance in studies, the higher they achieve in mathematics. This table also reveals a significant and positive correlation between total parental involvement and mathematics achievement of male adolescents. It indicates that adolescents whose parents are more involved in their activities, score higher in mathematics. Hence, the higher the parents are involved in general welfare, monitoring, psychological autonomy, leisure time activities, and academic growth of their children, the higher is the achievement in mathematics of male adolescents. Hypothesis 1, namely, "There exists a significant positive relationship of achievement in mathematics with parental involvement of ninth class male adolescents" stands verified.

Hypothesis 2: There exists a significant positive relationship of achievement in mathematics with the classroom environment of ninth class male adolescents.

**Table 2**  
**Correlation of Achievement in Mathematics**  
**with Different Dimensions of Classroom**  
**Environment of Ninth Class Male**  
**Adolescents (N=464)**

| Variables                                  | Achievement in Mathematics |
|--|----------------------------|
| <b>Dimensions of Classroom Environment</b> |                            |
| Involvement                                | 0.150**                    |
| Affiliation                                | 0.218**                    |
| Teacher support                            | 0.222**                    |
| Task orientation                           | 0.092*                     |
| Competition                                | 0.241**                    |
| Order and organization                     | 0.163**                    |
| Rule clarity                               | 0.131**                    |
| Teacher control                            | 0.155**                    |
| Innovation                                 | 0.172**                    |
| Classroom environment (total)              | 0.312**                    |

\*\* Significant at 0.01 level

\* Significant at 0.05 level

Results entered in Table 2 show that achievement in mathematics of male adolescents has positive and significant relationship with various dimensions of classroom environment i.e. involvement, affiliation, teacher support, task orientation, competition, order and organization, rule clarity, teacher control, innovation and total classroom environment.

A positive and significant correlation between achievement in mathematics of male adolescents and involvement dimension of classroom environment indicates that adolescents scoring high in involvement dimension of classroom environment also score high in mathematics achievement. This implies that the more adolescents participate in class discussions, and do additional work on their own, the higher is their achievement in mathematics. Further, a significant and positive relationship of affiliation dimension of classroom environment with mathematics achievement of male adolescents also suggests that the more the male adolescents help each other in the home work, the higher is their achievement in mathematics.

The correlation between achievement in mathematics and teacher support dimension of classroom environment was positive and significant. This shows that adolescents, who are supported and trusted by teachers, score high in mathematics. A positive and significant correlation between task orientation dimension of classroom environment and mathematics achievement of male adolescents indicates that adolescents who complete planned activities in the classroom score high in mathematics. A positive relationship of competition dimension of classroom environment with mathematics achievement of male adolescents implies that the higher is the competitive spirit among adolescents, the higher is their achievement in mathematics. A positive and significant correlation between mathematics achievement of male adolescents and order and organization dimension of classroom environment suggests that adolescents who behave

in an orderly and polite manner and organize assignments in an effective way, achieve high in mathematics.

Further, the positive and significant correlation between rule clarity dimension of classroom environment and mathematics achievement of male adolescents suggests that those adolescents, who follow a clear set of rules in the classroom, achieve high in mathematics. A positive and significant relationship between teacher control dimension of classroom environment and mathematics achievement shows that where there is a strict teacher control in the classroom, the achievement of male students in mathematics is high.

Entries made in Table 2 also show a positive and significant correlation between achievement in mathematics of male adolescents and innovation dimension of classroom environment, which suggests that male adolescents of those classes where more innovative techniques are used by teachers to encourage creative thinking among adolescents, score high in mathematics.

The correlation between total classroom environment and mathematics achievement of male adolescents has been found to be positive and significant. This implies that a more favorable classroom environment results in higher mathematics achievement of male adolescents. Thus, it can be concluded that mathematics achievement is significantly related with different dimensions of classroom environment, i.e. involvement, affiliation, teacher support, task orientation, competition, order and organization, rule clarity, teacher control, innovation, and total classroom environment. Hypothesis 2, namely, "There exists a significant positive relationship of achievement in mathematics with the classroom environment of ninth class male adolescents" stands verified.

Hypothesis 3: There exists a significant positive relationship of achievement in mathematics with the attitude towards mathematics of ninth class male adolescents.

**Table 3**  
**Correlation of Achievement in Mathematics**  
**with Different Dimensions of Attitude**  
**towards Mathematics of Ninth Class Male**  
**Adolescents (N=464)**

| Variables   | Achievement in Mathematics |
|---|----------------------------|
| <b>Dimensions of Attitude towards Mathematics</b> |                            |
| Self-confidence                                   | 0.292**                    |
| Motivation  | 0.282**                    |
| Usefulness  | 0.111*                     |
| Teacher's expectations                            | 0.142**                    |
| Enjoyment   | 0.222**                    |
| Attitude towards mathematics ( total)             | 0.279**                    |

\*\* Significant at 0.01 level

\* Significant at 0.05 level

Results reported in Table 3 show that achievement in mathematics of male adolescents has positive and significant correlation with various dimensions of attitude towards mathematics, i.e. self-confidence, motivation, usefulness, teacher's expectations, enjoyment and total attitude towards mathematics.

A positive and significant relationship of self-confidence dimension of attitude towards mathematics with mathematics achievement of male adolescents indicates that adolescents scoring high in self-confidence dimension of attitude towards mathematics, score high in mathematics as well. The positive and significant correlation between the motivation dimension of attitude towards mathematics and achievement in mathematics of male adolescents also indicates that adolescents who have a keen desire to pursue mathematics at higher level, score high in mathematics.

A significant and positive correlation between the usefulness dimension of attitude towards

mathematics and mathematics achievement of male adolescents suggests that male adolescents scoring high in the usefulness dimension of attitude towards mathematics also score high in mathematics. This implies that male adolescents who value the usefulness and worth of mathematics in their life, score high in mathematics. Further, a positive and significant correlation between teacher's expectations and the dimension of attitude towards mathematics and mathematics achievement of male adolescents indicates that adolescents who believe that their teachers have faith in their ability and performance in mathematics, score high in mathematics.

A positive and significant correlation of achievement in mathematics of male adolescents with enjoyment dimension of attitude towards mathematics indicates that those adolescents who enjoy mathematics learning and problem solving, have high achievement in mathematics. In addition, a positive and significant correlation of achievement in mathematics with total attitude towards mathematics of male adolescents points out that attitude towards mathematics plays a vital role in the achievement in mathematics of male adolescents. Hence, Hypothesis 3, namely, "There exists a significant positive relationship of achievement in mathematics with attitude towards mathematics of ninth class male adolescents" stands verified.

#### Hypothesis 4

Hypothesis 4 states, "Significant variance towards achievement in mathematics of ninth class male adolescents is contributed by parental involvement, classroom environment and attitude towards mathematics." To test this hypothesis the values of multiple R and F -Ratios were calculated and entered in Table 4.

**Table 4**  
**R- Values and F- Ratios with regard to Achievement in Mathematics of Ninth Class Male**  
**Adolescents (N=464)**

| Variable | R    | R <sup>2</sup> | % Variance | F- Value  | Step up Regression Equation                                  |
|----------|------|----------------|------------|-----------|--|
| 1.234    | .463 | .215           | 21.5       | 41.902**  | $Y = -18.245 + 0.272^{**}x_1 + 0.245^{**}x_2 + 0.056^{*}x_3$ |
| 1.23     | .455 | .207           | 20.7       | 60.058**  | $Y = -15.679 + 0.303^{**}x_1 + 0.267^{**}x_2$                |
| 1.2      | .423 | .179           | 17.9       | 100.493** | $Y = -8.77 + 0.360^{**}x_1$                                  |

\*\* Significant at 0.01 level \* Significant at 0.05 level

|                                 |       |   |                              |
|---------------------------------|-------|---|------------------------------|
| 1. Achievement in Mathematics   | $x_1$ | = | Parental Involvement         |
| 2. Parental Involvement         | $x_2$ | = | Classroom Environment        |
| 3. Classroom Environment        | $x_3$ | = | Attitude towards Mathematics |
| 4. Attitude towards Mathematics | Y     | = | Achievement in Mathematics   |

First of all, the effect of all the three independent variables i.e. parental involvement, classroom environment and attitude towards mathematics was seen on achievement in mathematics of male adolescents. Table 4 shows that the values of multiple R and  $R^2$  were 0.463 and 0.215 respectively. The analysis of variance for the multiple regression data yielded an F - value of 41.90 which was significant at 0.01 level of significance. Attitude towards mathematics was significant at 0.05 level of significance, whereas, the variable parental involvement and classroom environment were significant at 0.01 level of significance.

Further in the next trial, attitude towards mathematics with least t- value was deleted and the multiple R and  $R^2$  were found to be 0.455 and 0.207 respectively and F- value was found to be 60.058, which was significant at 0.01 level of significance. The contribution of parental involvement and classroom environment was significant at 0.01 level of significance.

Similarly, in the next trial, the classroom environment with the lowest t- value was deleted. In the final run values of multiple R and  $R^2$  were 0.432 and 0.179 and F- value was found to be 100.49 which was significant. Here again the contribution of parental involvement was significant at 0.01 level of significance.

### Discussion of results

Entries made in Table 4 reveal that parental involvement and classroom environment contributed a significant variance towards achievement in mathematics of male adolescents. However, attitude towards mathematics shows slight prediction in achievement in mathematics of male adolescents. 21.5% variance was contributed by the independent variables i.e. parental involvement, classroom environment and attitude towards mathematics towards the criterion variable i.e. achievement in mathematics of male adolescents. 20.7% of the

variance in achievement in mathematics was contributed by parental involvement and classroom environment taken together of which 17.9% of the variance in achievement in mathematics was contributed by parental involvement only.

Parental involvement has the maximum contribution to the prediction (17.9%) followed by classroom environment (2.8%) while attitude towards mathematics has the least contribution (0.8%) to achievement in mathematics of male adolescents. The remaining 78.50% of variance towards achievement in mathematics remains unexplained. This suggests that there are some other variables than parental involvement, classroom environment and attitude towards mathematics which may be highly related to achievement in mathematics of male adolescents.

Thus, the Hypothesis 4, namely, “Significant variance towards achievement in mathematics of ninth class male adolescents is contributed by parental involvement, classroom environment and attitude towards mathematics” has been accepted.

To sum up the discussion of results, it can be concluded that all the dimensions of parental involvement, classroom environment and attitude towards mathematics are significantly related with mathematics achievement of male adolescents. It can be concluded that more parental involvement, the more favorable classroom environment and more favorable attitude towards mathematics result in higher achievement in mathematics of male adolescents.

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