

# CORRELATES OF ACADEMIC ACHIEVEMENT IN A GROUP OF PRIMARY SCHOOL STUDENTS

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## Abstract

The present study attempts to explore the effect of, self-efficacy, intrinsic motivation, locus of control and teachers' perception about students' motivation on their academic achievement for mathematics. Data from a group of 116 class IV students (52 boys and 64 girls) reading in three different primary schools located near northern part of Kolkata, India were collected. Children's Academic Intrinsic Motivation Inventory (Gottfried; 1986), Self-efficacy and achievement measure for mathematics (Ghosh; 2004) and Locus of Control scale (Clifford & Cleary; 1972) were administered on all the students in their classrooms. Apart from this class teachers were also asked to rate each student on four traits to know about their motivation for studies on a five -point scale and school performance record on mathematics were also collected. Significant gender differences were observed with respect to achievement in mathematics and teacher's rating. Boys scored significantly higher than girls in different mathematics tasks whereas teachers perceived girl students to be more attentive, curious and interested for studies. Results of regression analyses indicated that students' performance in mathematics can be efficiently predicted by one's intrinsic motivation for studies, teacher's perception, self-efficacy belief and gender. Internal locus of control was also found to have positive relationship with students' mathematics achievement. Thus, the findings of the study suggest that students' enjoyment for learning, belief about own capabilities and teachers' perception regarding students' interest and persistence in studies can enhance one's academic performance. The study has important implication that teachers' support for students' interests, and relationships through a variety of instructional practices can enhance their self-efficacy and intrinsic motivation which can ultimately lead to success in school functioning.

Keywords: Self-efficacy, intrinsic motivation, locus of control, academic achievement.

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## INTRODUCTION

A topic of great interest to psychologists and educators is the question – what motivates a child to learn. Motivation is a multifaceted concept. Some individuals are motivated from within while some are not. Until the 1960s, educators interested in enhancing student motivation primarily used extrinsic reinforcements to control behavior. But such behavior modification programs make desired effects which are contingent upon performing specified behaviors (for e.g. attentive to studies in the classroom, disciplined, doing homework etc.). At the same time, these techniques have been less effective in producing persistence and generalization of desired behaviors. This approach of extrinsic reinforcing often enhances classroom motivation but ignores the mediating cognitive processes, such as the person's

expectations, knowledge and beliefs that are essential for understanding when such changes will persist or generalize.

The development of cognitive competencies requires sustained involvement in activities. Such pursuits provide mastery experiences needed to build intrinsic interest and a sense of cognitive efficacy when they are lacking. Changing aspirations, time perspectives and social order in the life span of an individual determine how one will structure, regulate and evaluate their lives. Social cognitive theory (Bandura, 1986) analyzes developmental changes in perceived self-efficacy in terms of evolution of human agency across the life span of an individual. Self-efficacy is concerned with judgment about how well one can organize and implement courses of action in situations that may contain novel, unpredictable or stressful elements. According to Bandura (1997) self-

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efficacy refers to an individual's belief about how he or she will be successful at a given task or within a given construct. He further (1997) stated that confidence in future success is based largely on past performance.

### **Academic Achievement and Its Correlates**

Self-efficacy functions as a motivational facilitator for both learning and performance. Motivation, self-regulation, attribution, goal-setting, choice of strategies for attaining goals, feedback etc. are some of the major determinants of self-efficacy. Past researches have indicated that self-efficacy is a strong predictor of academic performance and achievement (Pajares, 1996; Schunk, 1985), and males tend to be more confident than females in subjects like mathematics, science and technology (Pajares and Miller, 1994). Pintrich and Schunk (2002) stated that self-efficacy is a crucial variable for learning and performance of social cognition, motor skills, strategies and behaviors. From the perspective of social learning theory, self-efficacy expectations are proposed to be an important factor influencing attitude toward mathematics and mathematics performance as well as mathematics related educational and career choices (Bandura, 1977, 1982; Hackett & Betz, 1981). Randhawa (1993) found that the effects of mathematics attitude on mathematics achievement were mediated by self-efficacy. Chemers, Hu, & Garcia (2001) in their work on mathematical problem solving have shown that children with higher self-efficacy strived for longer periods and used more effective problem solving strategies than students with lower self-efficacy. Ghosh (2004) also observed that self-efficacy judgments of primary school students about their capabilities to solve mathematical problems have an important effect on subsequent achievement.

Motivation is of great importance to students' academic performance and for overall adaptation to the demands of the school environment. Academic intrinsic motivation involves enjoyment of school learning characterized by a mastery orientation, curiosity, and intrinsic interest for the subject and performance for challenging, difficult and novel tasks. Research evidences reveal that academic intrinsic motivation is a significant factor for children's higher academic achievement and more favorable perceptions of their academic competence

(Gottfried, 1985, 1990; Harter, 1981, 1992; Watkins & Hattie, 1990). Harter and Cornell (1984) found that perceived control is an important correlate of academic motivation. Findings of their study revealed that the intrinsically motivated child would perceive himself / herself to be in control of his / her successes and failures.

Locus of control is a concept which refers to a person's belief about what causes the good or bad results in one's life, either in general or in a specific area such as academics or health. It can be either internal which means that the person himself or herself controls his own life, or it may be external which means that the person believes that fate or luck, or some higher power controls the decisions of his/her life. Persons with a generalized expectancy, that is those who can control reinforcements (internally oriented), have shown higher academic achievement than those who perceive reinforcements as dependent on chance, fate or powerful others i.e., who are externally oriented (Makri-Botsari, 1999; Nowicki & Strickland, 1973). Specific classroom procedures produce greater internality in children, and thus improve academic achievement. Students with high intrinsic motivation, a task orientation and high self-efficacy are found to be relatively active readers and high achievers (Guthrie, Cox, Knowles, Buehl, Mazzoni & Fasculo, 2000). Anderson, Hattie & Hamilton (2005) observed that moderate levels of locus of control and self-efficacy appear to be more adaptive for motivation and achievement than either extremely high or low levels.

Teacher's perception regarding student's motivation for learning is an important indicator to know about students' persistence, interest, curiosity etc. for learning. Teachers know their students better than others. In order to know about this, class teachers are asked to rate each student on several traits namely, curiosity, persistence, attention and interest in mathematics. It was envisaged that this will give an indication of students' motivation for learning.

In view of the above research studies it appears that intrinsic interest, efficacy beliefs, outcome expectancies, motivation etc. operate to give fruitful results i.e. to perform effectively in a given situation. The present study, therefore, wants to investigate:

- The pattern of academic achievement in mathematics of primary school students reading in class IV in different schools of Kolkata, India.
- To find out the pattern of relationship of achievement in mathematics with different indicators like intrinsic motivation, self-efficacy, locus of control and teacher's perception regarding students' motivation for studies.
- To find out the predictors of mathematics achievement.

## **METHOD**

### **Participants:**

Participants of this study were primary school students studying in three different schools located near northern part of Kolkata, India. These three schools were selected randomly from the north zone of Primary schools. After taking permission from the Headmaster/ Headmistress of the schools, the students were approached and tested in their respective classes. There were 116 students present on the day of testing. There were 52 boys and 64 girls reading in class IV i.e. at the terminal stage of primary schooling. The mean age of the students was 9.09 years ( $SD = .75$ ). All the students were from lower middle socio-economic class.

### **Measures:**

Measures used in the study were as follows:

**Self-efficacy measure:** Children's perception of self-efficacy belief for solving mathematical problems on subtraction, division and simplification were measured by using two problems in each of the three areas respectively (Ghosh, 2004). One by one the problems were shown to each student for 10 seconds to know about their self-efficacy beliefs and then efficacy judgment for each problem was taken with the help of a four-point Likert - type scale - ranging from 1 to 4 with verbal descriptors as 1 = not sure, 2 = may be, 3 = pretty sure and 4 = real sure. The children were shown the problems in such a way that they could judge their capabilities to solve the problems. However, they were asked to solve the problems at a later time.

**Achievement test for mathematics:** Achievement test for mathematical problems in the areas of subtraction, division and simplification specially prepared for an earlier study (Ghosh, 2004) was used here. Two problems for each dimension were prepared based on the school syllabus but not from the text-books taught in the schools. These six problems - two each from subtraction, division and simplification were given to the students for solving. There was no time limit but they were instructed to solve the problems as quickly as they can. The maximum possible score was 6 and the minimum was 0.

**Intrinsic motivation:** Academic intrinsic motivation was measured through Children's Academic Intrinsic Motivation Inventory developed by Gottfried (1985). This is a self-report inventory comprising questions for different subject areas and also for general orientation for school learning. In the present study only the general orientation part of the scale was used, which contains 18 items. It measures children's enjoyment for learning and the learning for challenging, difficult and novel tasks on a 5-point Likert scale ranging from strongly agree to strongly disagree. High score corresponds to high intrinsic motivation and low score to low intrinsic motivation.

**Teacher's perception regarding student's motivation:** It is important to know about students' persistence, interest, curiosity etc. in learning from teacher's perspective. In order to know this class teachers were asked to rate each student on four traits namely, curiosity, persistence, attention and interest in mathematics on a five-point scale. The composite score for this ranged from 4 (minimum) to 20 (maximum).

**Locus of Control:** A child's tendency to internalize or externalize was measured by a locus of control scale developed by Clifford and Cleary (1972). There are 15 items in the scale with Yes / No response format. Children were asked to state whether they were responsible for how well they did in school, or believe that the cause of their success or failure was outside their control. "Internalizers" perform better academically than those who are "externalizers". A high score indicates "internalization" and low score "externalization".

**School Performance for mathematics:** Students' performance in mathematics in the last annual examination of the school was also taken as an indicator of achievement in mathematics. Therefore, marks were collected from the schools for each student. All the marks were converted into 100 to make uniformity among the marks obtained from different schools.

Besides these measures, some biographical information like age, gender, socio-economic status etc. were also collected. Initially rapport was established with the students and then the data were collected in the classroom of the respective schools.

## RESULTS

### Pattern of Achievement in Mathematics and its Correlates by Gender:

Pattern of responses on mathematical tasks and its different correlates were calculated separately for boy and girl students and are shown by computing means and SDs. T-tests were also calculated to find out if there are any significant differences between boys and girls. The results are presented in Table-1

Table 1: Means, SD and t-value for different variables

	Boys n=52		Girls n=64		t-value (df: 114)
	Mean	S.D	Mean	S.D	
Achievement-Math (AM)	4.23	1.50	3.44	1.34	2.97**
Self-efficacy (SE)	16.67	1.77	16.72	1.81	.15
Intrinsic motivation (IM)	64.04	7.20	61.27	8.64	1.88
Locus of control (LOC)	10.25	1.20	10.41	2.25	.49
Teacher rating (TR)	14.60	3.40	16.36	3.27	2.84**
School Performance (SP)	45.96	26.50	51.25	20.11	1.88

\*\* p < .01

Significant gender differences were observed with respect to achievement in mathematics and teacher's perception regarding student's motivation for learning. Boys scored higher in mathematics achievement whereas teachers rate girl students as having higher persistence, curiosity, interest and attention for learning. The effect size was found to be .55 for achievement in mathematics and thus indicating moderate difference between boys and girls student, and with respect to teacher rating it was found to be .53 which also shows that girl students are more motivated for studies than boys. But no significant gender difference was observed with respect to school performance in mathematics though the girl students scored somewhat higher than the boys.

### Relationship of Achievement in Mathematics with Different Correlates:

It is assumed that student's achievement in mathematics will be related with different psychological attributes or indicators. Pearson product-moment correlation coefficients were calculated among the variables used in the study for boys, girls and the total group respectively and the results are presented in Table – 2.

Table 2: Correlation Coefficients of Achievement in mathematics and School performance with Different Variables (Boys & Girls)

Variables	Total Group n=116		Boys n= 52		Girls n= 64	
	AM	SP	AM	SP	AM	SP
SE	.24**	.41**	.10	.48**	.40**	.35**
IM	.35**	.37**	.28*	.32*	.37**	.50**
LC	.16	.28**	.33*	.18	.04	.38**
TR	.27**	.50**	.23	.40**	.48**	.59**

\*p <.05 \*\* p< .01

The results reveal that achievement in mathematics is significantly related with one's intrinsic motivation, teacher's perception about students' motivation and with self-efficacy beliefs, though the relationship with self-efficacy belief in case of boys is somewhat mild. Internal locus of control was also found to be significantly related with academic achievement in case of boys but not for girls. School performance in mathematics is also strongly related with one's self-efficacy belief, intrinsic motivation, teacher's rating and locus of control.

motivation can predict one's achievement in mathematics (both for specially constructed test and school marks). Stepwise regression analyses were conducted by taking intrinsic motivation, self-efficacy, locus of control, teacher's rating and gender as predictors and achievement in mathematics as criterion variable. Tables 3&4 show the results of regression analyses.

**Predictors of Mathematics Achievement:**

Next, we wanted to know whether these attributes namely, intrinsic motivation, self-efficacy, locus of control and teacher's perception about student's

Table 3: Significant Predictors of Achievement in Mathematics (specially constructed test)

Steps	Significant Predictors	Std. Beta	R <sup>2</sup> change	F-change	p-value
Step-I	Intrinsic Motivation	0.353	0.125	16.267	0.000
Step-II	Intrinsic Motivation Gender	0.316 -0.216	0.045	6.187	0.014
Step-III	Intrinsic Motivation Gender Teacher Rating	0.249 -0.305	0.080	11.945	0.001
Step-IV	Intrinsic Motivation Gender Teacher Rating Self-Efficacy	0.193 -0.323 0.321 0.214	0.043	6.750	0.011

Table 4: *Significant Predictors of School Performance in Mathematics*

Steps	Significant Predictors	Std. Beta	R <sup>2</sup> change	F-change	p-value
Step-I	Teacher Rating	0.497	0.247	37.38	0.000
Step-II	Teacher Rating	0.510	0.183	36.23	0.000
	Self-Efficacy	0.428			
Step-III	Teacher Rating	0.473	0.038	8.04	0.005
	Self-Efficacy	0.379			
	Intrinsic Motivation	0.204			

Results presented in the above tables indicate that intrinsic motivation is the most significant predictor for specially constructed test for mathematics achievement. Gender is also another important indicator of achievement, along with teacher's rating and self-efficacy belief. Stepwise regression analysis for school performance in mathematics reveals that teacher's perception regarding students' motivation is the most significant predictor followed by self-efficacy and intrinsic motivation. This shows that the teachers are well acquainted with the students' motivation for studies. It also indicates that self - confident and intrinsically motivated students perform better in mathematics examination.

## DISCUSSION

The findings of the present study reveal that boy and girl students significantly differ with respect to academic achievement in mathematics. Boys scored significantly higher than the girls thus suggesting that boys have more academic competence for mathematics.. This may be due to the fact that the boys grasp the rules of mathematics better than the girls. Previous researches have also indicated that males tend to be more confident than females in academic areas related to mathematics, science and technology (Pajares & Miller, 1994). On the other hand, teachers perceived that the girl students are much more motivated, interested and persistent in studies than the boys. This may have happened as because the boys in this younger age are diverted to other areas specially in playing games.

The correlation patterns obtained in this study reveal strong to moderate positive correlations of academic competence with academic intrinsic motivation, self-efficacy, teacher's perception for students' motivation and internal locus of control. The pattern of these correlations is consistent with the earlier findings (Gottfried, 1990; Harter, 1981, 1992; Harter &

Cornell, 1984; Watkins & Hattie, 1990) which found that perceived scholastic competence was related strongly to academic intrinsic motive, teacher's perception, self-efficacy and internal locus of control. Intrinsic motivation, teacher's perception, self-efficacy and gender of the student were observed to be important determinants of academic achievement.

Thus, we can interpret the findings in a way that children who enjoy learning challenging tasks, show task persistence, and strive to learn more, have higher academic performance in mathematics. Moreover, these students' self perceptions about their capabilities to solve mathematical problems are reflected in their subsequent achievement (Ghosh, 2004). The study also revealed that academic achievement is positively related with internal locus of control. This is because the internals attribute success to one's ability and effort whereas externals believe in luck or fate for any outcome. This finding is in accordance with the earlier findings of Makri-Botsari (1999) and Nowicki and Strickland (1973).

It can be concluded from the findings of the study that intrinsic motivation for mastery orientation, curiosity, preference for challenging and novel tasks can be correlates of academic competence particularly for mathematics. In addition, one's belief about own capabilities and effort can also predict one's academic achievement. The findings also indicated the important role of a teacher in judging the motivation of students.

The study has significant implication for school functioning. Students' orientation and motivation toward academic achievement and confidence in their own capabilities can be enhanced through proper guidance and counseling. Parents and teachers can play important role in this respect. Parental warmth, supportiveness, and encouragement are important for developing confidence, internal locus of control and

intrinsic interest for studies. Teachers can promote intrinsic motivation and foster mastery orientations. Thus, through effective instructional practices student's beliefs about their capabilities and expectations for success in schools can be enhanced which may lead to fruitful learning.

## ACKNOWLEDGMENT

The author gratefully acknowledges the assistance received from Dr. Rituparna Basak during data collection.

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