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A study of achievement in mathematics of ninth class adolescents with regard to gender and type of school

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Abstract
This study was based on a survey of secondary school students' mathematics achievement. Students of both the gender constitute the population of this study. Sample of the study was 925 students i.e. 453 government school students (223 males and 230 females) and 472 private school students (241 males and 231 females) of 9th grade selected randomly from 10 private and 10 government schools located in Chandigarh. Mathematics achievement test prepared and standardized by the investigator to examine the mathematics achievement of male and female students at secondary school level was used. Descriptive statistics and t-test with $P < 0.05$ level of significance were used for data analysis. Significant differences were found between government and private school adolescents with regard to achievement in mathematics. Government school male and female adolescents differ significantly, however Private school male and female students do not differ with regard to achievement in mathematics.

Keywords: mathematics achievement, gender, government school, private school

1. Introduction
The world today, which leans more and more heavily on science and technology, demands more and more mathematical knowledge on the part of more and more people and the world of tomorrow will make still greater demands on a person to be 'well educated' in the technological society of today, and as such he or she should have some degree of mathematical literacy (James, 2008) [6]. Mathematics provides language to sciences and is imperative for thought, logical reasoning and progress. It releases the mind and also gives individuals an appraisal of the intellectual abilities by pointing towards course of improvement. It is the basis of all sciences and technology and therefore of all human endeavors (Aminu, 1990) [2]. Mathematics is a subject which provides basis directly or indirectly to almost all subjects. A bank of mathematical brain would help the rational and scientific growth of any society. All scientific education is based on mathematics. Its neglect means to remain ignorant about all the advancements. The knowledge of mathematics is indispensable for a wide variety of professions (Bala, 2006) [4]. No other subject has larger application than mathematics. It is the most significant instrument for understanding and exploring our scientific, economic and social world (Awoniyi, 2013) [3]. In every field of human endeavor the importance of mathematics cannot be underestimated (Tella, 2008) [15]. Because of the wide importance of mathematics and the way in which it is advancing at an amazing rate, it has a persistent influence on our everyday lives and contributes to the wealth of the country. Educators and parents have long considered the role gender plays in the development of attitude toward mathematics and in mathematics achievement (White, 2001) [16]. Gender, socio-economic status, and parents' educational level are various demographic factors which have been predictors of math achievement (Saritas & Akdemir, 2009) [12]. A study through a meta-analysis reveals that males tend to do better on mathematics tests that involve problem-solving, while females tend to do better in computation, and there is no significant gender difference in understanding math concepts (Hyde, Fennema, & Lamon 1990) [5]. Females tend to earn better grades than males in mathematics (Kimball, 1989) [7]. Sarsani and Maddini (2010) [13] studied mathematics achievement of secondary school students in relation to sex, caste, type of school, nativity and medium of instruction and found that girls' performance is better than boys, caste has no influence on performance, locality influences the performance and English medium students perform better than Telugu medium students. Ajai and Imoko (2015) [1] assessed gender differences in mathematics achievement and retention by using Problem-Based Learning (PBL) and revealed that male and female students taught algebra using PBL did not significantly differ in achievement and retention scores. The finding showed that students' achievement and retention in algebra are not dependent on gender, but function of method. Both sexes are capable of competing and collaborating in classroom activities.

2. Materials and Methods
2.1 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 descriptive survey method.

2.2 Sample
In the present study, 925, 9th class students i.e. 453 government school students and 472 private school students selected randomly from 10 private and 10 government schools located in Chandigarh. Two -stage random sampling technique was employed.

2.3 Instruments used for the study
Mathematics achievement test developed and standardized by the investigator comprising 60 items was used for data collection. The reliability coefficient for mathematics achievement test for the final draft was found to be 0.92.

2.4 Statistical techniques used
Descriptive statistics i.e. mean, S.D. and t-test with $P < 0.05$

level of significance were used for data analysis.

2.5 Hypotheses

- There exists significant difference between ninth class government and private school adolescents with regard to achievement in mathematics.
- There exists significant difference in achievement in mathematics of ninth class male and female adolescents studying in government schools.
- There exists significant difference in achievement in mathematics of ninth class male and female adolescents studying in private schools.

3. Results & Discussion

Table 1: Mean Differential between Achievement in Mathematics of Ninth Class Government and Private School Adolescents

Variable	Mean (Government) (N=453)	Mean (Private) (N=472)	SD (Government)	SD (Private)	t – value	Level of Significance
Achievement in Mathematics	31.96	39.02	10.97	13.11	8.85	0.01

Entries made in Table 1 reveal that the mean differential between the mean scores of ninth class government and private school adolescents in mathematics achievement (t-value= 8.85) was significant at .01 level of significance. The significant t-value indicates that the government school adolescents differ significantly from private school adolescents with regard to their achievement in mathematics. Mean score of adolescents in mathematics achievement of private school adolescents is higher than their counterparts in government schools. This suggests that performance of private school adolescents in mathematics is better than those studying in government schools. This can be due to the fact that in private schools there is better learning environment as compared to their government schools.

Hence, Hypothesis 1, namely, "There exists significant difference between ninth class government and private school adolescents with regard to achievement in mathematics" has been accepted. The above results confirm the findings of McKay (2012) [8] who has reported that mathematics achievement differs on the basis of school type.

Table 2: Mean Differential between Achievement in Mathematics of Ninth Class Male and Female Adolescents Studying in Government Schools

Variable	M (male) (N=223)	M (female) (N=230)	SD (male)	SD (female)	t- value	Level of Significance
Achievement in Mathematics	30.21	33.64	10.66	11.03	3.36	0.01

Entries made in Table 2 reveal that the mean differential between the mean scores in mathematics achievement of ninth class male and female adolescents studying in government schools was significant at .01 level of significance. This indicates that male and female adolescents studying in government schools differ significantly with regard to achievement in mathematics. Mean score of female adolescents was higher than the mean score of male adolescents. This suggests that performance of female students in mathematics is better than those of male adolescents studying in government schools.

Hence, Hypothesis 2, namely, "There exists significant difference between ninth class male and female adolescents studying in government schools with regard to achievement in mathematics." has been accepted. Above results are in line with the results by Baskaran (1991); Janet (2008); Sarsani and Maddini (2010) [13]; Petersen (2004), and Strayhorn (2010) who have reported better performance of females than males, but are not in line with the results by Bennet (2001); Choudhury and Das (2012); Karabetian (2000); Mckay (2012) [8], and Prince (2012) [10] who have reported that mathematics achievement is independent of gender.

Table 3: Mean Differential between Achievement in Mathematics of Ninth Class Male and Female Adolescents Studying in Private Schools

Variable	M(male) (N=241)	M(female) (N=231)	SD(male)	SD(female)	t-value	Level of Significance
Achievement in Mathematics	38.06	40.02	13.75	12.36	1.625	NS

Entries made in Table 3 reveal that the mean differentials between the mean scores of female and male adolescents studying in private schools in mathematics achievement is not statistically significant. This indicates that female adolescents do not differ significantly in achievement in mathematics from male adolescents. Hence, there are no gender differences with regard to mathematics achievement of adolescents studying in private schools.

Hence, Hypothesis 3 namely, "There exists significant difference in achievement in mathematics of ninth class male and female adolescents studying in private schools" has been rejected. The above results were contrary to the findings of Ronglien (2013) who has found that boys obtain higher scores on the mathematics test than girls but are in line with the results by Solazzo (2008) [14] and Peters (2013) [9] who reported no gender differences with regard to mathematics achievement.

Thus results conclude that gender did not predict mathematics achievement of private school adolescents. However, government school girls' performance is better than boys in mathematics. Private school students' mathematics performance is better than government school students which can be due to the factors i.e. mathematical competitions, books, their school teachers, socio economic status, and school attendance. Sometimes locality as well as medium of instruction also influence mathematics achievement.

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