Relationship Between Socio-Economic Status And Achievement In Mathematics Of Secondary School Students

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Abstract: This study examines the relationship between parental socio-economic status and the achievement in mathematics of secondary school students, with particular emphasis on the influence of sex and type of school management. The primary objective is to explore how socio-economic status affects students' performance in mathematics and to test the hypotheses formulated accordingly. The Modified Kuppuswamy's Socio-Economic Status Scale (updated by Parul Sood and Supreet Bindra, 2022) was utilized to assess the socio-economic status of the students' families. Mathematics achievement was measured based on students' marks from the previous academic year. The sample comprised 120 Class IX students drawn from government, private aided and private unaided schools located in the Bengaluru North zone of Bengaluru Urban District. Data analysis involved descriptive statistics such as mean and standard deviation, along with an independent samples 't'-test and the coefficient of correlation to determine the relationships and differences between groups. The findings revealed a significant positive relationship between socio-economic status and achievement in mathematics. Furthermore, the results indicated that girls performed better than boys in mathematics, while students from private unaided schools outperformed their counterparts in government and private unaided schools. This disparity in achievement may be attributed to differences in access to educational resources, learning environments and parental support across different socio-economic backgrounds and school types.

Index Terms - Socio-Economic Status, Achievement, Mathematics, Secondary School Students, School Management, Sex

1. INTRODUCTION

Mathematics is considered a foundational discipline in school education, playing a critical role in the cognitive and analytical development of students. It not only fosters problem-solving and logical reasoning skills but also serves as a key determinant of academic and professional success in the modern, technologically driven world (NCERT, 2020). However, performance in mathematics varies considerably among students, influenced by a myriad of socio-cultural and economic factors. In India, where socio-economic disparities are prominent and access to quality education is often unequal, understanding the impact of socio-economic status (SES) on academic achievement, particularly in mathematics, becomes essential.

Socio-economic status, commonly measured through indicators such as parental education, occupation and family income, significantly shapes students' educational experiences and outcomes. Children from higher SES backgrounds typically have access to enriched learning environments, private tuitions, technological resources and parental guidance that positively influence their academic performance (Sirin, 2005; Kumar & Nair, 2020). On the other hand, students from lower SES families may face challenges such as lack of educational support at home, inadequate school infrastructure and financial constraints, which adversely affect their academic progress, especially in subjects like mathematics that require continuous practice and conceptual clarity.

In the Indian education system, the type of school management-government, private aided or private unaided-further compounds the SES-related disparities. While private unaided schools often offer better resources and individual attention, government schools, though intended to serve all socio-economic groups, may not provide equivalent academic support (Tilak, 2018). Moreover, gender continues to play a significant role, with emerging evidence suggesting shifting trends in mathematics performance between boys and girls across different socio-economic backgrounds (Pandey & Pal, 2016).

This study, conducted in the Bengaluru North zone of Karnataka, aims to explore the intricate relationship between SES and mathematics achievement among secondary school students. It also examines the moderating roles of gender and school type, thereby contributing to a more nuanced understanding of educational equity in contemporary India.

2.   REVIEW OF RELATED LITERATURE

A review of related literature is an essential part of any research study. It helps the researcher to understand what has already been studied, identify the gaps in existing knowledge and build a strong foundation for the current investigation. The present study focuses on the relationship between socio-economic status and achievement in mathematics among secondary school students. Hence, this section is divided into two parts: (1) studies related to achievement in mathematics and (2) studies related to socio-economic status.

2.1   Studies Related to Achievement in Mathematics

Several researchers have explored various factors affecting achievement in mathematics. Nandhini (2025) found that mathematics self-efficacy among higher secondary students varied significantly based on gender, type of school and school management. This indicates that internal belief systems and institutional environments influence students' math performance. Bhutta, Ahmad and Ansari (2025) conducted a large-scale study in Pakistan and highlighted how teacher quality, school systems and family background significantly predicted students' math performance. Similarly, Das and Swain (2024) observed a positive relationship between achievement motivation and academic performance among secondary school students, with socio-economic status also playing an indirect role. Yadav (2024) found a strong link between study habits and math achievement among Class 10 students in government schools, with urban students outperforming rural ones. These studies collectively show that both personal traits (motivation, self-

efficacy) and environmental factors (teacher support, school type) significantly affect students' achievement in mathematics.

2.2   Studies Related to Socio-Economic Status

Many studies have also highlighted the influence of socio-economic status (SES) on students' academic and psychological development. Kaur (2025) found that students from higher SES backgrounds showed better emotional, social and academic adjustment, particularly in private schools. Rajendran and Selvaganapathy (2024) reported a significant relationship between SES and academic achievement, with male students showing higher SES levels and better achievement than females. Byiringiro (2024) found that family type (nuclear or joint) strongly influenced mathematics achievement in Ethiopian secondary schools. Bloch (2024) confirmed a significant correlation between parents' SES and their children's academic performance in both government and private schools. Ali and Kumari (2023) explored SES and study habits together and found that students with better study habits and higher SES backgrounds showed improved achievement in mathematics. Aashiq et al. (2023) found that students from families with moderate income and educated parents performed better academically than those from underprivileged backgrounds.

2.3   Overview and Research Gap

The reviewed literature clearly shows that both mathematics achievement and socio-economic status have been studied widely, often in isolation or in broader academic contexts. Factors such as self-efficacy, motivation, study habits, parental education and school type consistently influence students' academic performance, especially in mathematics. However, there is limited research focusing specifically on the combined effect of socio-economic status and school-related variables like sex and school management on mathematics achievement within the Indian urban context, particularly in regions like Bengaluru.

Moreover, while many studies have explored these factors individually, comparative studies analyzing how SES interacts with school type and sex differences in mathematics performance remain scarce. This gap necessitates a focused study to understand the complex interplay of socio-economic and institutional variables influencing mathematics achievement.

3.   SIGNIFICANCE OF RESEARCH

The significance of this study lies in its attempt to bridge the knowledge gap regarding the socio-economic determinants of mathematics achievement at the secondary school level in India-a critical stage in students' academic journey. The findings of this research have substantial implications for educators, policymakers and curriculum designers aiming to foster inclusive and equitable learning environments.

Firstly, the study highlights the urgent need to address socio-economic disparities in Indian classrooms. With evidence pointing to a significant positive relationship between socio-economic status and mathematics achievement, this research highlights the importance of targeted interventions, such as remedial coaching, learning aids and community support for students from underprivileged backgrounds (Mehta & Kapoor, 2021). The use of the updated Modified Kuppuswamy Scale, contextualized for urban Indian settings, adds rigor and relevance to the socio-economic assessment.

Secondly, by revealing differences in achievement based on school management types, the study brings attention to the inequality in educational inputs and outcomes among government, private aided and private unaided schools. These knowledge can inform school improvement policies and resource allocation, particularly under schemes like Samagra Shikshana and the National Education Policy (NEP) 2020, which emphasize holistic and equitable education (MHRD, 2020).

Thirdly, the sex dimension of the study, which shows girls outperforming boys in mathematics, challenges conventional stereotypes and highlights the evolving dynamics of sex and education in India. It calls for further exploration of sex-sensitive pedagogical approaches and encourages support for girls' continued success in STEM fields.

Therefore, this study contributes to the growing body of research emphasizing the socio-economic roots of educational inequality in India. It provides empirical evidence that can support data-driven policymaking and practical educational reforms aimed at enhancing mathematics learning outcomes for all students, regardless of their background.

4. STATEMENT OF THE PROBLEM

The present study is undertaken to investigate the *"Relationship between Socio-Economic Status and Achievement in Mathematics of Secondary School Students."* The research aims to explore how socio-economic factors influence students' performance in mathematics and whether variables such as sex and type of school management play a significant role in this relationship.

5. OBJECTIVES OF THE STUDY

The study is guided by the following specific objectives

1. To examine the relationship between socio-economic status and mathematics achievement among secondary school students.

2. To determine whether there is a significant difference in mathematics achievement between male and female secondary school students.

3. To analyze the differences in mathematics achievement among secondary school students studying in government, private aided and private unaided schools.

6. RESEARCH HYPOTHESES

The study tests the following null hypotheses:

1. There is no significant relationship between Socio-Economic Status of students and Achievement in Mathematics.

2. There is no significant difference in the Achievement in Mathematics between secondary school boys and girls.

3. There is no significant difference in the Achievement in Mathematics among students from government, private aided and private unaided schools.

7. METHODOLOGY

This study examines the relationship between parental socio-economic status and the achievement in mathematics of secondary school students, with particular emphasis on the influence of sex and type of school management. The primary objective is to explore how socio-economic status affects students' performance in mathematics and to test the hypotheses formulated accordingly. The Modified Kuppuswamy's Socio-Economic Status Scale (updated by Parul Sood and Supreet Bindra, 2022) was utilized to assess the socio-economic status of the students' families. Mathematics achievement was measured based on students' marks from the previous academic year. The sample comprised 120 Class IX students drawn from government, private aided and private unaided schools located in the Bengaluru North zone of Bengaluru Urban District. Data analysis involved descriptive statistics such as mean and standard deviation, along with an independent 't'-test and the coefficient of correlation to determine the relationships and differences between groups with the help of SPSS Package and MS Excel. The level of significance was fixed at 0.05 and 0.01 level of confidence in all the cases.

8. DATA ANALYSIS

Data analysis is a crucial part of any research study as it helps in examining the collected information to draw meaningful conclusions. In the present study, statistical techniques were used to explore the relationship between socio-economic status and achievement in mathematics among secondary school students. Descriptive statistics such as mean and standard deviation were used to understand the general performance and background of students. Inferential statistics like correlation and independent 't'-tests were applied to test the hypotheses and identify any significant relationships or differences based on socio-economic status, sex and type of school management. The results of the data analysis are presented and interpreted in the following sections.

Table-1: Shows variables, mean, standard deviation, obtained 'r' value and level of significance related to Socio-Economic Status and Achievement in Mathematics of secondary school students.

Variables	Mean	Standard Deviation
Achievement in Mathematics	79.125	15.550
Socio-Economic Status	24.008	7.935
Obtained 'r' Value and Level of Sig.	0.085[NS]	

N=120; df=118; NS-Not Significant, *Significant at 0.05 level (0.174)

Table-1 presents the descriptive statistics and the correlation analysis between Socio-Economic Status (SES) and Achievement in Mathematics among secondary school students. The mean score for Achievement in Mathematics is 79.125 with a standard deviation of 15.550, indicating a moderate spread of scores around the mean. The mean SES score is 24.008 with a standard deviation of 7.935, showing some variability in the socio-economic background of the students.

The obtained Pearson correlation coefficient ('r' value) between Socio-Economic Status and Mathematics Achievement is 0.085, which is a very low positive correlation. However, this value is not

statistically significant at the 0.05 level (the critical value being 0.174 for df = 118). This implies that the observed relationship could be due to chance and not a consistent pattern in the population. Since the obtained 'r' value (0.085) is less than the critical value and not significant, the null hypothesis is retained. Therefore, there is no significant relationship between the Socio-Economic Status and Achievement in Mathematics among the secondary school students in the sample studied.

Table-2: Independent 't' test results related to Achievement in Mathematics scores of secondary school students with respect to Sex.

Sex	Sample	Mean scores	Std. Deviation	't' Value	Sig. level
Boys	60	73.366	16.584	4.35	**
Girls	60	84.883	12.050		

**Significant at 0.01 level, (N=120; df=118, 0.01=2.62)

Table-2 presents the results of the independent 't'-test conducted to examine the difference in Achievement in Mathematics between secondary school boys and girls. The sample consisted of 60 boys and 60 girls, making a total of 120 students.

The mean score for boys in mathematics was 73.366 with a standard deviation of 16.584, whereas the mean score for girls was 84.883 with a standard deviation of 12.050. This indicates that, on average, girls performed better in mathematics compared to boys, with relatively less variation in their scores. The calculated 't' value is 4.35, which is greater than the critical value of 2.62 at the 0.01 significance level (df = 118). This means the difference in mathematics achievement between boys and girls is statistically significant at both the 0.05 and 0.01 levels.

As the obtained 't' value (4.35) is significant, the null hypothesis is rejected. Therefore, it can be concluded that there is a significant difference in the Achievement in Mathematics between secondary school boys and girls, with girls performing significantly better than boys in this study.
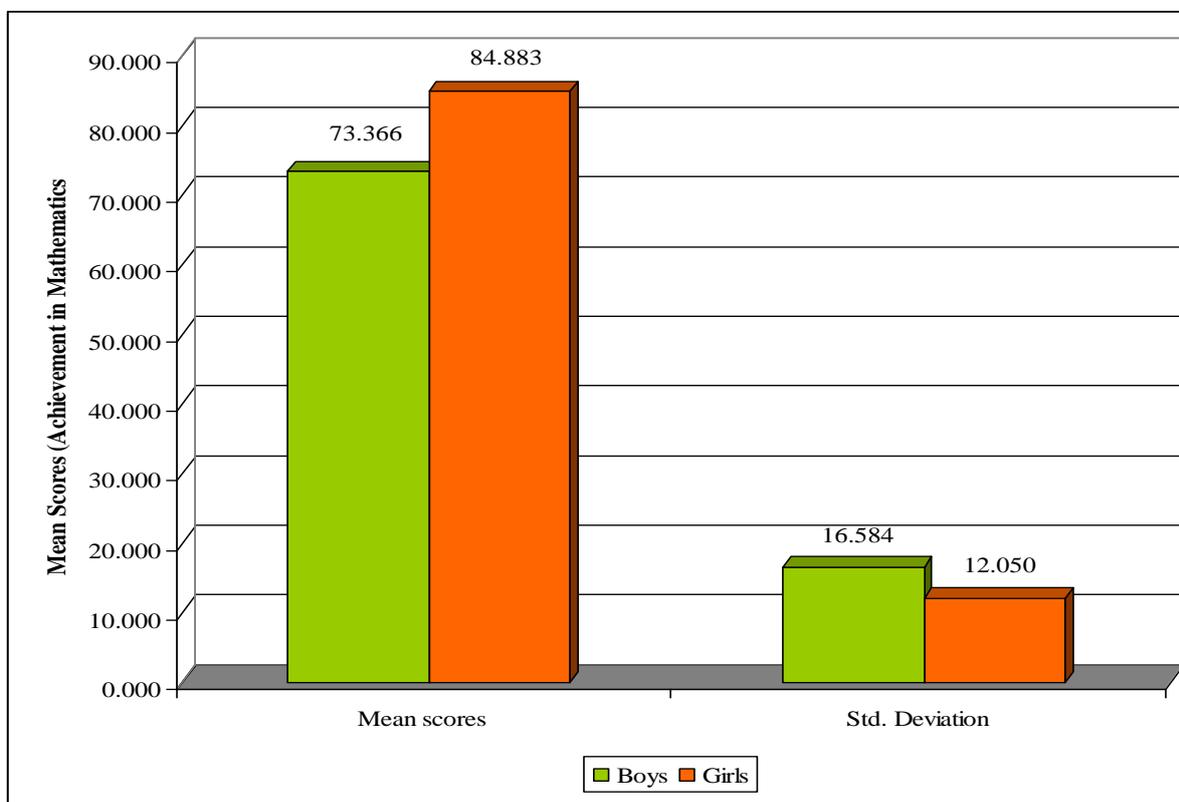
Graph No.1: Bar graph shows comparison of Achievement in Mathematics of secondary school students with respect to sex.

Table-3: Independent 't' test results related to Achievement in Mathematics scores of secondary school students with respect to type of school management.

| Type of School Management	Sample	Mean scores	Std. Deviation	't' Value	Sig. level
Government	40	82.250	15.065	3.77	**
Private Aided	40	68.900	16.524		
Private Aided	40	68.900	16.524	5.92	**
Private Unaided	40	86.225	8.297		
Government	40	82.250	15.065	1.46	NS
Private Unaided	40	86.225	8.297		

NS-Not Significant; **Sig. at 0.01 level (N=80; df=78, 0.01=2.64); *Sig. at 0.05 level =1.99.

Table-3 shows the results of independent 't'-tests conducted to examine the differences in Achievement in Mathematics among secondary school students studying in government, private aided and private unaided schools. Each group consisted of 40 students, making it possible to compare their mean scores effectively.

➤ When comparing government and private aided schools, the mean score of government school students was 82.250 (SD = 15.065), while that of private aided school students was 68.900 (SD = 16.524). The 't' value obtained is 3.77, which is significant at the 0.01 level, indicating that students in government schools performed significantly better than those in private aided schools.

➤ In the comparison between private aided and private unaided schools, the mean score of private unaided school students was 86.225 (SD = 8.297), much higher than the private aided group 68.900

(SD=16.524). The 't' value of 5.92 is also significant at the 0.01 level, indicating that private unaided school students significantly outperformed their private aided counterparts.

➢ Lastly, the comparison between government and private unaided schools shows that private unaided school students (mean = 86.225) had slightly higher scores than government school students (mean = 82.250), but the 't' value of 1.46 is not significant, suggesting that this difference is not statistically meaningful.
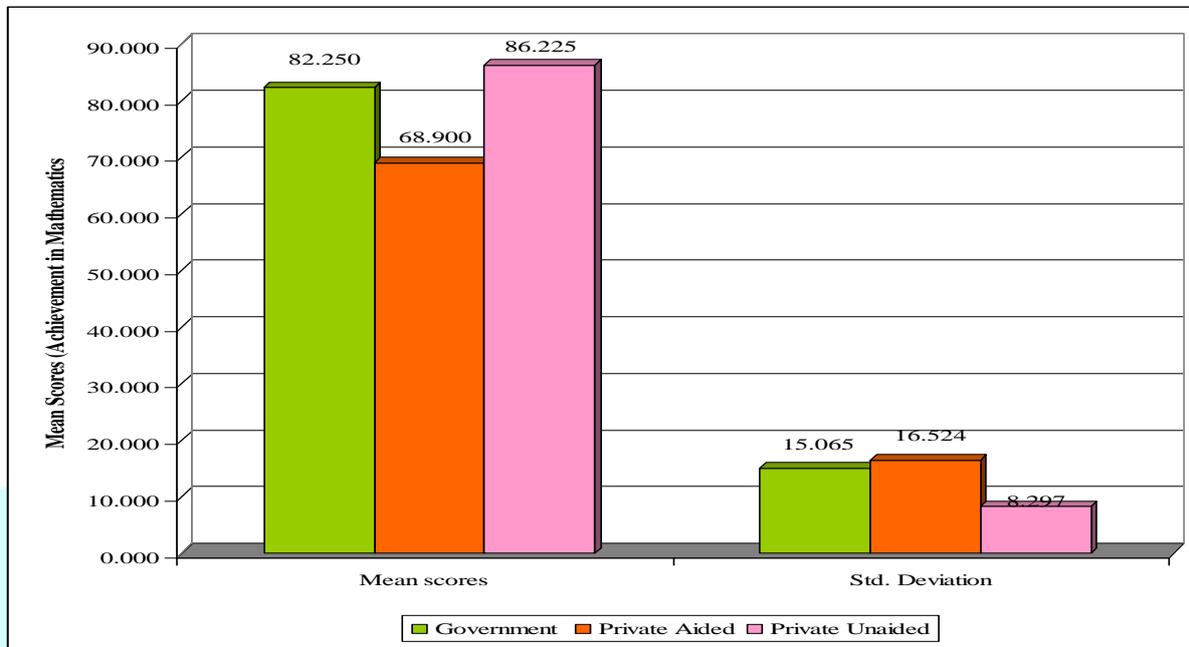
Graph No.2: Bar graph shows comparison of Achievement in Mathematics of secondary school students with respect to type of school management.

Based on the analysis, it was found that there is a significant difference in mathematics achievement between students of government and private aided schools, as well as between private aided and private unaided schools. In both cases, students from government and private unaided schools performed better than those from private aided schools. However, when comparing government and private unaided schools, the difference in performance was not statistically significant. This means that students from both government and private unaided schools showed similarly high levels of achievement in mathematics, while students from private aided schools performed comparatively lower.

9.   FINDINGS

The present study investigated the relationship between socio-economic status and achievement in mathematics among secondary school students, along with differences in achievement based on sex and type of school management. The key findings are as follows:

1. There was no significant relationship found between socio-economic status and achievement in mathematics, suggesting that students' socio-economic backgrounds did not directly influence their mathematics performance in this sample.

2. Girls performed significantly better than boys in mathematics, indicating a notable sex-based difference in academic achievement in this subject.

3. Students from private unaided and government schools performed significantly better in mathematics than those from private aided schools. However, there was no significant difference between the performance of students from government and private unaided schools.

10. DISCUSSION OF FINDINGS

The findings indicate that socio-economic status, as measured by the Modified Kuppuswamy's Scale, did not have a strong influence on students' mathematics achievement. This contrasts with several previous studies that found a positive correlation between SES and academic performance (Sirin, 2005; Kumar & Nair, 2020). One possible explanation could be the increasing access to educational resources like free online learning tools, public tutoring programs and school interventions that bridge SES gaps in urban areas like Bengaluru.

The result showing girls outperforming boys in mathematics is consistent with recent trends in educational research which suggest a closing and even reversing of traditional sex gaps in academic subjects. This may reflect increased focus on girls' education, greater motivation and support mechanisms available in schools (Pandey & Pal, 2016).

The differences in achievement based on school type highlight the variability in academic standards and support across management systems. Private unaided and government schools may offer more structured instruction or access to better teaching resources compared to private aided schools. However, the lack of significant difference between government and private unaided schools suggests that with proper support and infrastructure, government schools can perform on par with well-resourced private institutions.

11. CONCLUSIONS

In conclusion, the study found that sex and type of school management are significant factors influencing mathematics achievement among secondary school students, while socio-economic status was not a determining factor in this sample. Girls were found to perform better than boys and students in government and private unaided schools showed higher achievement in mathematics compared to their peers in private aided schools. These findings emphasize the importance of school quality and sex-sensitive support in enhancing academic outcomes.

12. EDUCATIONAL IMPLICATIONS

The study has several implications for educational practice and policy:

1. Teachers should recognize and support the learning needs of both boys and girls, ensuring equitable classroom practices and encouragement in subjects like mathematics.

2. School managements, especially in private aided institutions, need to review their teaching methods, resource availability and student support systems to improve academic performance.

3. Policy makers should ensure that government schools are continuously supported with quality infrastructure, teacher training and learning materials, as the results show that such schools can perform on par with private unaided institutions.

4. Curriculum developers and educational leaders can use this data to design targeted interventions, especially for schools and student groups lagging behind, regardless of their socio-economic background.

13. SUGGESTIONS FOR FURTHER RESEARCH

Based on the scope and limitations of the current study, the following suggestions are proposed for future research:

1. A similar study can be conducted with a larger and more diverse sample across different districts or states to generalize the findings more widely.

2. Future research could explore the influence of parental involvement, teaching strategies and digital learning resources on mathematics achievement.

3. Regional studies could be undertaken to analyze how changes in socio-economic conditions over time impact academic performance.

4. Researchers could also study the role of motivation, study habits and classroom environment as mediating factors between SES and academic achievement.

5. Comparative studies between rural and urban students could provide knowledge into the role of location and infrastructure in mathematics learning outcomes.

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