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Impact of Study Habits on the Achievement in Mathematics of Secondary School Students

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Abstract: This study investigates the impact of study habits on the achievement in mathematics of secondary school students, with a specific focus on the influence of sex and type of school management. The primary objective is to identify the relationship between study habits and students' achievement in mathematics and to test the hypotheses formulated based on these objectives. The Adolescent's Study Habits Scale for Mathematics Learning developed by the researcher (2024) serves as the main tool for assessing the study habits of students. Achievement in mathematics is measured using the students' previous year mathematics marks. The sample consists of 240 IX class students selected from government, private aided and private unaided schools in Bengaluru Urban District. Data analysis includes descriptive statistics such as mean and standard deviation, along with an independent 't' test and coefficient of correlation. The findings of the study provide knowledge into how study habits influence the mathematical achievement of secondary school students. The results revealed a significant relationship between study habits and achievement in mathematics. There are no significant changes between boys and girls' mathematics achievement and students from private unaided schools scored better compared to those from private aided and government schools. This could be attributed to better academic environments, resources and support systems in private unaided schools.

Index Terms – Study Habits, Achievement, Mathematics, Secondary Schools, Students, school management, Sex

1. INTRODUCTION

Mathematics is widely regarded as a foundational subject that develops logical reasoning, problem-solving skills and analytical thinking. Despite its importance, mathematics achievement among secondary school students in India continues to pose a challenge, as evidenced by national assessments such as NAS (National Achievement Survey, NCERT, 2021), which revealed wide disparities in mathematical performance across the regional areas, sex and types of school management. Among the various factors influencing students' academic performance, study habits play a crucial role in shaping the learning outcomes in mathematics.

Study habits are the behaviours and practices students adopt to learn and retain knowledge effectively, including time management, concentration, goal setting and note-taking. Research indicates that students with consistent and structured study habits tend to perform better academically (Kumar & Kumar, 2020). In the Indian context, where the education system is heavily examination-oriented, cultivating effective study habits becomes even more essential. With the rise of competition and the increasing complexity of the mathematics curriculum, understanding the role of study habits in determining academic success is of vital importance.

Further, differences in educational environments between government, private aided and private unaided schools also contribute significantly to student outcomes. Private unaided schools often offer more resources, better-trained faculty and greater parental engagement, which may positively influence students' study practices and academic achievement (Reddy & Sinha, 2022). Similarly, sex-related differences in study habits and academic performance have also been reported, with several studies noting that girls often adopt more disciplined study routines than boys (Chaudhary & Soni, 2019).

2. REVIEW OF RELATED LITERATURE

2.1 Introduction

The review of related literature forms a crucial foundation for any research study as it offers knowledge into previous works and identifies gaps that the present study aims to address. In the context of secondary school education, mathematics continues to be a vital subject that reflects a student's logical reasoning, quantitative aptitude and problem-solving ability. However,

mathematics achievement is often influenced by a variety of internal and external factors, including psychological, behavioral and institutional elements. Among these, study habits have been recognized as a pivotal behavioral factor influencing students' academic performance. The review below synthesizes national and international research works related to both achievements in mathematics and study habits, specifically among secondary school learners.

2.2 Studies Related to Achievement in Mathematics

Recent research has emphasized a strong connection between achievement motivation and mathematics performance. Das & Swain (2024) conducted a study in the Kalahandi district of Odisha and discovered that higher achievement motivation correlated with better academic outcomes, particularly among boys and that socio-economic background also played a key role. In another study, Yadav (2024) explored how study habits impacted mathematics performance in government Hindi medium schools. The findings confirmed that students with better study habits performed significantly well, especially those from urban areas.

The study by Rani & Rani (2024) explored the role of mathematical anxiety, noting its deep psychological influence on mathematics achievement. Their review found that students often struggled with mathematics due to feelings of tension and a lack of support, contributing to low confidence and poor performance. To overcome this, they emphasized the need for supportive learning environments and innovative teaching strategies. Grover (2024) looked into adolescents' attitudes toward mathematics in Chandigarh. While girls exhibited a more positive attitude, no significant sex difference in actual performance was observed. Interestingly, the attitude itself was not a significant predictor of achievement, suggesting that cognitive and behavioral factors may be more influential.

Nandhini (2023) conducted a broad survey in Chennai among 1,050 higher secondary students, revealing moderate levels of achievement and suggesting that both personal and school-related variables, such as family background, school type and subject group, impact performance. On an international level, Wang et al. (2023) synthesized 156 PISA-based studies and identified multiple ecological factors-ranging from socio-economic status to school management-that affect mathematics achievement. Notably, absenteeism, teacher shortages and low academic engagement were consistent negative predictors of performance across contexts.

2.3 Studies Related to Study Habits

The importance of effective study habits in shaping academic outcomes is a well-supported theme in contemporary educational research. Bentil (2023) explored this in Ghana, identifying a strong and statistically significant relationship between study habits and academic performance, even after controlling for learning styles. In the Indian context, Swamy (2023) analyzed study habits among high school students in Bengaluru, Karnataka. The study found significant sex and school-type differences, with private unaided school students and girls demonstrating better study habits.

Similarly, Gahir, Sahu and Sahoo (2022) carried out a correlational study in Odisha and revealed a high positive correlation between study habits and academic achievement in both boys and girls, underlining the universal relevance of disciplined study routines. Singh & Sharma (2022), through a review of over twenty studies, emphasized the role of factors such as home environment, socio-economic background and parental involvement in reinforcing strong study habits that lead to academic success.

On the other hand, Singh & Gohain (2022) presented a contrasting view. Their study among higher secondary students found no significant relationship between study habits and school environment, indicating that other personal or motivational factors might play a larger role. Munir (2022), in a Nigerian study focused on biology performance, also confirmed a significant relationship between study habits and academic success, calling for greater parental involvement and support at home to enhance students' learning behaviours.

2.4 Overview of Related Literature

Across the reviewed studies, a consistent theme emerges: academic performance, especially in mathematics, is influenced by a complex interplay of psychological, behavioral, social and institutional variables. While achievement motivation, mathematical

anxiety and attitude towards the subject significantly affect outcomes, study habits act as a powerful mediator of academic success. Students who display consistent organized and goal-oriented learning behaviors tend to perform better, regardless of sex or background. Furthermore, school-related variables like type of management, teaching quality and school culture also significantly shape both study habits and achievement levels.

2.5 Research Gap

Despite the extensive research on the individual roles of study habits and various psychological factors on academic achievement, limited studies exist that integrate these variables specifically in relation to mathematics performance among secondary school students in the Indian urban context. Furthermore, most studies are either regionally focused or lack a comparative perspective based on school management types (government, aided, unaided). Also, while many studies confirm a relationship between study habits and academic success, fewer have examined how demographic variables such as sex and school type interact with this relationship, particularly in Bengaluru Urban District. The present study aims to bridge this gap by exploring the impact of study habits on mathematics achievement with a focus on these variables.

3. SIGNIFICANCE OF RESEARCH

This study holds substantial significance in the Indian educational landscape, especially in the wake of the NEP 2020, which emphasizes foundational numeracy and improved academic outcomes through student-centered learning. By focusing on the impact of study habits on mathematics achievement, the study contributes to identifying modifiable behaviours that can improve student performance. Unlike innate abilities, study habits can be cultivated through proper guidance, school support and parental involvement.

In addition, the study's comparative approach-analyzing students across different types of school management (government, private aided and private unaided)-provides practical knowledge for policymakers and educators to bridge performance gaps. In a country as diverse as India, where socio-economic factors often influence educational access and outcomes, identifying the positive role of study habits offers a cost-effective, scalable strategy for enhancing academic performance in mathematics.

Moreover, this research may help curriculum developers and teacher training institutions to integrate study habit enhancement strategies into teaching methods. With the growing academic pressure and stress among secondary school students, equipping them with effective study skills can lead to long-term academic and emotional well-being.

4. STATEMENT OF THE PROBLEM

The selected topic for the present research is: "Impact of Study Habits on the Achievement in Mathematics of Secondary School Students."

5. OBJECTIVES OF THE STUDY

The objectives of the present study are as follows:

1. To examine the significant relationship between study habits and mathematics achievement among secondary school students.
2. To determine whether there is a significant difference in mathematics achievement of secondary school students based on sex.
3. To investigate the significant difference in mathematics achievement of secondary school students with respect to the type of school management.

6. RESEARCH HYPOTHESES

The following are the research hypotheses for the present study in null form:

1. There is no significant relationship between Study habits and Achievement in Mathematics of secondary school students.
2. There is no significant difference in the Achievement in Mathematics of secondary school boys and girls.

3. There is no significant difference in the Achievement in Mathematics of secondary school students studying in government and private aided schools.
4. There is no significant difference in the Achievement in Mathematics of secondary school students studying in private aided and private unaided schools.
5. There is no significant difference in the Achievement in Mathematics of secondary school students studying in government and private unaided schools.

7. METHODOLOGY

This study investigates the impact of study habits on the achievement in mathematics of secondary school students, with a specific focus on the influence of sex and type of school management. The primary objective is to identify the relationship between study habits and students' achievement in mathematics and to test the hypotheses formulated based on these objectives. The Adolescent's Study Habits Scale for Mathematics Learning developed by the researcher (2024) serves as the main tool for assessing the study habits of students. Achievement in mathematics is measured using the students' previous year mathematics marks. The sample consists of 240 IX class students selected from government, private aided and private unaided schools in Bengaluru Urban District. Data analysis includes descriptive statistics such as mean and standard deviation, along with an independent 't' test and coefficient of correlation 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. ANALYSIS OF DATA

The analysis of data presents the collected data to examine the impact of study habits on the achievement in mathematics of secondary school students. The primary objective of this analysis is to test the hypotheses formulated earlier using appropriate statistical techniques. The data were analyzed using descriptive statistics such as mean and standard deviation and inferential statistics including correlation and t-tests. Each hypothesis was tested based on the calculated values and corresponding levels of significance.

To test hypothesis-1, Pearson's product moment correlation coefficient ('r') was computed between study habits and achievement in mathematics.

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

Variables	**Mean**	**Standard Deviation**
Achievement in Mathematics	77.537	16.503
Study Habits	175.908	34.231
Obtained 'r' Value and Level of Sig.	0.271**	

N=240; df=238; **Significant at 0.01 level (0.181)

The obtained correlation coefficient value (r) between study habits and achievement in mathematics is 0.271, which is significant at the 0.01 level (critical value = 0.181 for df = 238). This positive correlation indicates a moderate but significant relationship between the two variables. This means that students who exhibit better study habits tend to perform better in mathematics. The mean score of achievement in mathematics is 77.537 and the mean score for study habits is 175.908, indicating overall satisfactory levels in both variables among the sample of 240 students. Since the calculated 'r' value (0.271) is greater than the table value at the 0.01 significance level, the null hypothesis is rejected. This leads to the conclusion that there exists a significant positive relationship between study habits and achievement in mathematics among secondary school students. The findings suggest that enhancing students' study habits can contribute to improved performance in mathematics.

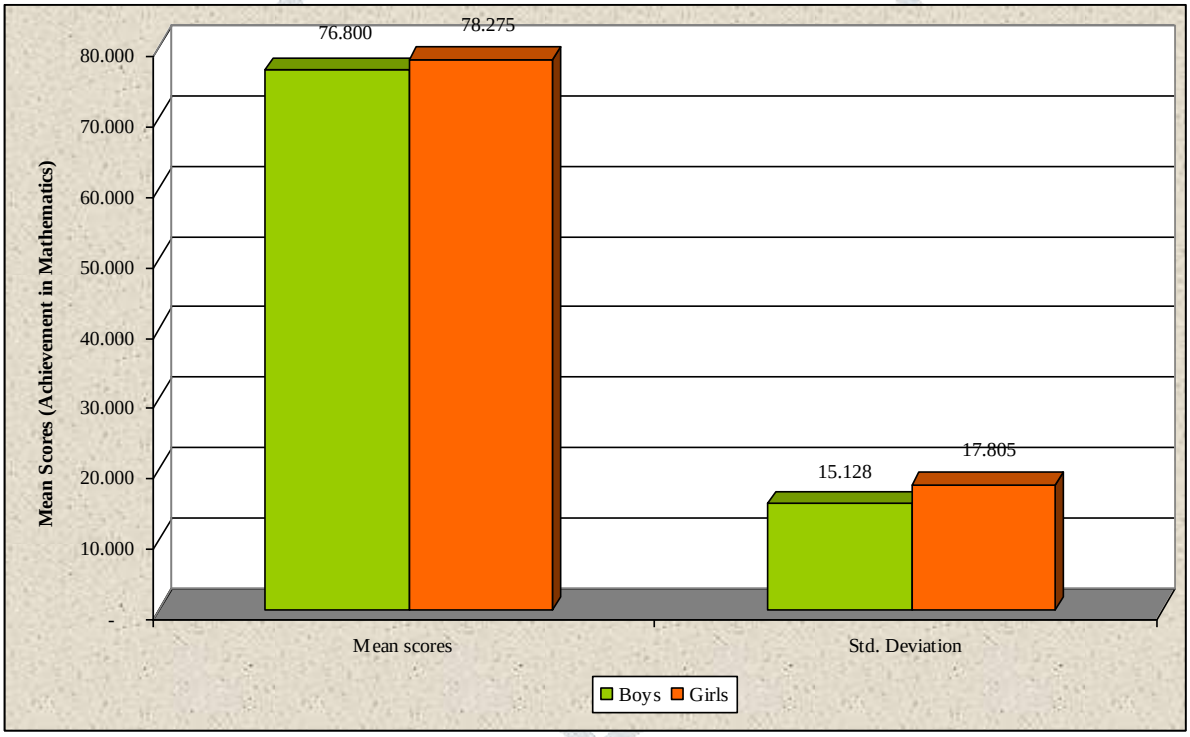
To test hypothesis-2, an independent 't' test was conducted to compare the mathematics achievement scores of boys and girls.

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	120	76.800	15.128	0.70	NS
Girls	120	78.275	17.805		

NS Not Significant (N=240; df=238, 0.05=1.97)

The table shows that the mean achievement score in mathematics for boys is 76.800, while for girls, it is 78.275. Although girls have a slightly higher mean score compared to boys, the calculated 't' value is 0.70, which is less than the critical value of 1.97 at the 0.05 significance level (df = 238). This indicates that the difference in the mathematics achievement scores between boys and girls is not statistically significant. The observed difference in means may be due to chance rather than a consistent pattern across the population. Since the obtained 't' value (0.70) does not exceed the critical value at the 0.05 level of significance, the null hypothesis is accepted. Therefore, it is concluded that there is no significant difference in the achievement in mathematics between secondary school boys and girls. This implies that sex does not play a major role in determining mathematics performance among the students in the present sample.



Graph No.1: Bar graph shows comparison of Achievement in Mathematics of secondary school students with respect to sex.

To test hypothesis-3,4 and 5, independent 't' tests were conducted for the pairs of school types.

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	80	79.875	15.874	5.51	**
Private Aided	80	65.750	16.541		
Private Aided	80	65.750	16.541	10.37	**
Private Unaided	80	86.987	7.853		
Government	80	79.875	15.874	3.59	**
Private Unaided	80	86.987	7.853		

**Significant at 0.01 level (N=160; df=158, 0.01=2.61)

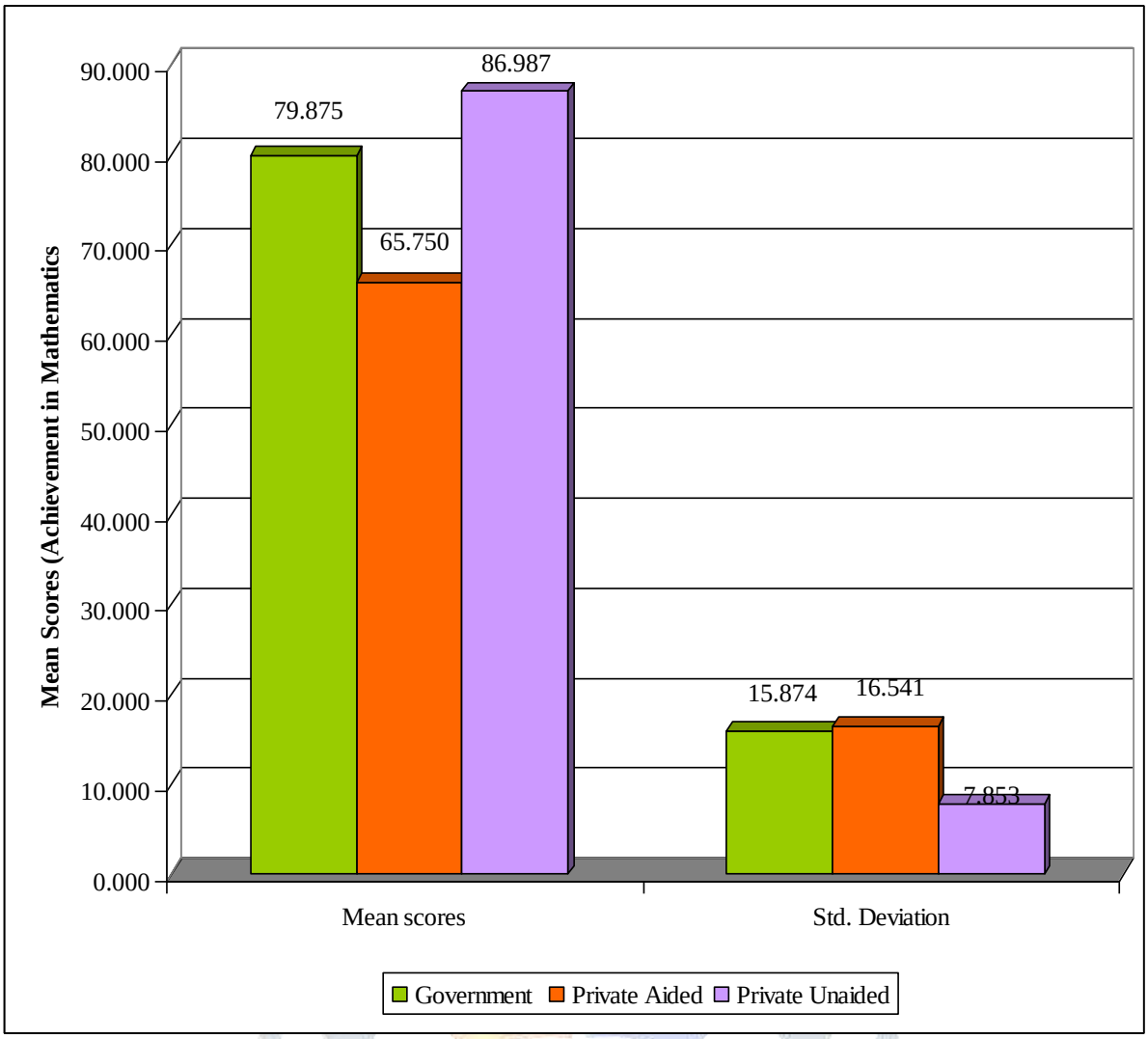
To examine the influence of school management type on mathematics achievement among secondary school students, independent 't' tests were conducted for three different pairs: government vs private aided schools, private aided vs private unaided schools and government vs private unaided schools. The results are presented in Table 3.

The comparison between government and private aided schools revealed that students from government schools had a mean mathematics achievement score of 79.875, whereas those from private aided schools had a lower mean score of 65.750. The obtained 't' value of 5.51 is greater than the critical value of 2.61 at the 0.01 level of significance, indicating a statistically significant difference. This suggests that students studying in government schools performed significantly better in mathematics than their peers in private aided institutions. Possible reasons could include a more stable academic environment, better-qualified teachers or greater focus on foundational subjects in government schools.

In the second comparison between private aided and private unaided schools, a substantial difference was observed. Students in private unaided schools had a mean score of 86.987, much higher than the 65.750 of private aided school students. The 't' value of 10.37 indicates a highly significant difference at the 0.01 level. This highlights that students in private unaided schools significantly outperform those in private aided schools in mathematics. Factors such as better infrastructure, more rigorous academic monitoring, availability of resources and greater parental involvement in private unaided schools may contribute to this difference.

Lastly, the comparison between government and private unaided schools showed that private unaided school students had a higher mean score (86.987) compared to government school students (79.875). The 't' value of 3.59 also exceeds the critical value, confirming a significant difference at the 0.01 level. Therefore, research suggests that while private unaided students perform better than government students.

In conclusion, the null hypotheses 3, 4 and 5 are rejected, as significant differences in mathematics achievement were found across all three types of school management. These results clearly indicate that the type of school management has a meaningful impact on students' academic performance in mathematics. Students from private unaided schools perform the best, followed by those from government schools, while students from private aided schools exhibit the lowest achievement. These findings may reflect variations in instructional quality, learning environment, academic expectations and student support systems across different school types.



Graph No.2: Bar graph shows comparison of Achievement in Mathematics of secondary school students with respect to type of school management.

9. FINDINGS OF THE STUDY

The analysis of the data led to several significant findings. Firstly, there was a positive and significant relationship between students' study habits and their achievement in mathematics, indicating that students who demonstrated better study habits tended to perform better academically in mathematics. Secondly, when examining sex differences, it was found that although girls had a slightly higher mean score than boys, the difference was not statistically significant, suggesting that sex does not play a major role in influencing mathematics achievement among secondary school students. Further, the findings based on type of school management showed significant variations in achievement. Students from private unaided schools outperformed those from both government and private aided schools. The performance of government school students was significantly better than that of private aided school students, but still lower than students from private unaided schools. These differences were all found to be statistically significant, confirming that the type of school management has a notable impact on students' performance in mathematics.

10. DISCUSSION OF RESULTS

The results support existing literature that emphasizes the importance of good study habits in academic achievement. The significant correlation found between study habits and mathematics achievement aligns with previous Indian studies (e.g., Yadav & Nath, 2020; Sharma, 2021) that highlight how structured learning practices and time management improve subject-specific outcomes. Regarding sex, although girls slightly outperformed boys, the lack of a statistically significant difference is consistent with the findings of national assessments (like NAS, NCERT) that show narrowing sex gaps in STEM education in recent years. The finding reinforces the idea that learning outcomes are more dependent on individual effort and school environment rather than sex alone. The comparison of school management types revealed a clear academic advantage for students in private unaided

schools, which may be attributed to better teacher-student ratios, instructional resources, accountability and academic monitoring. On the contrary, private aided schools, despite being semi-government institutions, showed the lowest performance, which could point to potential issues such as lack of innovation, less effective pedagogical practices or poor academic supervision.

11. CONCLUSION

The study concludes that study habits significantly influence the academic achievement in mathematics among secondary school students. Good study habits such as regular revision, time management organized note-taking and focused attention are closely linked to higher performance. Although sex differences in achievement exist marginally in favor of girls, they are not significant enough to draw conclusion about inherent academic superiority. Importantly, the type of school management plays a critical role in shaping student outcomes, with students from private unaided schools consistently performing better than those in government and private aided schools. These findings emphasize the need for interventions focused on improving study habits and ensuring quality education across different school types.

12. EDUCATIONAL IMPLICATIONS

The study offers several important educational implications. Firstly, teachers and school administrators should emphasize the development of effective study habits through structured programs that include study skills workshops, time management training and personalized mentoring. Integrating these elements into the school curriculum can boost students' academic performance, especially in mathematics, a subject often perceived as challenging. Secondly, policy makers should take note of the performance disparities among school types. While private unaided schools tend to perform better, efforts should be made to improve the academic infrastructure and teaching quality in private aided and government schools. Training teachers, reducing class sizes and promoting student-centric learning help bridge this gap. Furthermore, since sex does not significantly affect mathematics achievement, equal opportunities and support must be provided to both boys and girls to explore and excel in STEM fields. Lastly, regular assessment and monitoring of students' study habits and academic progress helps identify struggling learners early and provide timely interventions to support them.

13. SUGGESTIONS FOR FURTHER RESEARCH

Future studies may examine the influence of other psychological and environmental factors such as motivation, parental involvement, teacher support and peer influence on mathematics achievement alongside study habits. Conducting regional research could help understand how study habits develop over time and their long-term effect on academic achievement. Additionally, intervention-based studies that aim to improve study habits and measure changes in academic performance would offer practical knowledge. Further research could include comparative analysis between rural and urban students or among students from different educational boards (CBSE, ICSE, State Boards), to explore regional or curriculum-related differences in study habits and mathematics achievement.

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