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To What Extent Can a Student's Academic Performance be Predicted Based on Socioeconomic Status and Daily Habits Using Data Science Techniques?

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ABSTRACT

Despite having the same teachers and similar methods of education, students studying in a specific school produce diverse academic results. This, in turn, results from their diverse backgrounds, personal behaviour, and socio-economic factors. To understand the extent to which these factors can affect a student's academic performance, this study, with a sample size of 100 boarding school students, identifies the relationships between them using data science techniques. By distributing forms and collecting some responses online, this study has utilised data science methods to analyse trends and present them through various graphs. By identifying patterns, this research provides valuable insights for teachers and educators to develop specific strategies for targeted students that can improve their performances. Analysis of this research show that while socio-economic factors play an important role in shaping students' performance, other factors like personal well-being and sleep are also pivotal. This highlights the need of promoting balanced schedules alongside healthy study habits to support the overall student performance and well-being.

Keywords: **academic performance, socioeconomic status, data science, student habits, boarding schools.**

1. INTRODUCTION

The academic performance of students is influenced by a variety of factors, including socio-economic status, mental well-being, educational environment, and personal attitudes and behaviours. With this, daily habits such as sleep, diet, and physical activity directly affect concentration, memory skills, and overall health. In a boarding school, these factors become more effective. Despite, students' livings under the same school rules, followings the same routine, and learnings from the same teachers, differences in personal habits and backgrounds can lead to contrasting levels of academic results. In today's world where education links to future success, it becomes crucial to identify the force that drives it. The rise of data science makes it easier to study these differences in a clear and systematic way. Moreover, to understand the extent to which these factors are effective, data analytics can serve as a solution. Understanding these factors, institutions and teachers can support the students better. This paper explores the level of these features influencing academic performance using responses from a survey of 100 boarding school students.

2. OBJECTIVES OF THE STUDY

- To identify the relationship between students' academic performance and their socio-economic status.
- To underscore the impact of daily habits such as diet, sleep, and physical activity on academic achievement.
- To explore whether students in the same boarding school environment show academic variations due to personal lifestyle choices.
- To apply data science techniques to identify patterns in the research and determine their extent.

• To provide guidance to teachers and school communities for better understanding and improving the learning system.

3. RESEARCH METHODOLOGY

3.1 Research Approach

This study follows a **Quantitative Research Design**, as it is based on data collected from 100 randomly selected students from different age groups in a boarding school. The purpose is to examine the relationships between various factors influencing their academic performance and to identify the extent to which these variables affect outcomes.

3.2 Data Source

The research is based on **Primary Data Collection** through a structured survey questionnaire. The survey included multiple-choice questions on family background, socioeconomic status, diet, health, physical activity, and academic performance. A sample size of 100 students was selected for the study. The target population included children across various age groups, with a majority being teenagers. Data collection was carried out in two modes: half of the students filled out physical forms, while the other half responded through Google Forms. The questionnaire consisted of 20 questions with variable options, carefully designed to match the comprehension level of each student. The participants were informed that their choices would be kept hidden and their names would not be disclosed. The aim was to not let peer influence affect the results, because of which the forms were distributed solely and not in groups.

3.3 Research Variables

1. Dependent variables- Academic performance (measured through scaled grade

2. Independent variables- Socioeconomic status such as family income and education; Daily habits such as sleep duration and physical activity.

3. Control variables- School environment such as teachers, routine; Age group (of similar schooling stage)

4. Exogenous variables- Peer influence, Family pressure

4. DATA ANALYSIS AND INTERPRETATION

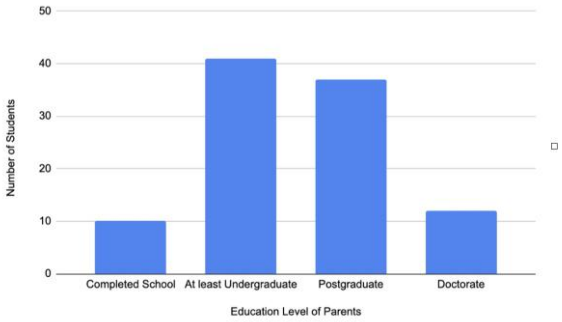
Demographics: Total number of respondents – 100

Table 1. Distribution of Frequency

AGE GROUP	FREQUENCY
Below 11 years old	15
Between 12 and 14 years old	27
Between 15 and 17 years old	40
Above 18 years old	18

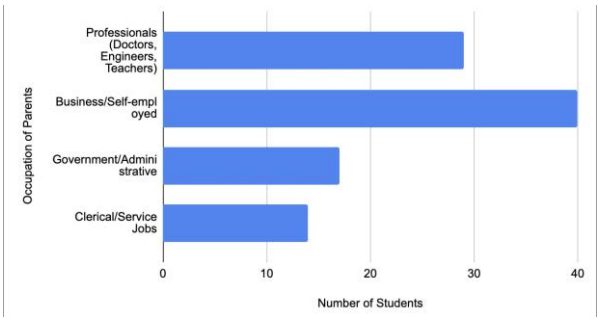
Questionnaire Responses:

Question 1: What is the highest educational qualification of your parent(s)/guardian(s)



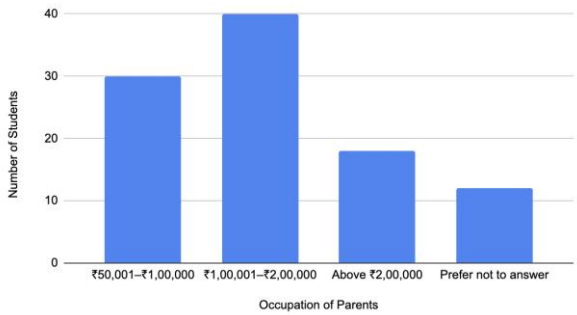
Out of 100 students, 10 reported that their parents had completed school education, 41 had at least an undergraduate degree, 37 held a postgraduate degree, and 12 held a doctorate.

Question 2: What is the primary occupation of your parent(s)/guardian(s)?



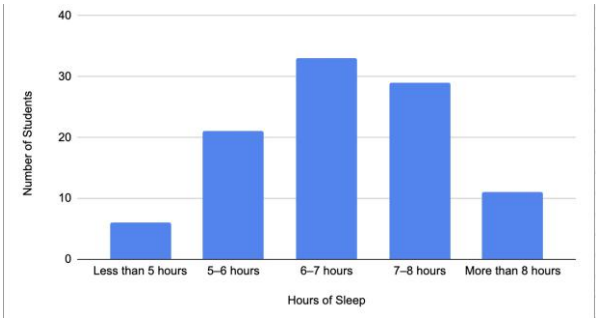
Out of 100 students, 29 reported their parents as professionals (doctors, engineers, teachers, etc.), 40 in business/self-employed, 17 in government or administrative roles, and 14 in clerical/service jobs.

Question 3: What is your family's approximate monthly income?



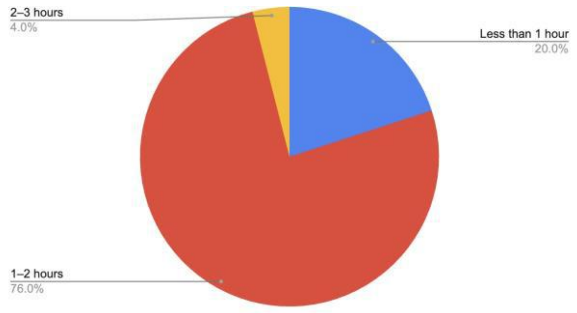
Out of 100 students, 30 reported a family income of ₹50,001–₹1,00,000, 40 between ₹1,00,001–₹2,00,000, 18 above ₹2,00,000, and 12 chose not to answer.

Question 4: On average, how many hours of sleep do you get on school nights?



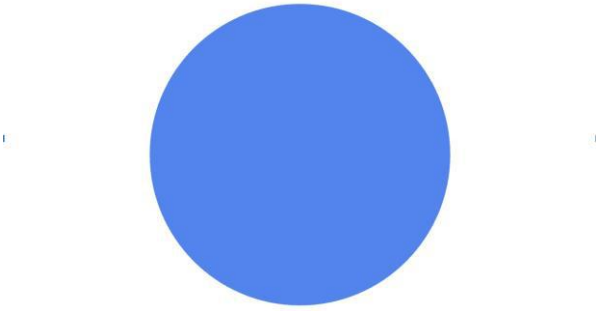
Out of 100 students, 6 reported sleeping less than 5 hours, 21 slept 5–6 hours, 33 slept 6–7 hours, 29 slept 7–8 hours, and 11 slept more than 8 hours.

Question 5: How many hours do you spend on academic study outside of class each day?



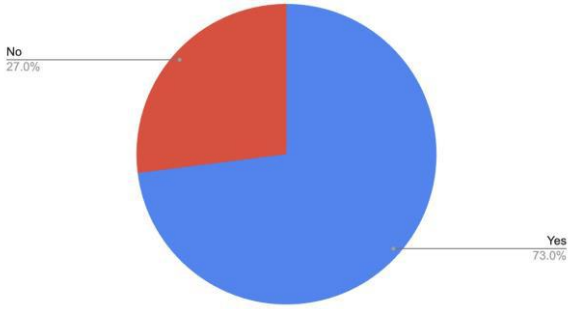
Out of 100 students, 20 studied less than 1 hour, 76 studied 1–2 hours, and 4 studied 2–3 hours.

Question 6: Do you have internet access at home during vacations?



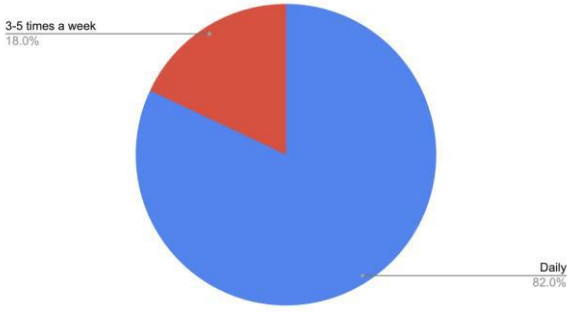
Out of 100 students, all 100 responded 'Yes' for having internet access at home.

Question 7: Did you attend tuition or coaching before joining boarding school?



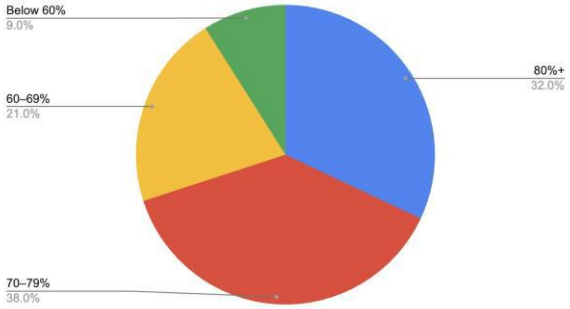
Out of 100 students, 73 had attended tuition or coaching before joining boarding school, while 27 did not.

Question 8: How often do you participate in physical activities or sports each week?



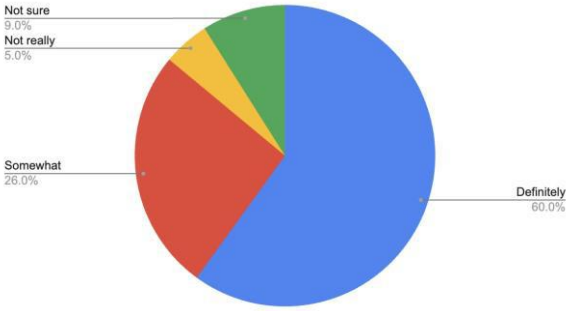
Out of 100 students, 82 engaged in sports/physical activity daily and 34 participated 3–5 times a week.

Question 9: How would you describe your academic performance this term?



Out of 100 students, 32 identified themselves as A-grade performers (80%+), 38 as B-grade (70–79%), 21 as C-grade (60–69%), and 9 as D-grade (below 60%).

Question 10: Do you feel the boarding school lifestyle has improved your academic performance?



Out of 100 students, 60 felt that the boarding school lifestyle definitely improved their academic performance, 26 felt it somewhat helped, 5 felt it did not really help, and 9 were not sure.

6 . CONCLUSION

Use of data science in this research has not only helped in collecting the information but has also shown trends in the outcomes. This approach was easier, quicker and efficient to document the data. The research concludes that students are influenced by socio-economic factors, however, these cannot be the only factors to determine their academic performance.

Several students who came from well-educated families had an average score below 60 percent, due to lack of recreational activities and insufficient sleep. On the other hand, several students whose annual family income was lower than ₹2,00,000 demonstrated higher concentration on their studies.

5. USEFULNESS OF THE RESEARCH

This research delves into the factors that affect students' overall academic behaviour by taking into account crucial aspects such as socio-economic background and personal habits. It has helped analyze which factors influence performance and outcomes. The findings can provide guidance to institutions on how to better support students of different age groups and design interventions that improve academic success while promoting well-being.

how to better support students of different age groups and

7.LIMITATIONS OF THE RESEARCH

- The sample size is limited to 100 randomly selected students from a boarding school, making it difficult to generalize the findings.
- Most participants belonged to the urban section of society, which may not reflect outcomes for rural students.
- The study was conducted over a few days due to limited availability of materials and sources, which may not capture long-term effects.
- Information on study habits, sleep, and academic performance is self-reported, which could include biases or inaccuracies.

The research findings may not be applicable to all age groups or educational systems, as it focuses only on a specific boarding school setting.

Daily habits, mainly sleep, play a significant role in shaping a students' academic behaviour. For example, most students who slept more than six hours reported higher grades, illustrating that both socio-economic factors and personal habits shape a students' academic result. However, the extent can vary across the students. This states that maintaining a healthy schedule is essential for all students regardless of their background.

This research also highlights that understanding these factors may result in teachers and institutions providing better support to students. By taking into account a student's family background, personal habits, and mental being, schools can promote healthier routines, better study plans, and sufficient amount of relaxation time for all.

This highlights that academic scores and success not only depends on background but also on lifestyle, choice of livelihood, and over well-being.

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