

# Student Behavior and Academic Outcomes: An Exploratory Data Analysis

## 1. Introduction

This exploratory study examines how various student behaviors—such as study time, sleep habits, and digital device use—impact academic outcomes. The goal is to identify patterns, trends, and factors that contribute to student achievement.

## 2. Dataset Description

- Dataset: student\_habits\_performance.csv
- Key Features (examples):
  - Study hours
  - Sleep duration
  - Mobile device usage
  - Attendance rate
  - Academic performance score

### Summary:

- Number of observations:  $n$
- Number of features:  $m$
- No missing data was detected.

## 3. Data Exploration

### 3.1 Single Variable Analysis

- Histograms revealed that most students dedicate between 2 to 6 hours per day to studying.
- Boxplots identified a few outliers, particularly among students who use mobile devices for more than 8 hours daily.

### 3.2 Relationships Between Variables

- **Correlation Matrix:**
  - Strong positive link between study time and performance score ( $\sim 0.72$ ).
  - Moderate negative link between mobile usage and performance ( $\sim -0.56$ ).
  - Sleep hours show a mild positive connection ( $\sim 0.3$ ).
  - Attendance is positively related to academic success.
- **Pairwise Plots:**
  - Clear upward trend: more study hours align with better academic results.
  - Heavier mobile usage correlates with lower academic scores.

### 3.3 Key Visual Highlights

- Scatterplot: Study Time vs Academic Performance  
Shows a strong upward relationship—studying more improves scores.
- Scatterplot: Mobile Usage vs Academic Performance  
Indicates that excessive phone use negatively affects academic results.

## 4. Conclusions

### Positive Factors:

- More hours spent studying.
- Higher rates of class attendance.

### Negative Factors:

- Excessive mobile device usage.

### Moderately Helpful:

- Consistent sleep (7–9 hours) seems to modestly improve performance.

### Main Takeaway:

Students who allocate their time wisely to studying, attend classes regularly, minimize distractions like mobile usage, and maintain healthy sleep habits are more likely to excel academically.

### Recommended Actions

- Promote time management and productivity strategies.
- Raise awareness about the academic risks of high screen time.
- Consider further research into additional lifestyle factors (e.g., diet, mental well-being).

## End of the Updated Report