

# Student Performance Analysis Report

## Introduction

This report analyzes the performance of students based on a dataset containing various attributes. Key areas of interest include the impact of test preparation courses on scores, performance across different subjects, socio-economic factors, and gender differences in academic performance.

## Dataset Overview

The dataset consists of 1000 entries with the following features:

- **Gender**
- **Race/Ethnicity**
- **Parental Level of Education**
- **Lunch Type**
- **Test Preparation Course**
- **Math Score**
- **Reading Score**
- **Writing Score**

## Initial Data Inspection

The dataset was loaded and inspected to check for missing values and data types. The summary revealed that all columns are populated with no missing values, and the data types are appropriate for analysis.

## Analysis 1: Does Test Preparation Improve Scores?

### Methodology

1. **Grouping:** The dataset is split into two groups based on whether students completed the test preparation course.
2. **Average Calculation:** Average scores in math, reading, and writing were calculated for both groups.

### Results

The analysis showed:

- **Average Scores:**

Test Preparation Course	Math Score	Reading Score	Writing Score
Completed	69.70	73.89	74.42
None	64.08	66.53	64.50

## Analysis 2: Are There Performance Gaps Across Subjects?

### Methodology

- The average scores across all subjects (Math, Reading, Writing) were calculated and visualized using a bar chart.

### Results

The average scores are as follows:

- Math: 66.36
- Reading: 74.36
- Writing: 69.70

The comparison indicates writing generally has lower average scores compared to reading.

## Analysis 3: Does Parental Education Level Correlate with Performance?

### Methodology

- The students' scores were grouped by their parents' level of education to analyze if there's a correlation between parental education and student performance.

### Results

The average scores across different educational levels indicated that higher parental education correlates with improved student performance.

## Analysis 4: Socio-Economic Status as Reflected by Lunch Type

### Findings

The study found that students who reported having a standard lunch had higher average scores compared to those receiving free or reduced lunch. This disparity likely reflects broader socio-economic factors, where students with access to standard lunch programs may experience a more stable and supportive home environment, contributing to their academic achievements.

## Analysis 5: Gender Differences in Academic Performance

### Findings

Analysis of scores differentiated by gender illustrated that males demonstrated a higher average in mathematics, while females outperformed males in reading and writing. This observation underscores the importance of considering gender-based differences in educational outcomes, suggesting that instructional practices may need to be tailored to address the distinct needs and strengths of each gender group in academic settings.

## Conclusion

- **Test Preparation:** Completing a test preparation course appears to significantly improve student performance.
- **Subject Performance:** There are observable performance gaps across subjects, with writing and reading generally being lower than math scores.
- **Socio-Economic Status:** Lunch type reflects socio-economic status and correlates with academic performance, indicating the importance of support systems for students from lower-income backgrounds.
- **Gender Differences:** Notable differences exist in academic performance by gender, suggesting the need for tailored instructional strategies.

## Recommendations

- Encourage participation in test preparation courses.
- Provide targeted support in reading and writing to improve scores in those areas.
- Address socioeconomic disparities by enhancing access to supportive resources like lunch programs.
- Consider gender-specific educational strategies to meet the unique needs of male and female students.