Beyond Scores: A Data Story of Student Performance

1. Introduction

Educational institutions generate large volumes of data; however, converting this data into meaningful and actionable insights remains a significant challenge. This technical report presents an analysis of student academic performance data using Microsoft Excel, with the aim of supporting data-driven decision-making in education.

This case study focuses on students at Shining Star Global School, analyzing academic outcomes across gender, race/ethnicity, subject areas (mathematics, reading, and writing), and test preparation status. The objective of the analysis is to identify performance patterns, uncover disparities, and highlight factors that influence academic success.

To achieve this, an interactive Excel dashboard was developed to consolidate complex academic data into intuitive visualizations. The dashboard enables school administrators, educators, and other stakeholders to efficiently assess student performance and identify actionable insights to improve instructional strategies and learning support systems.

2. Story of the Data

The data illustrates how multiple factors interact to influence student performance at Shining Star Global School. A strong relationship is observed between test preparation, gender, and academic achievement. Students who completed test preparation programs consistently demonstrate higher academic performance, while female students outperform their male counterparts across most subjects.

Additionally, performance disparities across race/ethnicity groups indicate that certain student populations may require focused academic support. Overall, the data emphasizes that strategic preparation programs, equitable learning support, and targeted interventions can significantly improve student outcomes. Leveraging these insights can help the school close performance gaps and foster a more inclusive and high-performing academic environment.

3. Methodology

A structured analytical approach was adopted to conduct this study. The key steps included:

1. Classification of variables into dependent variables (student scores) and independent variables (gender, race/ethnicity, parental education, lunch quality, and test preparation status).

2. Data cleaning and validation to ensure consistency and accuracy.

3. Aggregation of student scores using pivot tables to analyze performance by gender and race/ethnicity.

4. Design of an interactive Excel dashboard incorporating KPIs, bar charts, and comparative visualizations.

5. Evaluation of the impact of test preparation programs on student performance.

6. Documentation of findings and recommendations in a structured technical report.

4**. Pre-Analysis**

Before conducting the main analysis, several guiding questions were developed to explore potential drivers of student performance. These questions focused on understanding how demographic and socioeconomic factors affect academic outcomes, including:

- Gender influence on mathematics, reading, and writing scores
- Race/ethnicity influence on mathematics, reading, and writing scores
- Impact of parental level of education on student performance
- Effect of lunch quality on academic outcomes
- Impact of test preparation course completion on subject scores

These questions provided a clear analytical direction and ensured that the analysis addressed relevant educational performance concerns.

5. In-Analysis and Findings

During the in-analysis phase, each factor in the dataset was examined using pivot tables and Excel visualizations to identify key performance trends.

- At a high level, Ethnic Group C emerged as the best-performing group, consistently achieving higher scores in both mathematics and reading. This suggests that students within this group may benefit from effective learning environments or support systems that could be replicated across other groups.
- Gender-based analysis revealed that female students consistently outperform male students, particularly in mathematics and writing. Since the gender distribution is relatively balanced, these differences are likely driven by learning and behavioral factors rather than population size.
- Reading was identified as the most outstanding subject, especially among students who completed test preparation programs. Students who participated in test preparation consistently recorded higher scores, highlighting the effectiveness of structured academic preparation.
- From a racial perspective, Group D demonstrated strong performance in mathematics, while Groups B and C showed notable strengths in reading. In contrast, Groups A and E recorded lower scores across subjects, indicating the need for targeted academic interventions and additional learning resources.

6. Key Insights

Female students consistently outperform male students across subjects.

Ethnic Group C records the highest overall academic performance.

Test preparation programs significantly improve student outcomes.

Performance gaps across certain ethnic groups highlight areas requiring targeted intervention.

7. Conclusion

The analysis reveals clear performance patterns across gender, race/ethnicity, and test preparation status. Female students and students who completed test preparation programs demonstrate superior academic outcomes, while Ethnic Group C consistently shows the strongest overall performance. Persistent learning gaps among certain groups underscore the importance of targeted academic support, effective preparation programs, and data-driven interventions. This project demonstrates how educational data analytics can support informed decision-making and promote equity in academic achievement.