Student Performance Analysis Report

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1. Objective

The objective of this analysis is to evaluate how parental education, gender, and test preparation influence student performance in Math, Physics, and Chemistry. This report aims to provide insights and recommendations for improving student outcomes.

2. Dataset Overview

The dataset contains student performance records with key columns: GENDER, PARENTAL_LEVEL_OF_EDUCATION, TEST_PREPARETION, MATH_SCORE, PHYSICS_SCORE, CHEMISTRY_SCORE. The data was grouped and analyzed to calculate average scores and identify trends based on these factors.

3. Methodology

Analysis was performed using Python Pandas. Data was grouped by categorical features and mean scores were calculated for each subject. Correlation matrices, variance, and standard deviations were also computed to understand score distributions and relationships between subjects.

4. Parental Education-Wise Analysis

Parental Education	Math	Physics	Chemistry
master’s degree	69.75	75.37	75.68
bachelor’s degree	69.39	73.00	73.38
associate’s degree	67.88	70.93	69.89
some college	67.13	69.46	68.84
some high school	63.49	66.94	64.89
high school	62.14	64.70	62.45

Students with higher parental education perform significantly better across all subjects.

5. Gender-Wise Analysis

Average Scores by Gender: Female: 69.57, Male: 65.84 Males scored higher in Math (68.73 vs 63.63), while females outperformed in Physics (72.61 vs 65.47) and Chemistry (72.47 vs 63.31). The correlation between subjects shows a strong positive relationship.

6. Test Preparation-Wise Analysis

Students who completed test preparation scored higher across all subjects. Average scores: Completed = 72.67, None = 65.04. Subject-wise breakdown - Math: 69.70 vs 64.08, Physics: 73.89 vs 66.53, Chemistry: 74.42 vs 64.50.

7. Conclusion

Parental education level, gender, and test preparation status significantly influence student performance. Students from educated parental backgrounds, those who completed test preparation, and female students generally perform better in multiple subjects. Strategic academic interventions can improve student outcomes.

8. Recommendations

• Encourage test preparation programs for all students. • Provide additional support for students from less educated parental backgrounds. • Focus on improving Math outcomes for female students and Science engagement for male students. • Use correlation insights to guide targeted subject interventions.