

Student Performance Analysis Using Advanced Excel

1. INTRODUCTION

This project was undertaken as part of reinforcing my understanding of the "Data Visualization with Advanced Excel" course offered by PwC on Coursera. The aim was to apply advanced Excel tools such as PivotTables, charts, slicers, Goal Seek, and Scenario Manager to explore, analyze and present data in a meaningful way.

The project revolves around understanding trends in student performance and building an interactive dashboard that supports decision-making for educators and analysts.

2. Problem Statement

Educators and administrators often face challenges in identifying which student groups need additional support and how academic interventions can be planned. The goal of this project is to analyze student performance data to uncover patterns and simulate academic outcomes, helping to answer questions such as:

- Does test preparation improve student performance?
 - How do different student groups (by gender, ethnicity, lunch status, parent level of education and test preparation) perform across subjects?
 - What combination of scores is needed to achieve specific academic goals?
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3. Data Sourcing

The dataset used was based on a public student performance dataset often used in educational analytics. It includes records of students with the following fields:

- Gender
- Race/Ethnicity
- Lunch (Standard or Free/Reduced)
- Test Preparation (Completed or None)
- Parents Education
- Scores in Math, Reading, and Writing

The dataset was imported into Excel and cleaned using Power Query to ensure consistency and usability.

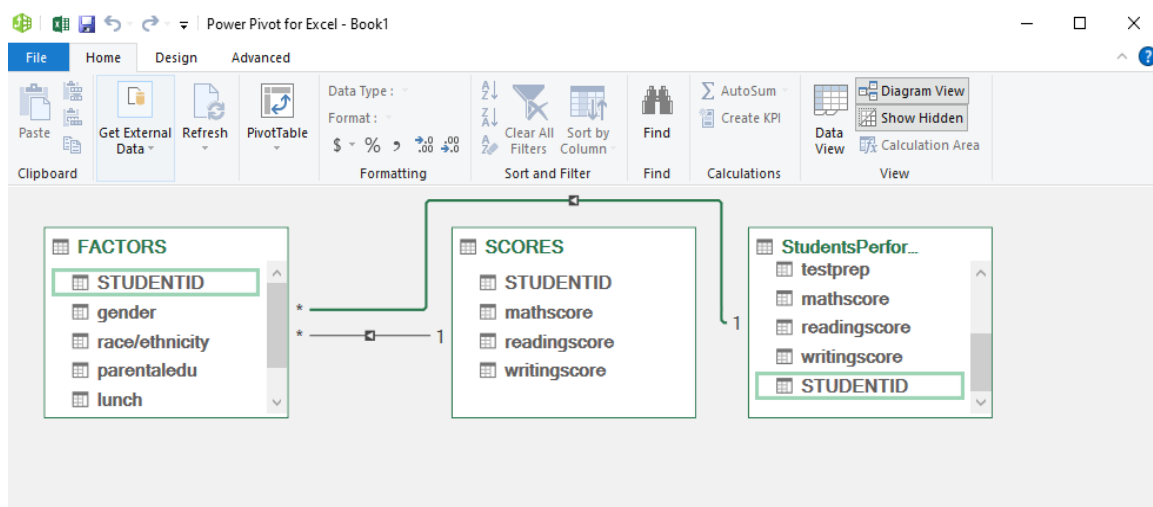
LINK FOR THE DATASET(<https://www.kaggle.com/datasets/spscientist/students-performance-in-exams/data>)

4. Data Modeling

Using Excel's Power Query Editor:

- Column names were cleaned and standardized.
- Data types were confirmed (e.g., numerical for scores, text for categories).
- No null values were found, so the data was immediately usable.

The data was then loaded into Excel where relationships were simulated.

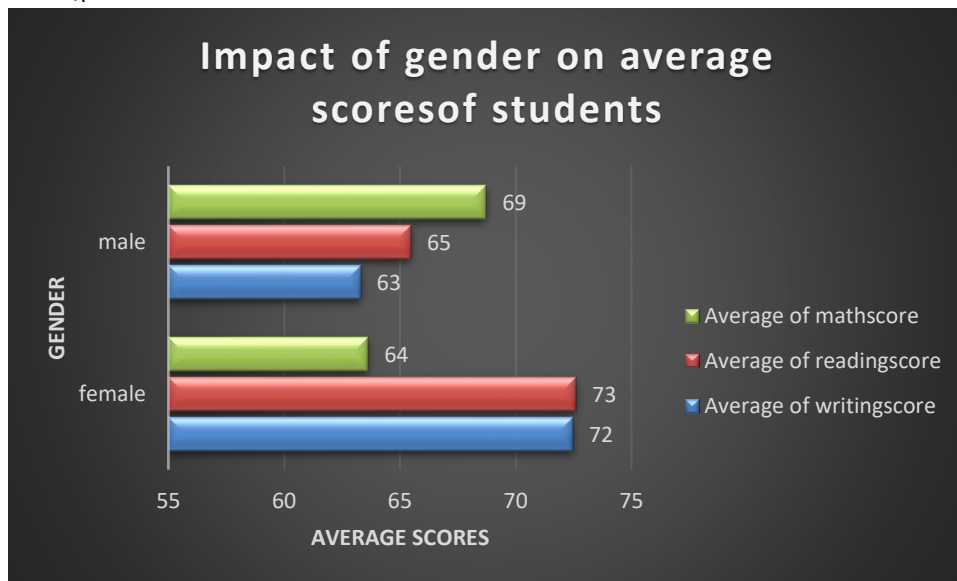


5. Data Analysis & Visualization

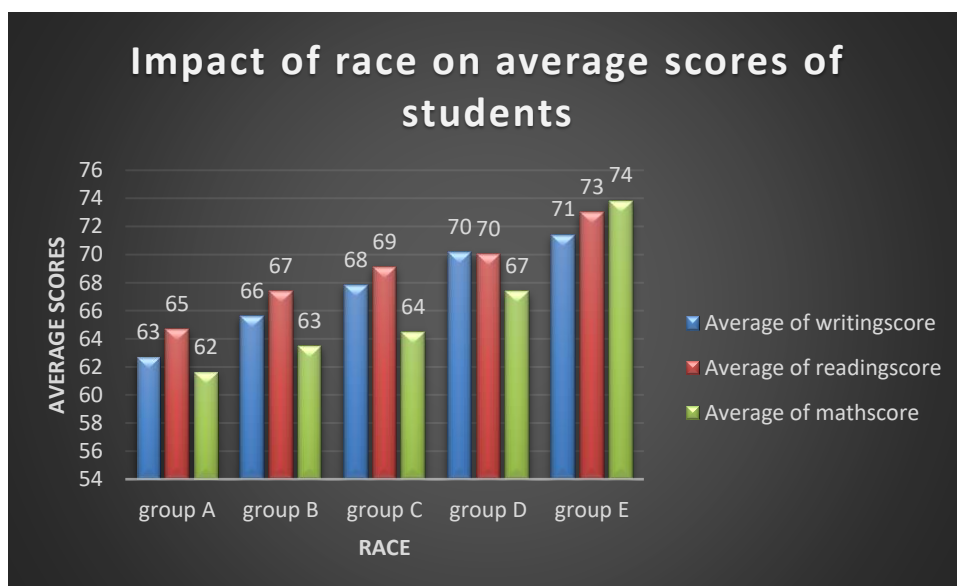
Analysis was carried out using:

- **PivotTables** to summarize data by category (gender, lunch, test prep, race and parent Education).
- **PivotCharts** for visualization (bar charts, column charts).

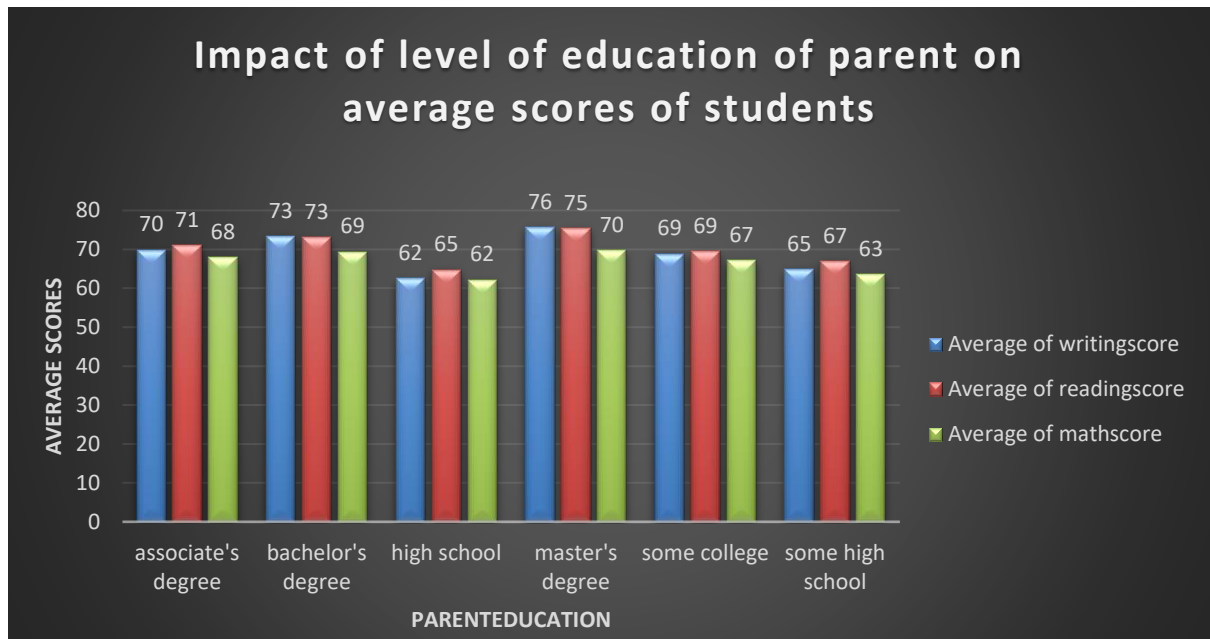
- ✚ **Slicers** for interactivity, enabling dynamic filtering of charts by gender, race, lunch status, parentEducation and test



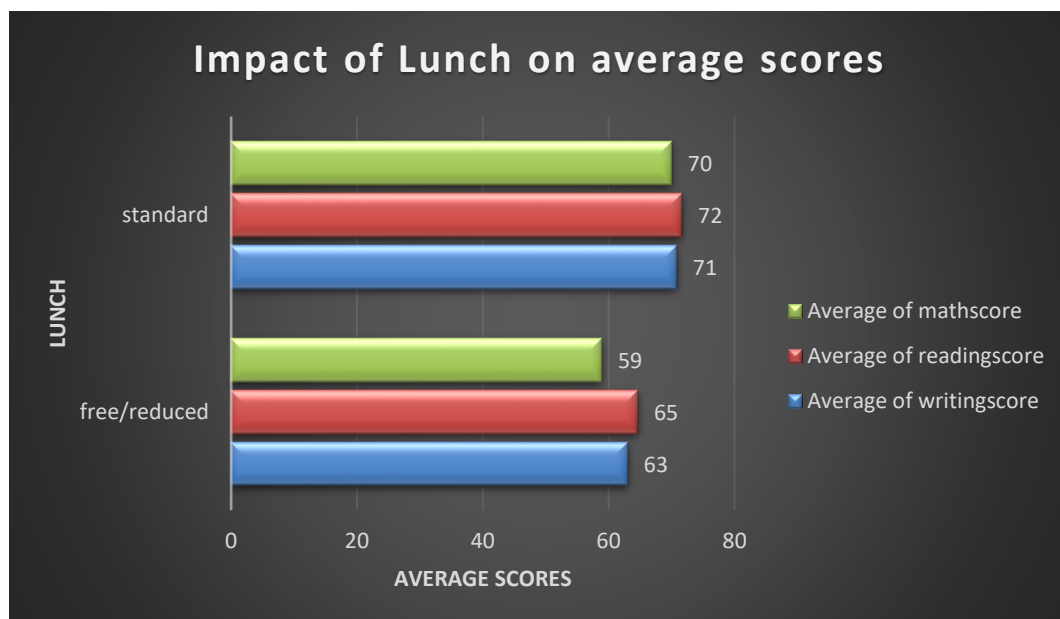
- ✚ **Females outperformed the males in writing and reading scores**
- ✚ **Males outperformed females in maths scores**



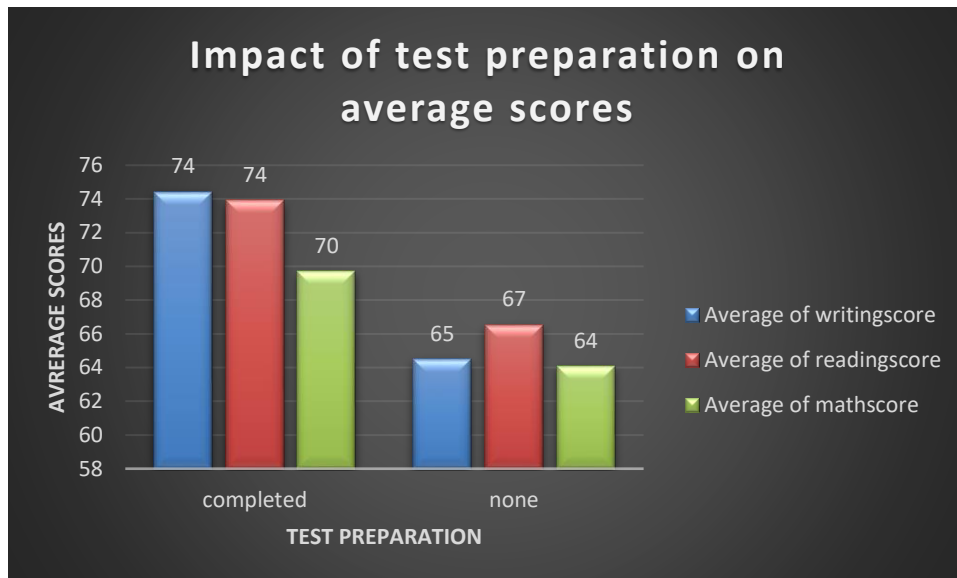
- ✚ **Group E had the highest scores**
- ✚ **Group A had the lowest scores**



- Students with parents who did masters had highest scores
- Students with parents whose highest level of Education is highschool had lowest scores



- Students who had standard lunch had highest scores



Those who completed test preparation had higher scores

Key Findings:

- Students who completed test prep scored significantly higher across all subjects.
- Those on free/reduced lunch scored lower, suggesting socioeconomic disparities.
- Female students tended to outperform males in reading and writing, while male students had slightly higher math scores.

6. What-If Analysis and Scenario Simulation

Two advanced Excel features were used:

GOAL SEEK:

Used to answer questions like:

- "What math score is needed to get an average of 85?"
- "How much should a student improve in writing to increase their overall score?"

USING GOALSEEK					
STUDENT	MATHS SCORE	WRITING SCORE	READING SCORE	AVERAGE SCORE	SCENARIO
1	93	78	84	85	What math score is needed to average 85?
2	65	70	75	70	What writing score is needed to hit 70 average ?
				AVERAGE SCORE	70

SCENARIO MANAGER:

Three academic performance scenarios were modeled:

- **Optimistic** (high scores)
- **Realistic** (average scores)
- **Pessimistic** (low scores)

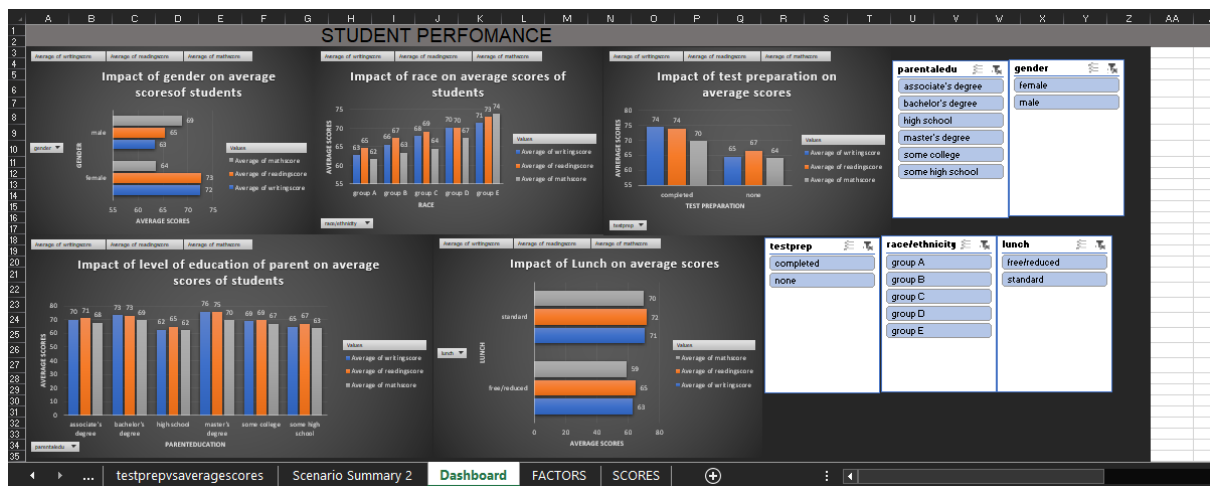
A	B	C	D	E	F	G	H
Scenario Summary							
		Current Values:		Realistic	Optimistic	Pessimistic	
Changing Cells:							
	\$AF\$32	80	80	90	65		
	\$AF\$33	82	82	95	60		
	\$AF\$34	85	85	92	70		
Result Cells:							
	\$AF\$35	82	82	92	65		
Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.							

A scenario summary was generated to visually compare outcomes.

7. Conclusion

The project successfully demonstrated how Excel can be used not only for data storage but also for **deep data analysis, interactive dashboards**, and **strategic forecasting**. It revealed clear academic patterns and actionable insights about student performance.

This is the dashboard:



Insights were extracted from the dashboard and analysis. These included trends in performance based on lunch type, gender, parent education, race and test preparation. Based on the findings, clear recommendations were made to improve student outcomes such as expanding test prep access and supporting students on free/reduced lunch.

8. Key Takeaways

- Students receiving standard lunch had higher average scores than those on free/reduced lunch — potentially highlighting socioeconomic factors affecting academic outcomes.
- Students who completed a test preparation course consistently outperformed those who did not, particularly in math and reading.
- Female students slightly outperformed male students in reading and writing, while male students had a slight edge in math.
- Scenario simulations show how score improvements in one subject can significantly impact overall average, a tool schools could use for student goal setting.

8. Recommendations

1. Encourage participation in test prep courses ,students who completed them performed better.
2. Support students on free/reduced lunch through mentoring and academic resources.
3. Use personalized academic planning tools (like Goal Seek) with students to set realistic targets.
4. Adopt dashboards at class or school level to track and visualize performance in real time.
5. Continue analyzing trends across demographics to ensure equity in academic grow

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