

Student performance report

Key questions:

- What factors most strongly influence student final exam performance?
- Does study behaviour impact results?
- How do lifestyle variables affect performance?
- Are there performance differences based on parental or study environment?

Business task:

The objective of this project is to analyse and evaluate key academic, behavioural, and environmental factors that influence student performance outcomes.

The dashboard produced from the cleaned data will provide insights in identifying what factors can potentially improve student scores and optimize academic support programs.

Summary

Analysis of 1,000 synthetic student records indicates that academic behaviours, particularly daily study hours, homework completion rate, and attendance, demonstrate the strongest positive association with final exam performance.

Lifestyle and environmental variables, including parental education level, study environment, sleep, and anxiety scores, showed limited measurable impact on final performance within this dataset.

Average daily study hours, Average final score and Average attendance percentage by Grade

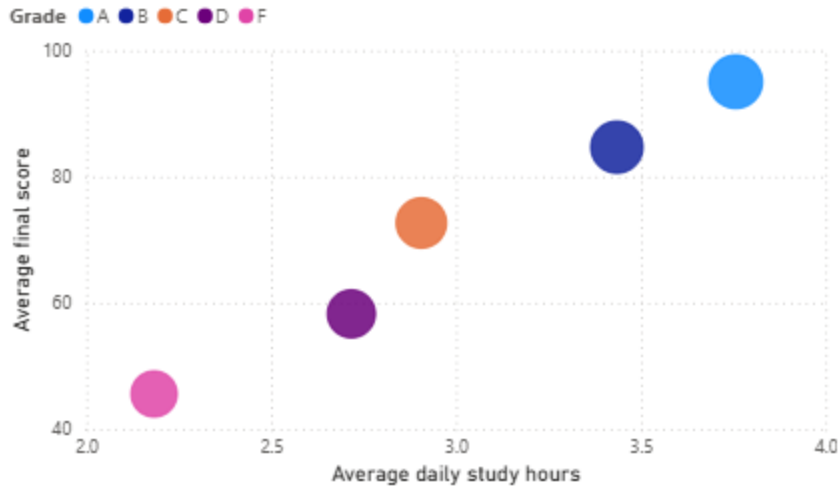


Fig. 1 illustrates the positive correlation between daily study hours and average final scores

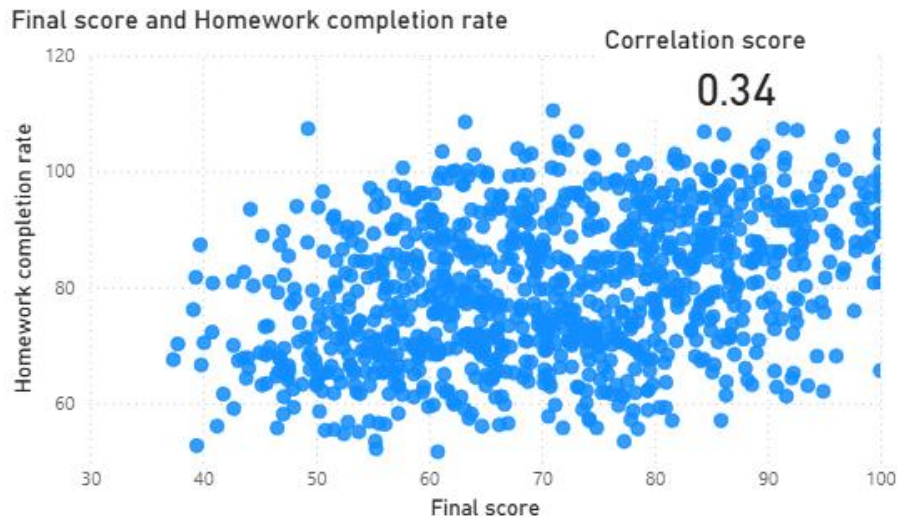


Fig. 2 illustrates the relationship between homework completion rate and final score outcomes

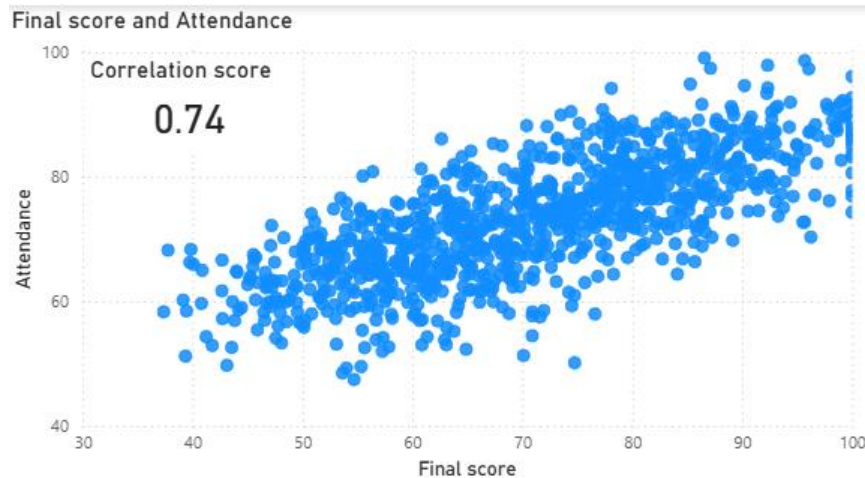


Fig. 3, higher attendance has strong positive correlation towards final score

Dataset overview

The dataset contains 1,000 students. Pre-processing has been applied to the dataset using Python as the scripting language.

The list of key variables considered include:

- Final score
- Attendance
- Sleep hours
- Parental academic background
- Grade achieved
- Study environment
- Motivation score
- Homework completion rate

Analysis

While the dataset contains numerous variables, this analysis focuses on those demonstrating measurable influence on final academic performance.

Initially, the data shows that most of the students have passed, with a minimum grade of D to count as a pass grade.

The factors that mostly influence final scores include daily study hours, how much homework was completed, and attendance. When these factors were put in the Key Influencers graph, the graph was able to pick up some correlation that suggest that changes in these factors are associated with changes in final score.



Fig. 4, key influencers graph explaining by how much should a factor increase to improve the final score. In this case, it displays how many hours would be ideal to improve final score

The Key Influencers analysis suggests that students studying between 2-4 hours daily demonstrate a statistically higher likelihood of improved final scores relative to lower study durations. While higher study duration correlates with stronger outcomes, practical implementation should consider student workload sustainability.

Homework is also a strong factor for better scores. Data showed that students with high homework completion rates (above 80%) demonstrated significantly higher average final scores compared to those below this threshold. This suggests that consistent homework completion is associated with improved academic outcomes. The Key Influencers graph says that if the completion rate is at least 80%, then the chances for a higher final grade increase.

Results show that high attendance and high scores are positively correlated (as shown in Fig. 3, with a score of 0.74 correlation coefficient). While attendance demonstrates a positive association with performance, it should not be interpreted as the sole determinant of academic success.

Parental academic backgrounds have been taken into account. The initial assumption was that parents that hold at least a degree may contribute to students scoring higher because parents can guide their children on what to do. However, the analysis did not reveal significant performance differences across parental education levels, suggesting limited observable influence within this dataset.

Average Final Score by Parent education level

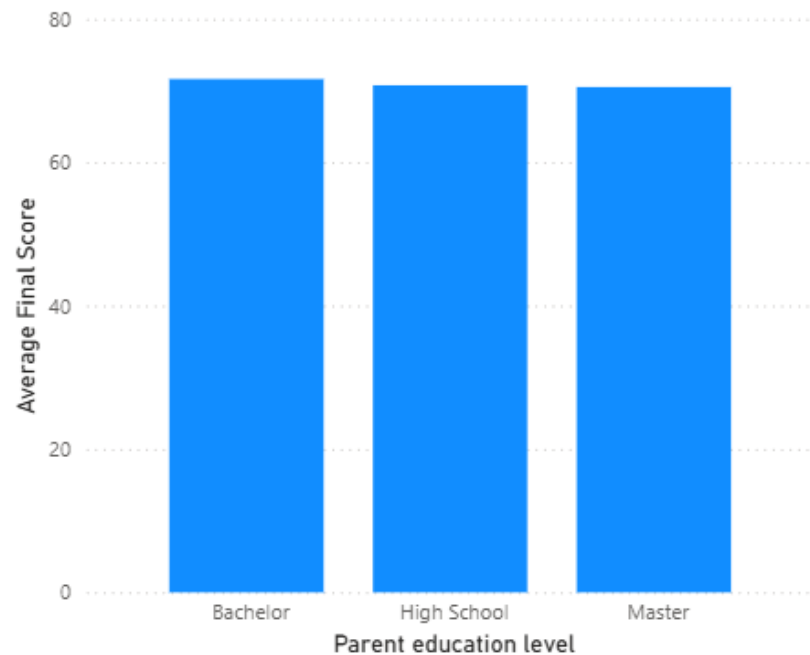


Fig. 5, bar chart for parental education level and average final score

Fig. 5 shows no significant difference between students' scores.

Next task is to find out if lifestyle variables affect performance. This would include factors such as sleep, screen time, anxiety scores, and motivation scores.

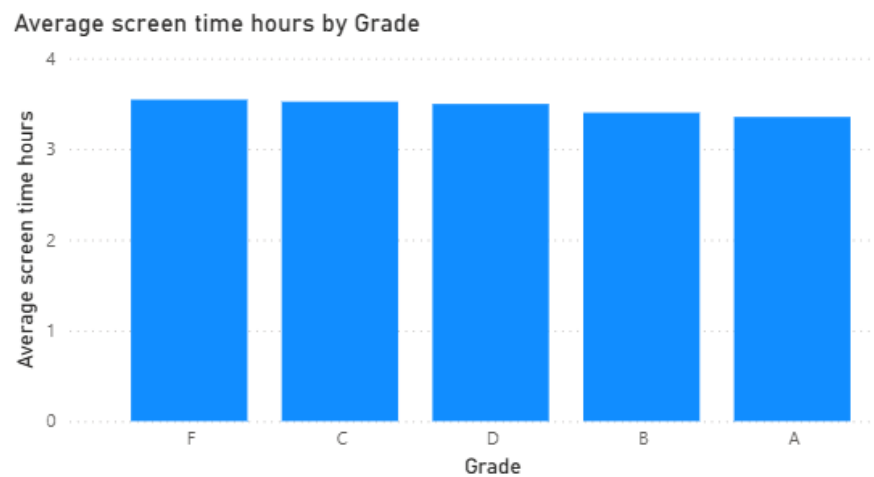
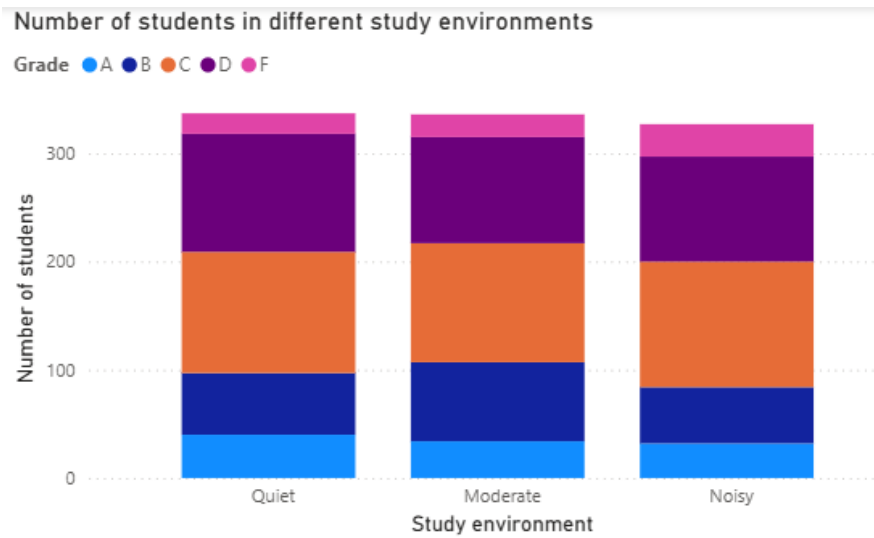


Fig. 6, bar charts about study environments and screen time hours

Fig. 6 shows no strong correlation between screen time hours and grades and it's the same for study environment. No strong correlation was observed between final score and exam anxiety score within this dataset.

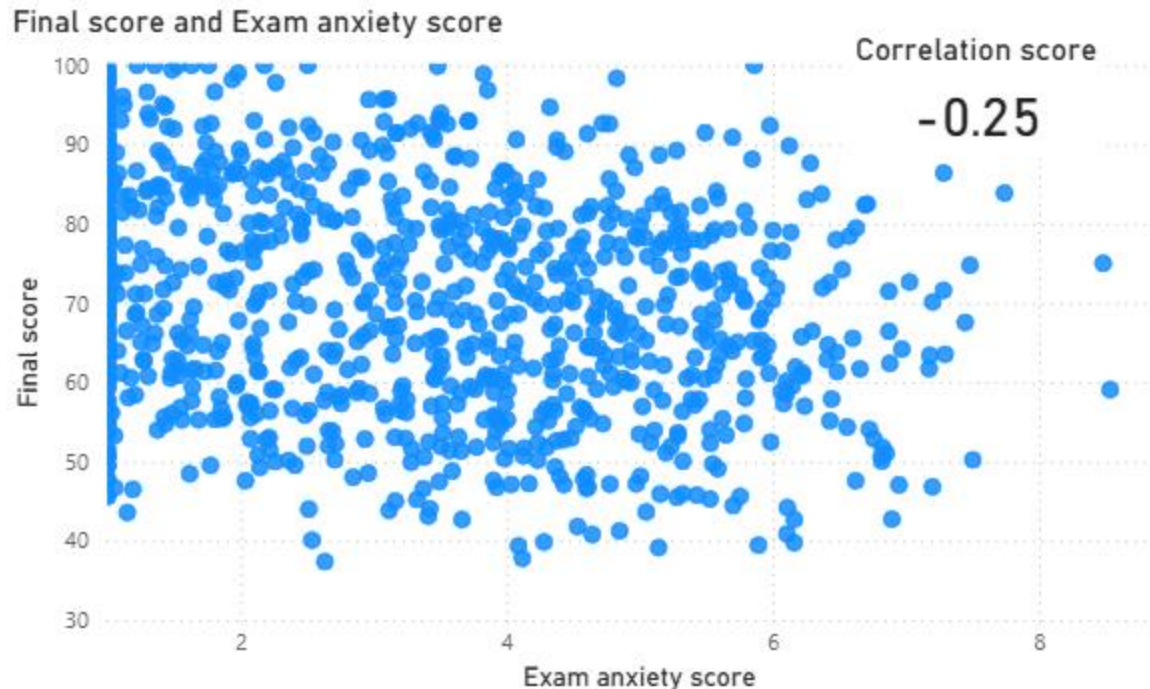


Fig. 7, scatterplot of Final score and Exam anxiety score

Recommendations

Based on these results, the recommendations would be for students to maintain structured daily study routines of approximately 2-4 hours and complete more homework as it shows that it contributes to a better grade. The school should also encourage students to maintain high attendance as much as possible so as not to fall behind with content.

Limitations

The dataset has limitations. It is a dataset extracted from Kaggle, and the original author stated that all records have been synthetically created. This could be a reason as to why some results do not match initial expectations.

Conclusion

Academic behaviours, particularly study duration, homework completion, and attendance, appear to show the strongest associations with student performance. Environmental and

lifestyle factors showed comparatively limited influence within this synthetic dataset. These findings suggest that structured academic behaviours are more strongly associated with student performance than lifestyle or environmental factors within this synthetic dataset.