Assignment Data Science DAI-101

Real-world Dataset Analysis using Data Science
ANALYSIS REPORT

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Chosen dataset - Student Performance Factors
Source: https://www.kaggle.com/datasets/lainguyn123/student-performance-factors

Introduction

This report presents an exploratory analysis aimed at understanding the various factors influencing student performance using a dataset that captures multiple dimensions of student profile including exam scores, demographic details, and background information. We investigate how these factors correlate with academic outcomes.

Key Insights and Conclusions

Our exploratory data analysis reveals several crucial factors influencing student performance, shedding light on what contributes to higher exam scores and what does not. Here are the key takeaways from the study:

1. Strong Correlation Between Study Hours, Attendance, and Exam Scores

Students who dedicated more hours to studying and maintained high attendance records performed significantly better in exams. This aligns with the expectation that consistent effort and engagement in class are essential for academic success. Regular attendance ensures better grasping of concepts, while additional study hours reinforce learning and improve retention.

Attendance vs. Exam Score


Hours Studied vs. Exam Score
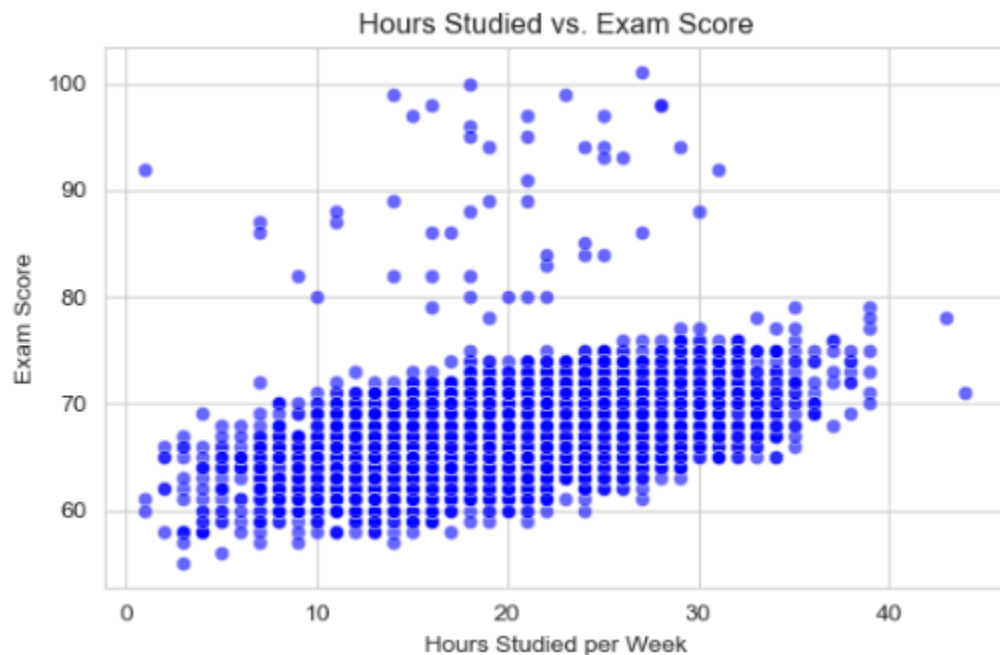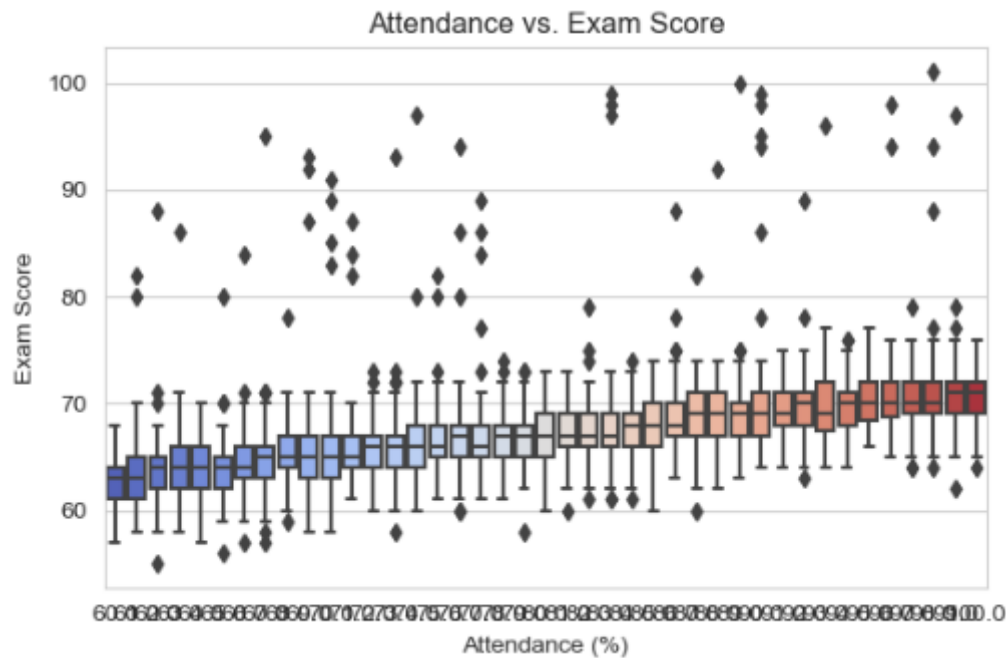
2. Moderate Influence of Previous Scores and Tutoring Sessions

Past academic performance and the number of tutoring sessions attended had a noticeable, albeit moderate, impact on final scores. While tutoring sessions provided additional academic support, they were not the sole determinant of success. Similarly, students who had performed well in previous exams tended to continue performing well, though other external factors also played a role in their progress.

Tutoring Sessions vs. Exam Score
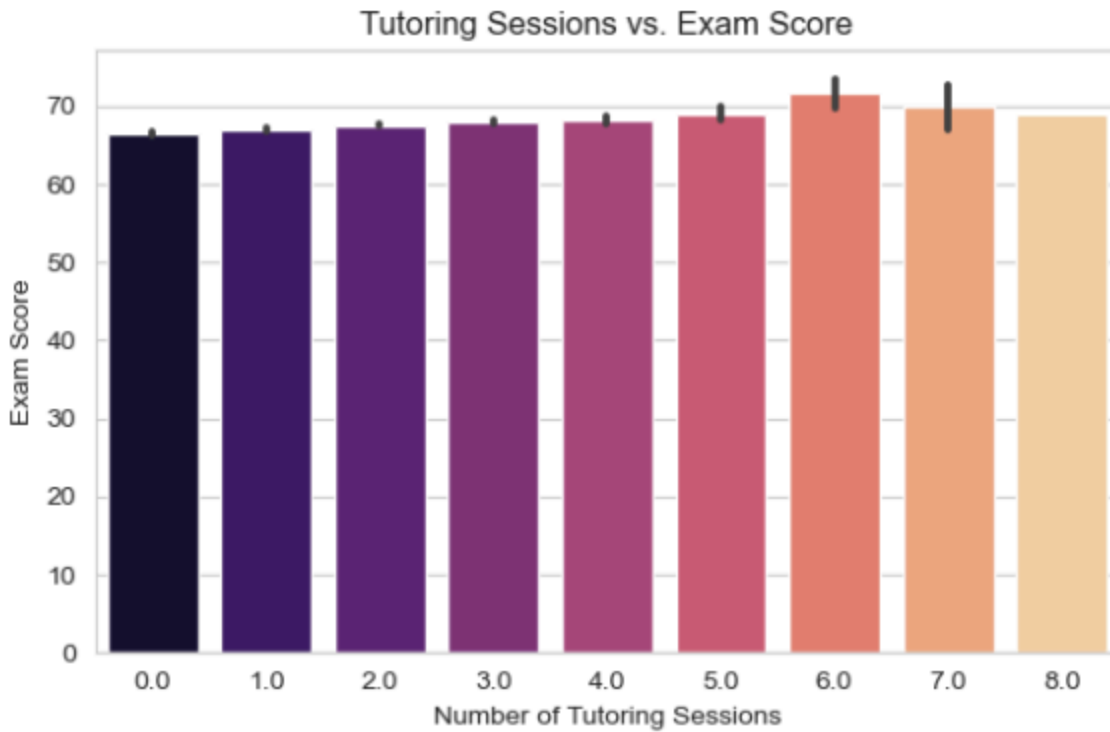
## 3. No Significant Impact of Sleep on Exam Scores

Contrary to common belief, the number of hours students slept did not have a direct positive correlation with their academic performance. In fact, there was a slight negative correlation, indicating that excessive sleep might be associated with lower study time or less focus on academic activities. However, this does not imply that sleep is unimportant—rather, an optimal balance is crucial for maintaining cognitive function.

Sleep Hours vs. Exam Score
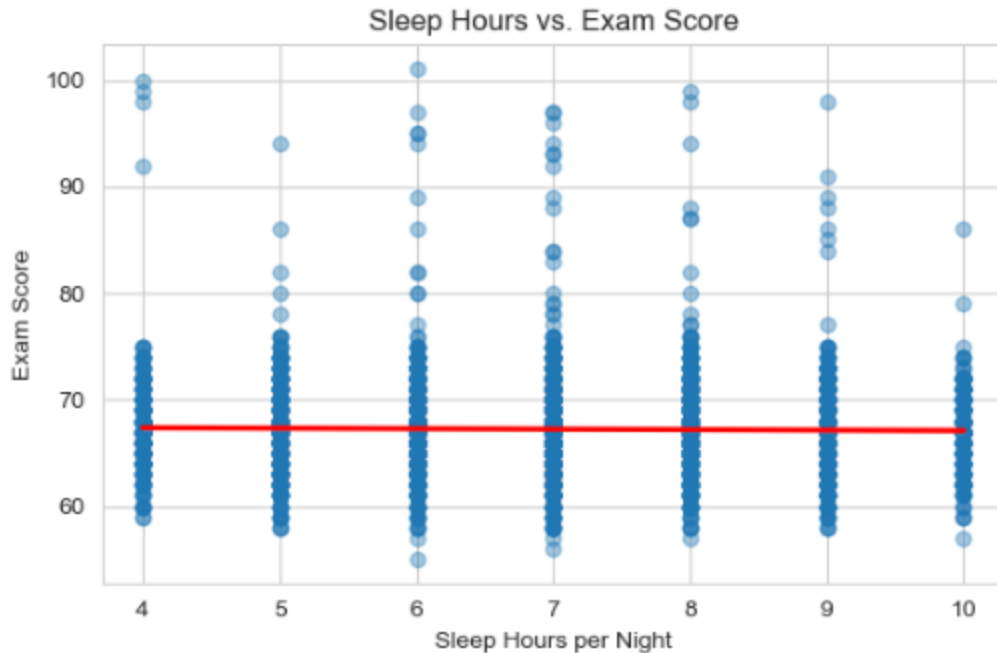
## 4. Higher Parental Involvement and Access to Resources Boost Performance

Students who had strong parental support, access to better study materials, and higher motivation levels performed better overall. Parental guidance and encouragement played a pivotal role in keeping students focused, while access to educational resources such as books, tutoring, and study environments contributed to better preparedness for exams.

Access to Resources vs. Exam Score

Parental Involvement vs. Exam Score


Internet Access vs. Exam Score
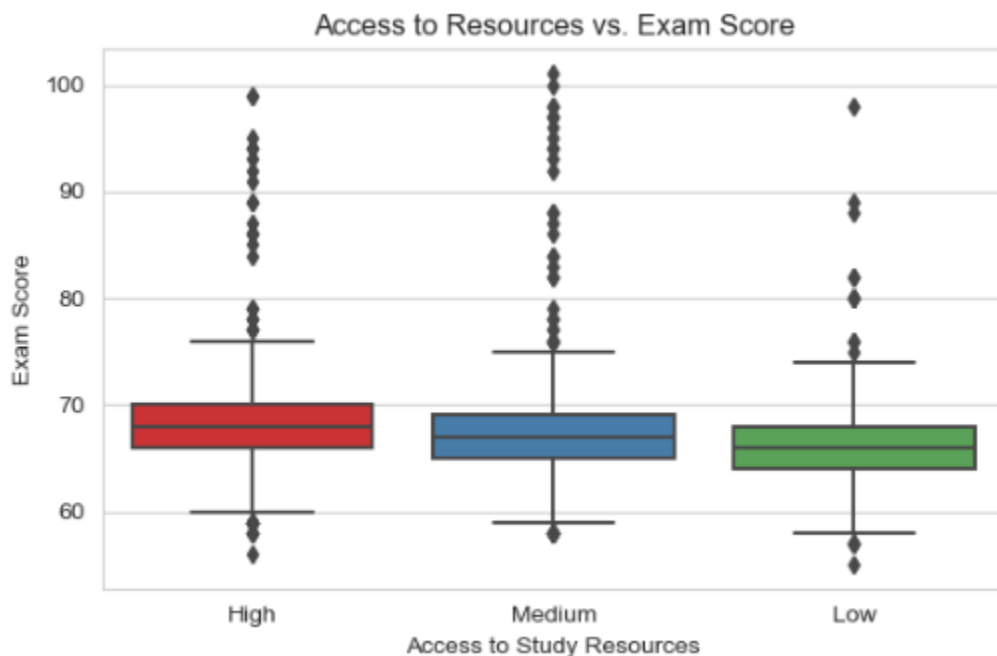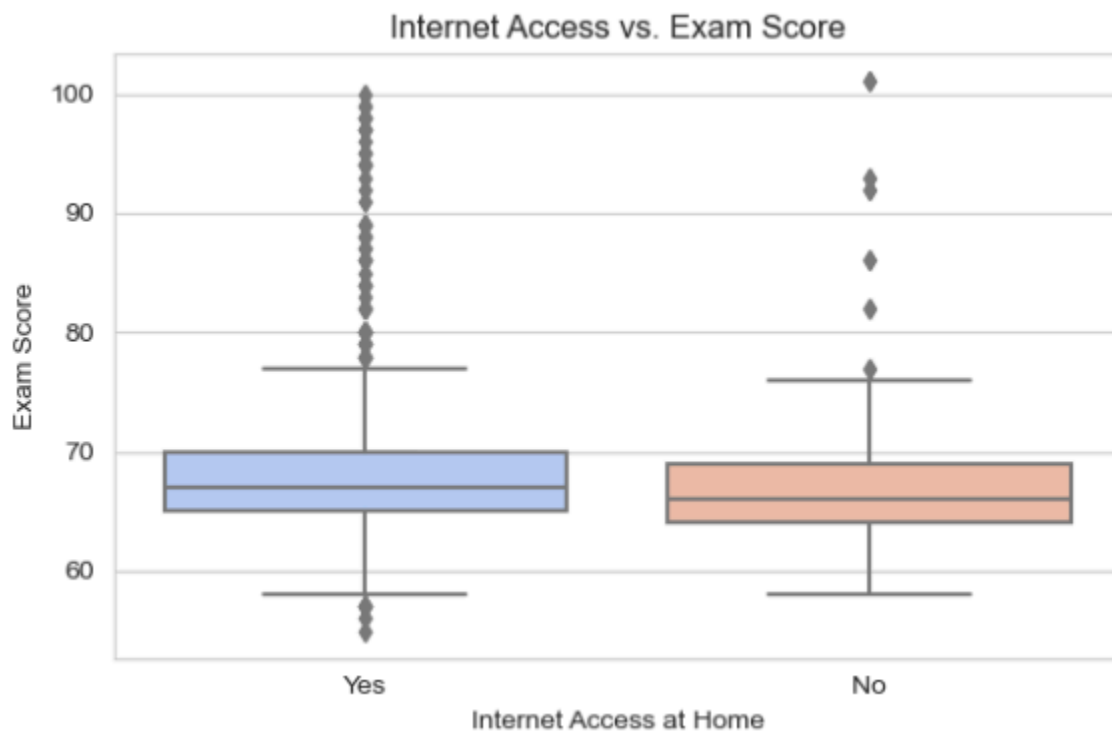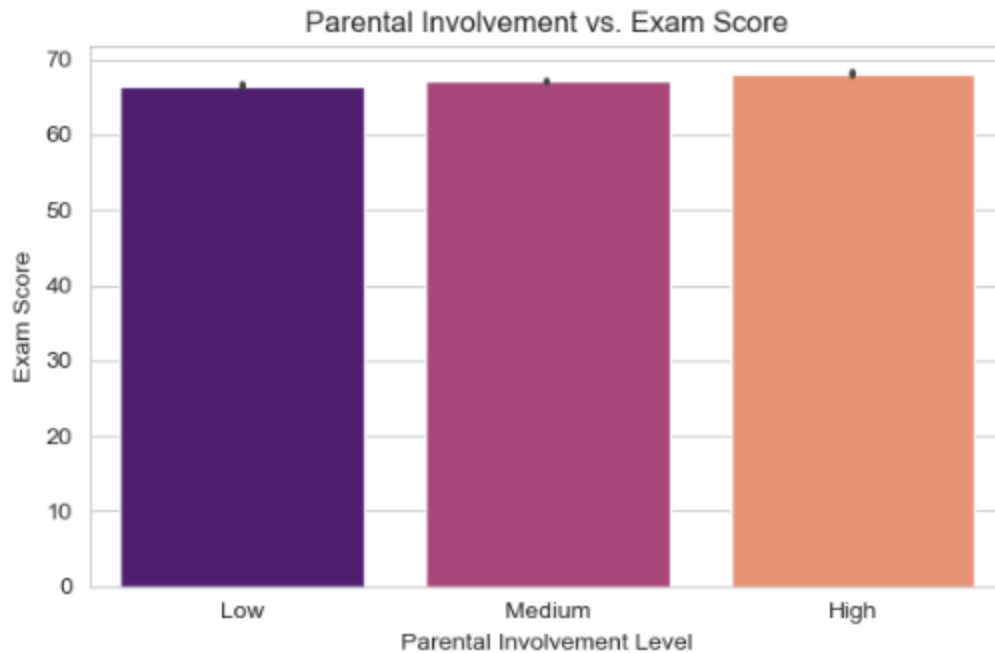
5. Public vs. Private Schools Showed Minimal Differences in Scores

Despite common assumptions that private schools provide a superior academic environment, our analysis found that students from public and private schools had very similar exam scores. This suggests that individual effort, parental support, and study habits might be more critical than the type of institution attended.

School Type vs. Exam Score
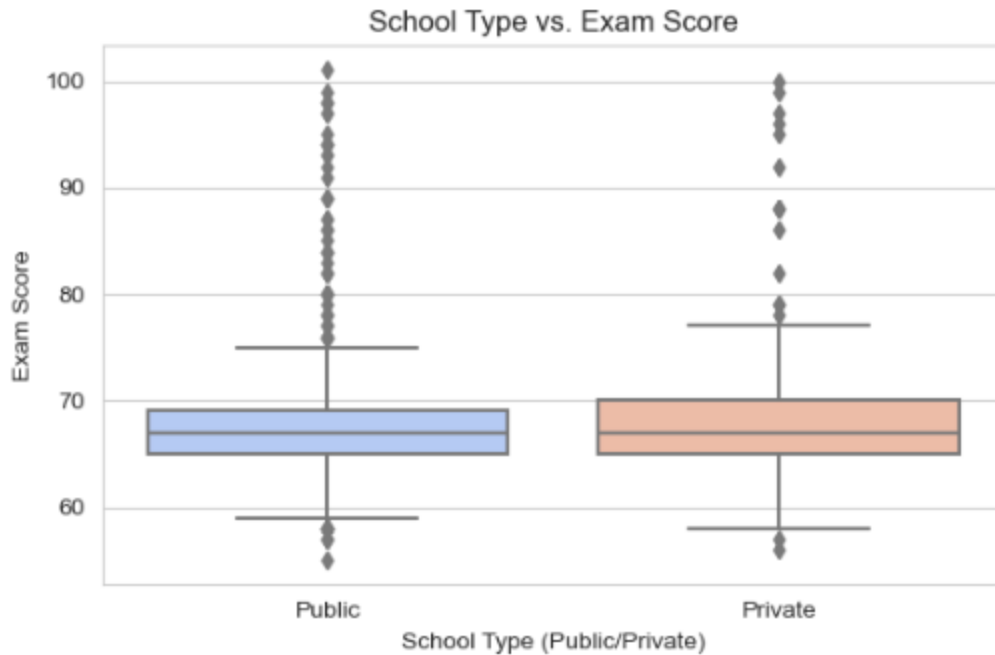
6. Extra-Curricular Activities Had a Positive Impact on Scores

Engaging in non-academic activities such as sports, music, or clubs positively influenced academic performance. Students involved in such activities tended to develop better time management skills, increased discipline, and higher levels of motivation, which translated into better academic outcomes. This reinforces the importance of a well-rounded educational approach that balances both academics and personal development.

Extracurricular Activities vs. Exam Score
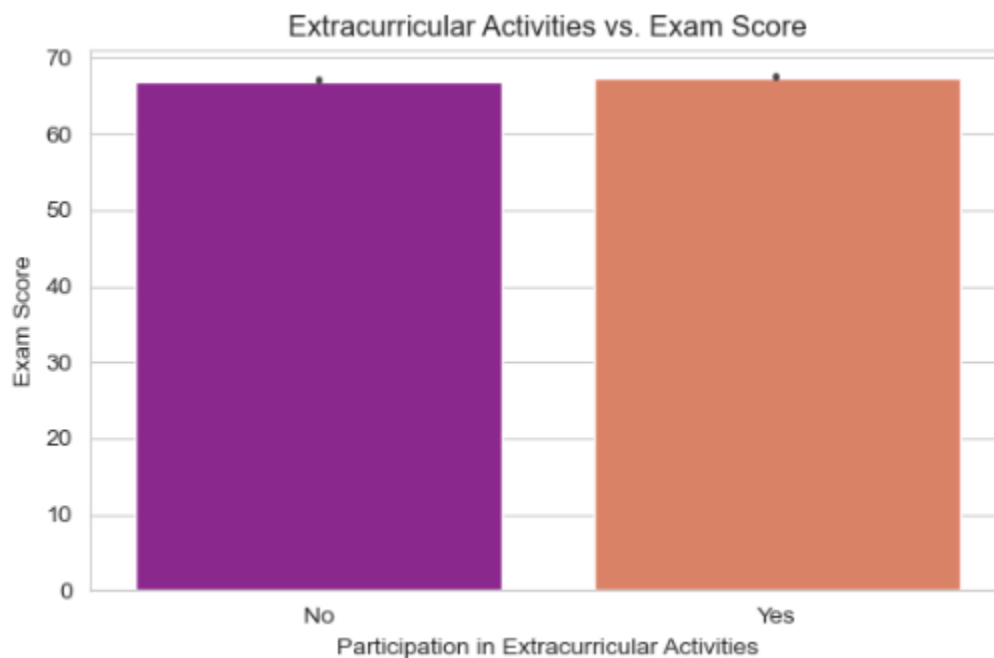
7. Gender Had No Significant Impact on Exam Scores

Our analysis found no substantial difference in performance based on gender. Male and female students performed at similar levels, indicating that factors such as study habits, motivation, and support systems play a far more crucial role in determining academic success than gender differences.

8. Learning Disabilities Had a Major Impact on Exam Scores

Students with learning disabilities faced significant challenges in achieving high exam scores. The data revealed a noticeable gap in performance between students with and without learning disabilities. This could be attributed to difficulties in processing information, slower comprehension rates, and the need for specialized learning strategies. Without appropriate support mechanisms, these students often struggle to keep up with traditional learning methods.
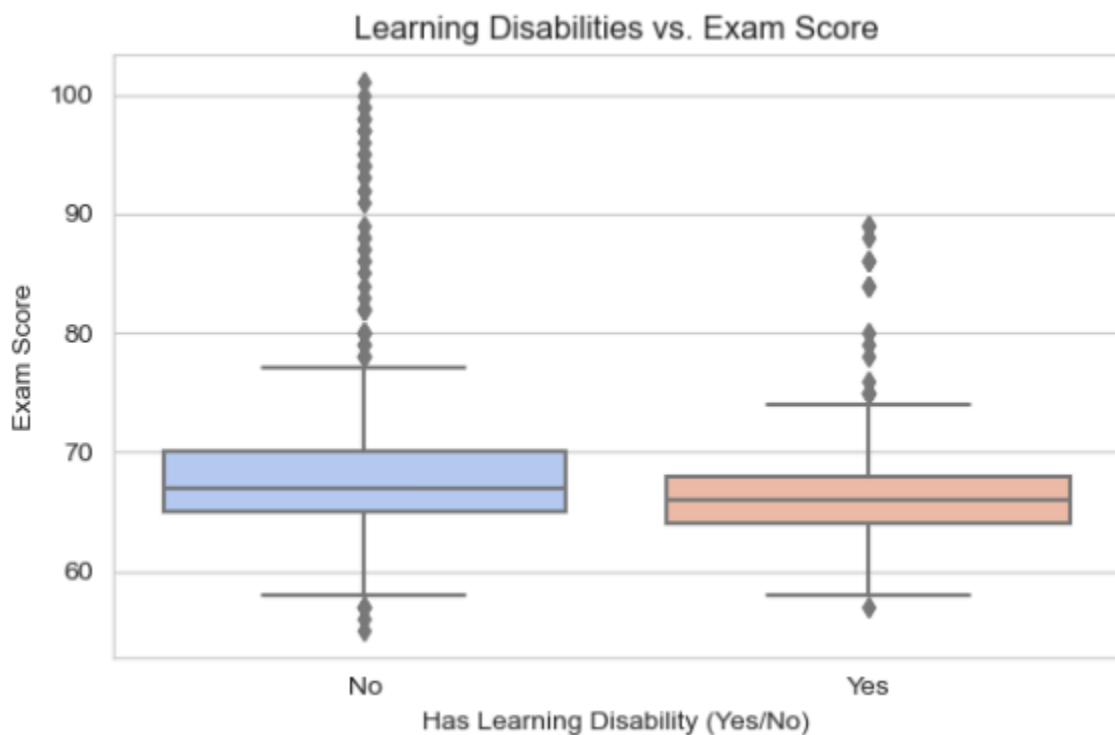

9. Peer Influence Had a Negligible Effect on Exam Scores

Surprisingly, the impact of peer influence on academic performance was minimal. While social interactions and friendships play a role in shaping a student's overall development, they did not significantly affect exam scores. This suggests that personal study habits, motivation, and family support are more critical in determining academic success.

Peer Influence vs. Exam Score
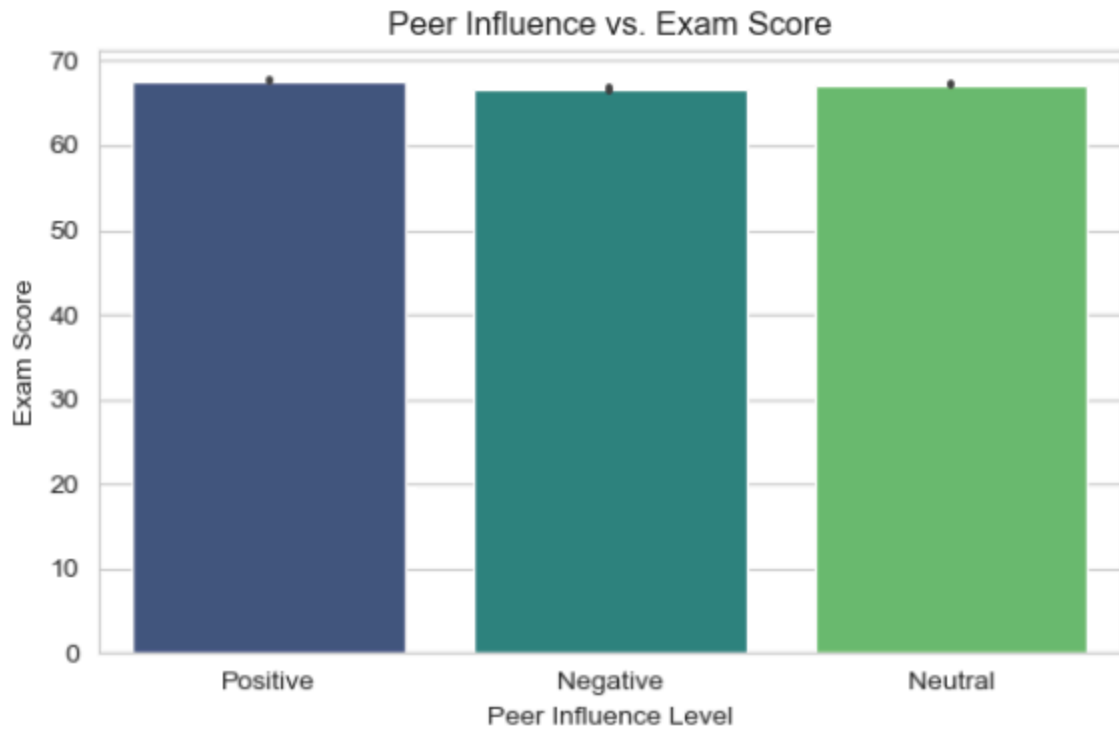
10. Family Income Had a Decent Impact on Scores

Students from higher-income families generally performed better, likely due to greater access to educational resources such as private tutoring, study materials, and a conducive learning environment. However, the effect was not overwhelmingly strong, indicating that personal effort, motivation, and parental involvement still played a more significant role in academic success.

Family Income vs. Exam Score
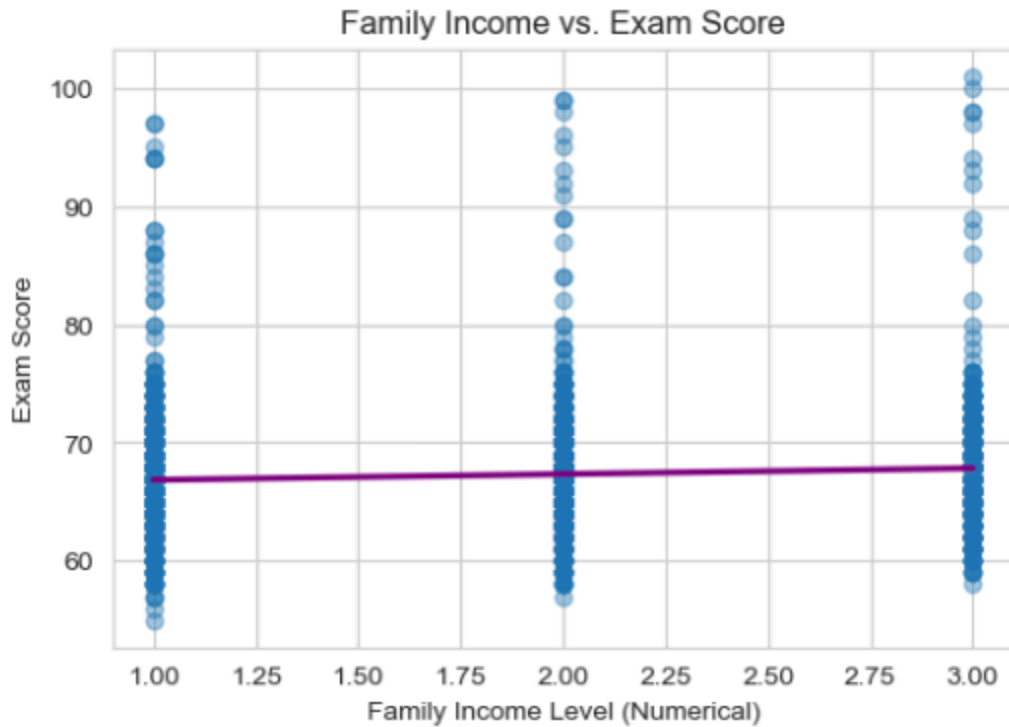
Conclusion

The findings highlight the importance of disciplined study habits, consistent attendance, parental support, and involvement in extra-curricular activities for academic success. While external factors like school type and gender had minimal impact, internal factors such as motivation, effort, and resource accessibility played a defining role. Encouraging students to develop effective study routines, seek academic support when needed, and maintain a balanced lifestyle can significantly improve their educational outcomes.