

STUDENT PERFORMANCE FACTORS

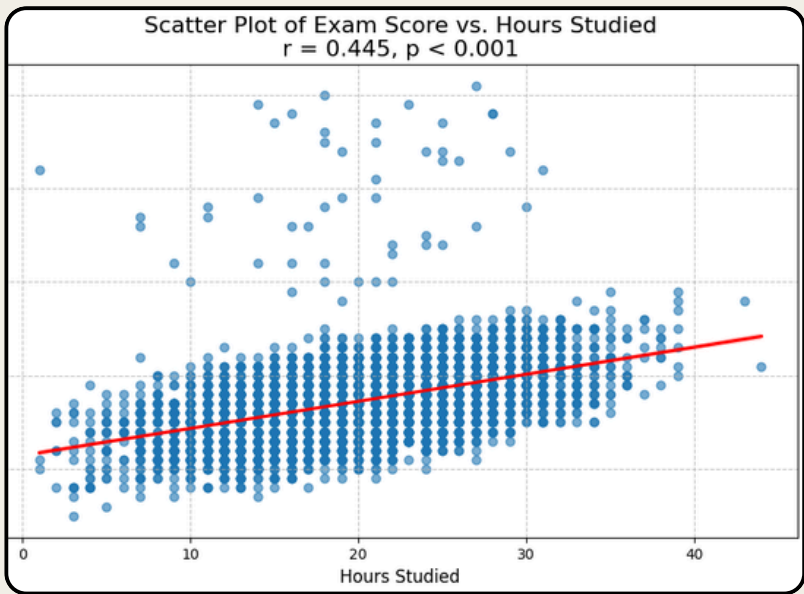
INTRODUCTION

Understanding what drives academic success is vital for educators, parents, and students. This research, "Decoding the Student Success Equation," investigates how various factors—including study habits, prior academic performance, parental involvement, external tutoring, and school environment—collectively influence student exam scores. We've used a simulated dataset and statistical hypothesis tests to uncover significant relationships and gain a deeper understanding of student performance.

ANALYSIS 1

Analysis of the Baseline Effect of Study Hours

- The Pearson correlation analysis revealed a statistically significant positive linear correlation between Hours_Studied and Exam_Score.
- Pearson Correlation Coefficient (r): 0.445
- P-value: 0.000 ($p < 0.001$)
- 95% Confidence Interval for Pearson r: [0.419, 0.475]
- Decision: We reject the null hypothesis (H_0).



HYPOTHESIS

All of these factors affect student exam scores:

- Study Habits
- Prior Academic Performance
- Parental Involvement
- External Tutoring
- School Environment

ANALYSIS 3

The Additive Effect of Parental Involvement The One-Way ANOVA revealed a statistically significant difference in mean Exam_Score across the different levels of Parental_Involvement.

- ANOVA F-statistic: 84.488
- ANOVA P-value: 0.000 ($p < 0.001$)

Here are the mean Exam_Scores and their 95% Confidence Intervals for each group:

- Low Parental Involvement: Mean Exam_Score: 66.36
- 95% CI: [66.15, 66.57]
- Medium Parental Involvement: Mean Exam_Score: 67.10
- 95% CI: [66.97, 67.22]
- High Parental Involvement: Mean Exam_Score: 68.09
- 95% CI: [67.92, 68.27]

Decision: We reject the null hypothesis (H_0).

ANALYSIS 2

Analysis of the Moderating Role of Prior Knowledge

Hypothesis 2a: For High Previous Scorers

- Pearson Correlation Coefficient (r_1): 0.453
- P-value (p_1): 0.000 ($p < 0.001$)
- 95% Confidence Interval for r_1 : [0.417, 0.493]
- Decision: We reject the null hypothesis (H_0).

Hypothesis 2b: For Low Previous Scorers

- Pearson Correlation Coefficient (r_2): 0.442
- P-value (p_2): 0.000 ($p < 0.001$)
- 95% Confidence Interval for r_2 : [0.400, 0.481]
- Decision: We reject the null hypothesis (H_0).

Z-test for Comparing Correlation Coefficients (r_1 vs r_2)

- Z-statistic (r_1 vs r_2): 0.578
- P-value (Z-test): 0.563
- Decision: We fail to reject the null hypothesis (H_0 : $r_1 = r_2$) as p-value (0.563) \geq alpha (0.05).
- Interpretation: No statistically significant difference in the correlation strength between groups. Prior knowledge does not significantly amplify study time effectiveness.

ANALYSIS 4

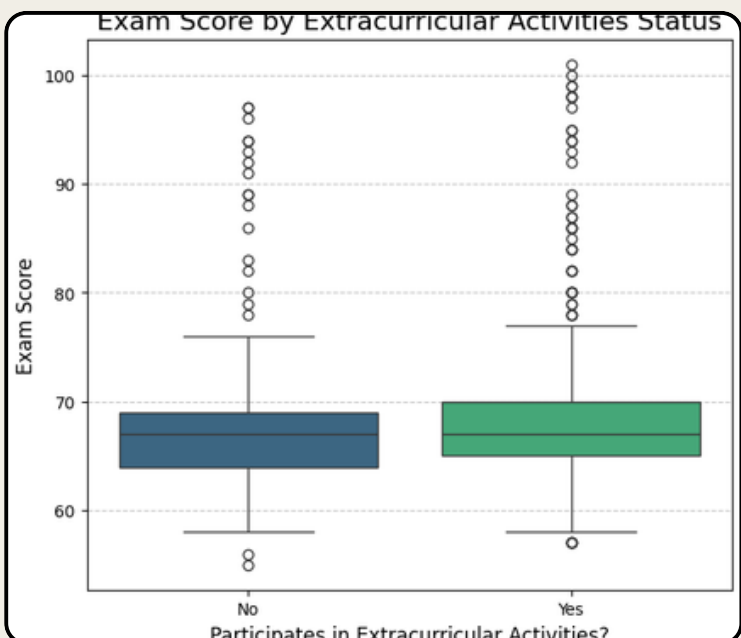
The independent samples t-test revealed a statistically significant difference in mean Exam_Score between students who participate in Extracurricular_Activities and those who do not.

- T-statistic: 5.243
- P-value: 0.000 ($p < 0.001$)

Here are the mean Exam_Scores and their 95% Confidence Intervals for both groups:

- Extracurricular Activities: Yes Mean Exam_Score: 67.44
- 95% CI: [67.32, 67.56]
- Extracurricular Activities: No Mean Exam_Score: 66.93
- 95% CI: [66.79, 67.08]

Decision: We reject the null hypothesis.



ANALYSIS 5

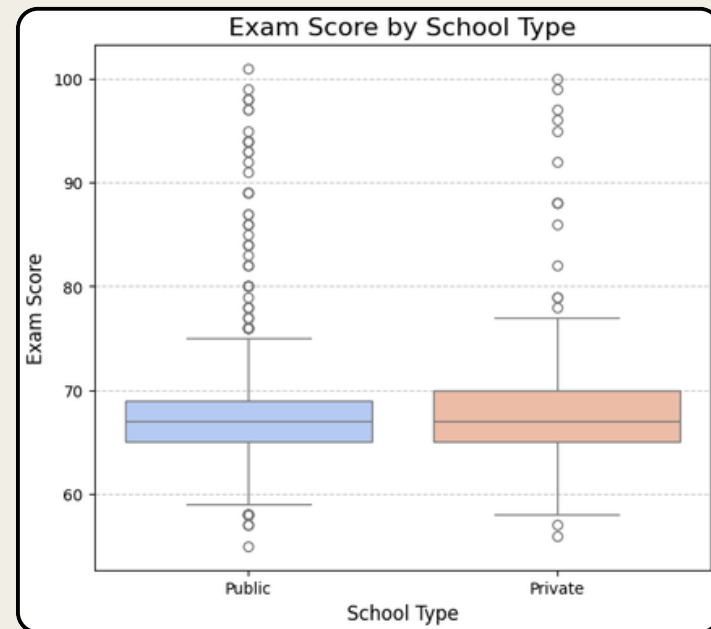
School Type and Exam Performance The independent samples t-test revealed no statistically significant difference in mean Exam_Score between students attending Public schools versus Private schools.

- T-statistic: -0.719
- P-value: 0.472 ($p > 0.05$)

Here are the mean Exam_Scores and their 95% Confidence Intervals for both groups:

- School Type: Public Mean Exam_Score: 67.21
- 95% CI: [67.10, 67.33]
- School Type: Private Mean Exam_Score: 67.29
- 95% CI: [67.12, 67.46]

Decision: We fail to reject the null hypothesis (H_0).



CONCLUSION

Student exam success is influenced by a complex interplay of factors. Individual effort, particularly Hours_Studied, is foundational, but Previous_Scores do not significantly amplify its benefits. Home support through Parental_Involvement significantly boosts scores. Extracurricular Activities also positively contribute, supporting a holistic development approach. Surprisingly, School_Type (Public vs. Private) showed no independent significant impact on average scores.