Project Report: Analysis of Factors Influencing Student Math Performance

1. Executive Summary

This report analyzes student Math performance data across three primary domains: **Inter-subject Correlation**, **Teaching Quality Metrics**, and **School Infrastructure Availability**. The objective is to identify key factors that drive achievement and potential bottlenecks in student success. The analysis reveals a strong positive correlation across subjects, highlights the importance of **teacher training** over mere experience or class ratio, and conclusively demonstrates a significant positive association between **basic school infrastructure** (especially Internet and Electricity) and higher Math scores. These insights provide a data-driven foundation for strategic educational investment.

[**Link to live Dashboard:**

https://app.powerbi.com/view?r=eyJrIjoiYjU1ZWQ4N2QtMmMzOC00ZTRlLThiMDktNGI0YTZmYTE4ZjJlIiwidCI6IjVjZTJiMzZmLTA0OTMtNGU5MC1hOWJjLThmNWFhYTc1OTQ2ZCJ9]

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2. Introduction and Methodology

2.1 Project Goal

To analyze and identify the most influential factors affecting student performance in Mathematics based on internal school data, categorized into student achievement, teacher attributes, and physical school resources.

2.2 Data Sources

Three primary data sets were analyzed:

1. Student Subject Scores (Math, Science, Language).
2. Teacher Attributes (Experience, Training, Student Ratio).
3. School Infrastructure (Library, Electricity, Toilets, Internet).

2.3 Math Grade Categories

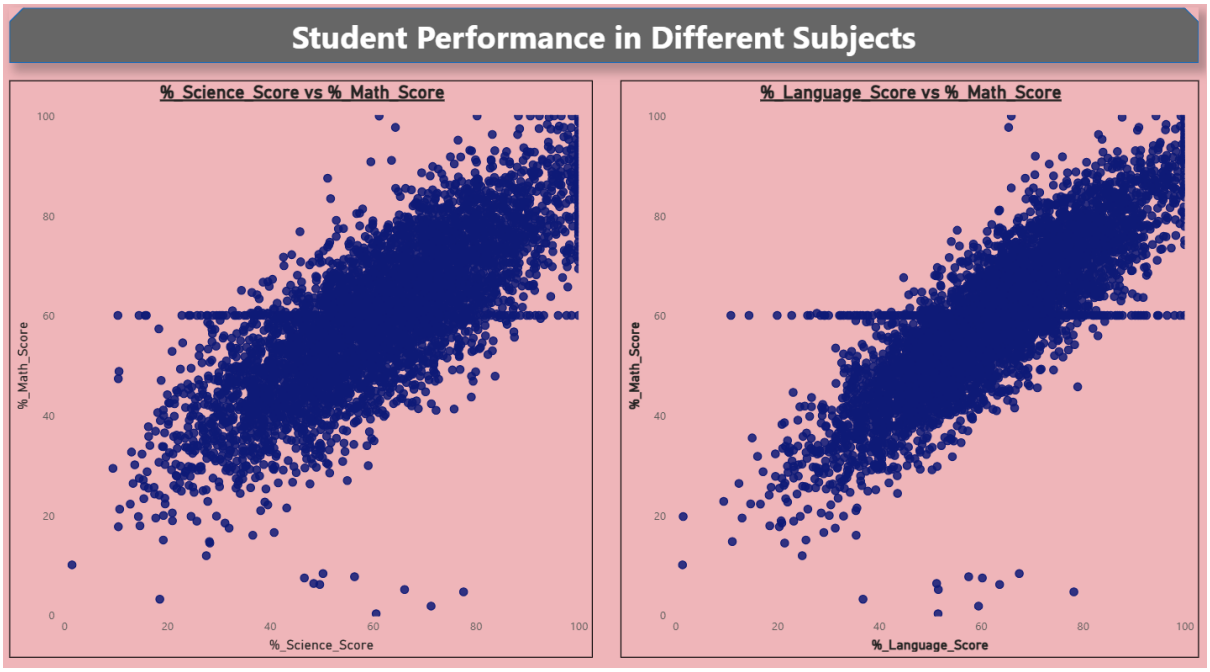
Scores were segmented into four performance bands:

- **Excellent:** 90-100
- **Very Good:** 80-90
- **Good:** 55-80
- **Fair:** 35-55
- **Fail:** 0-35

3. Findings

3.1 Inter-Subject Score Relationship

The analysis of student scores across Math, Science, and Language reveals a strong general trend in student aptitude.

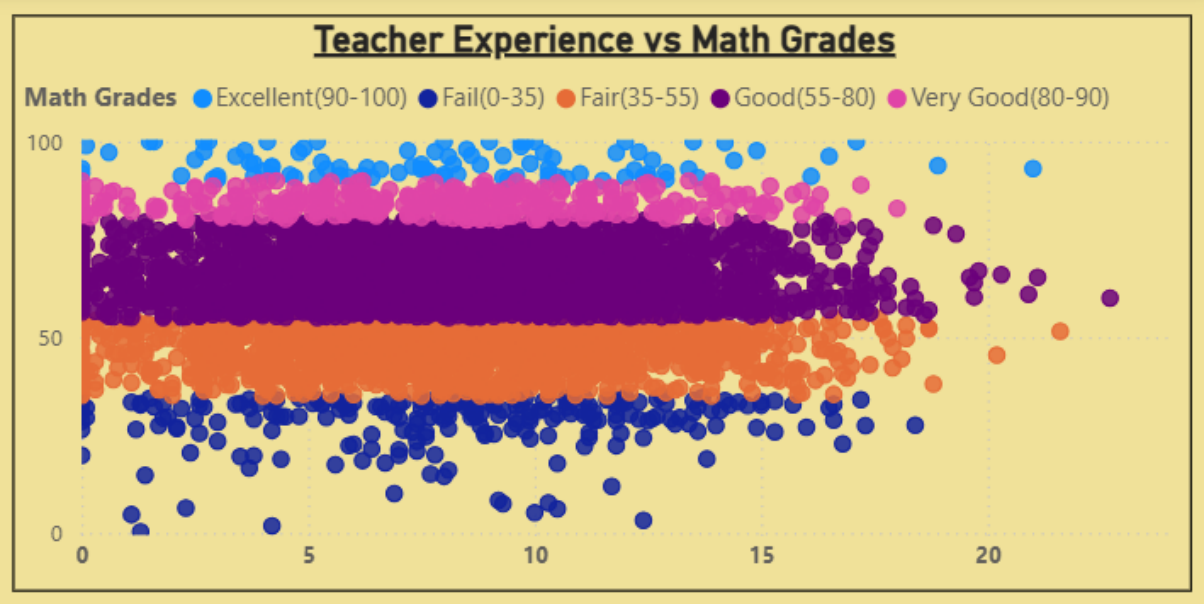


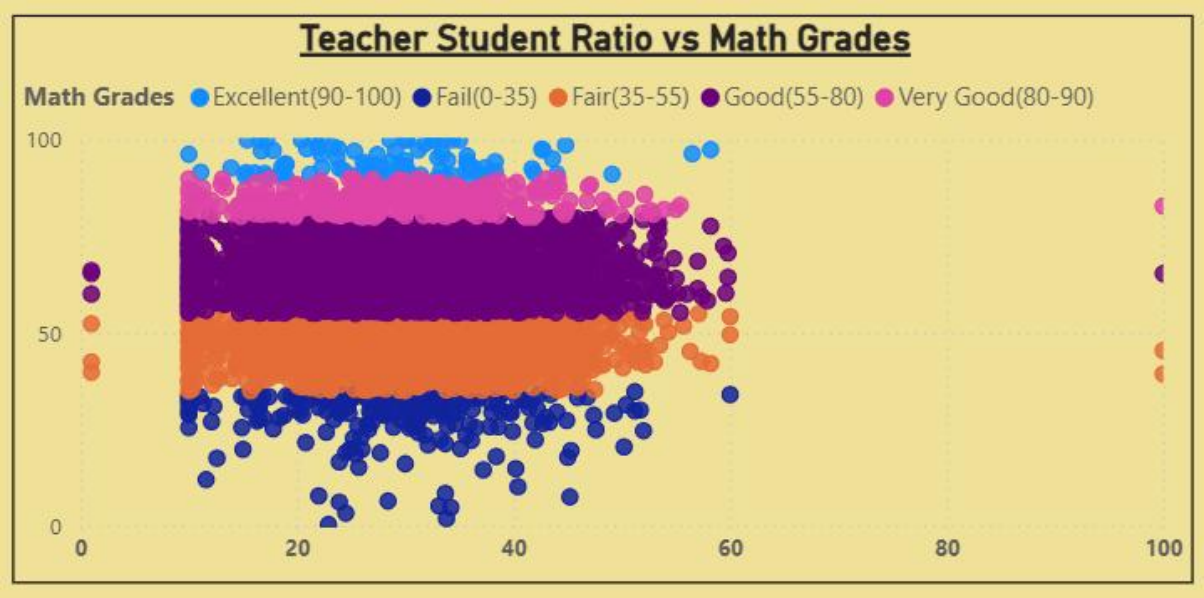
Strong Positive Correlation: Students performing well in Math generally perform well in Science and Language, indicating a strong general academic ability.

Equal Relationship Strength: The correlation between Math and Science is visually similar to the correlation between Math and Language, suggesting a balanced relationship across the three subjects.

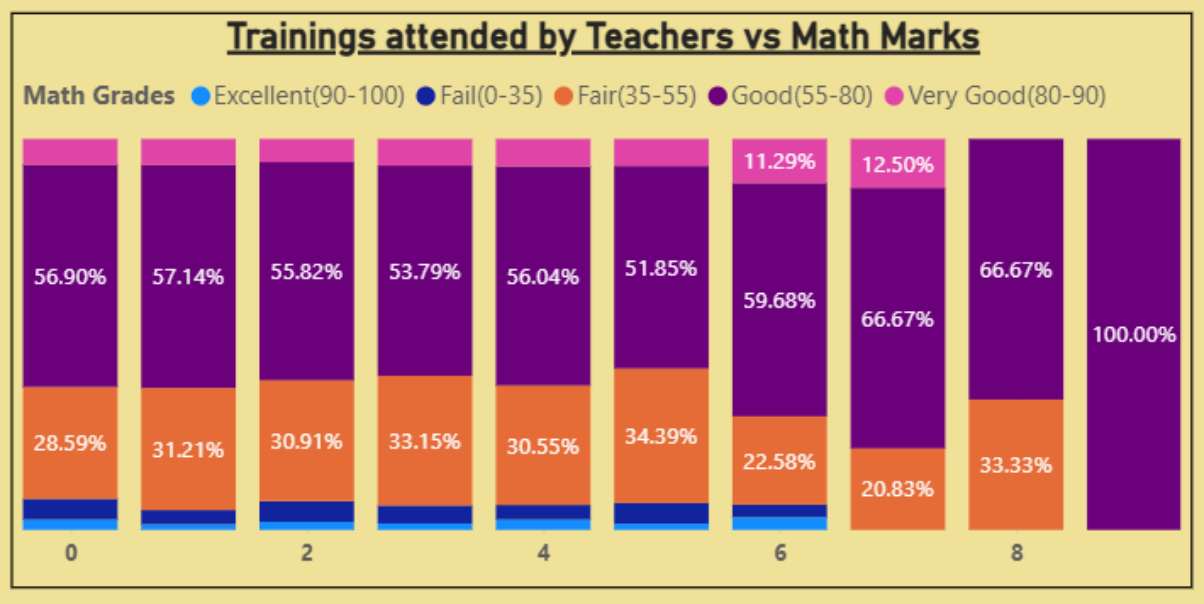
3.2 Impact of Teaching Quality

Teacher-related metrics were analyzed to determine which factors drive student success.

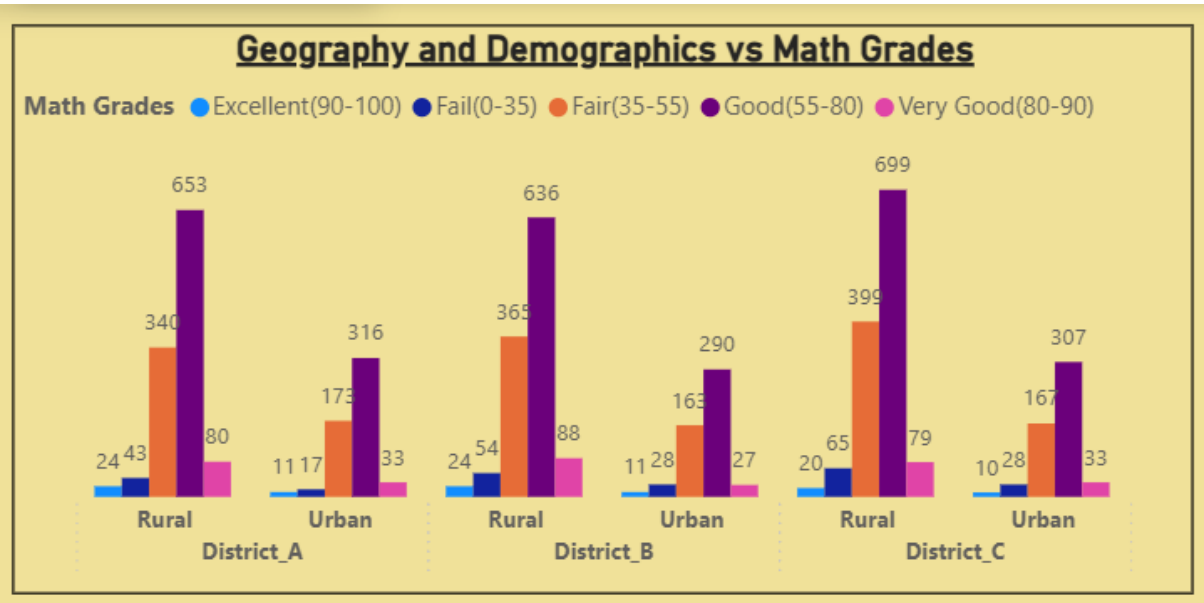




No Direct Correlation: Neither a teacher's **total years of experience** nor the **Teacher-Student Ratio** showed a strong or direct correlation with the proportion of Excellent or Failing Math grades. High and low grades were observed across all experience levels and class sizes.



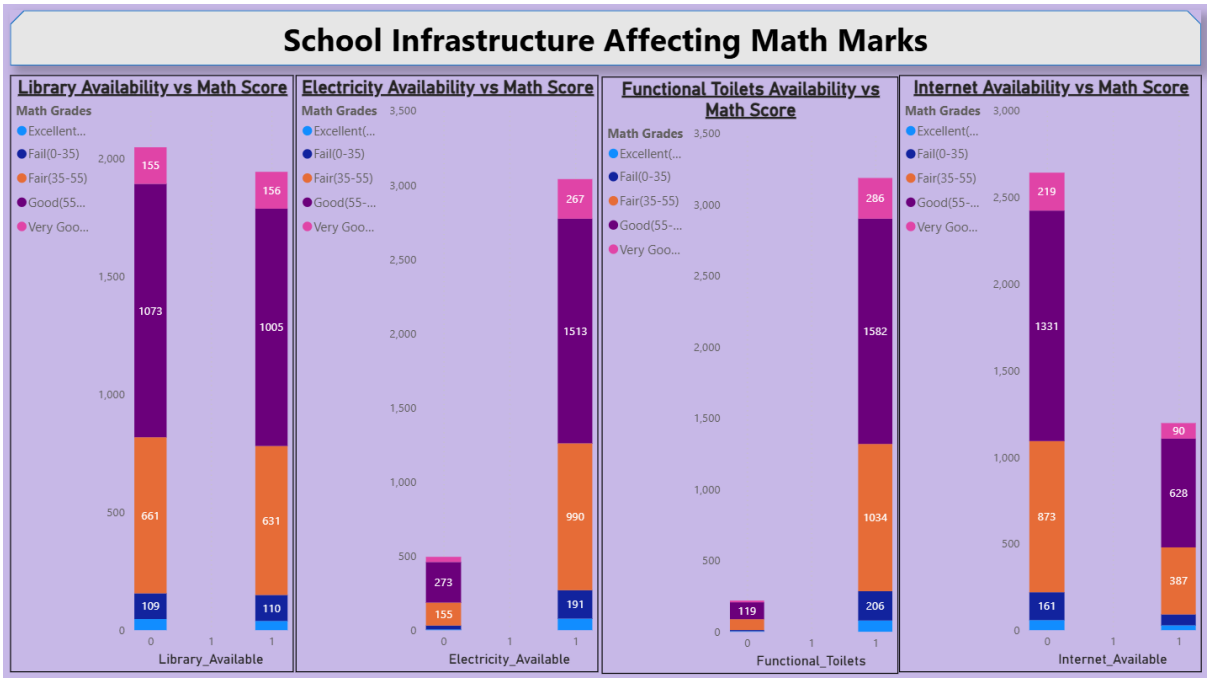
Training is Critical: A **strong positive relationship** exists between the number of trainings a teacher attends and student performance. Teachers with **6 or more trainings** had the lowest proportional rate of failing students 20% and the highest proportional rate of excellent students 66%.



Urban Advantage: Urban areas generally produce more students with **Excellent grades (90-100)** across all districts compared to rural areas.

3.3 Impact of School Infrastructure

The availability of basic physical and technological resources was highly correlated with student outcomes



Infrastructure is a Prerequisite: Schools with **any of the four resources available** (Library, Electricity, Toilets, Internet) educate a significantly larger total number of students and produce a vastly higher absolute number of high-performing students.

Internet is Key for Excellence: The availability of **Internet** was associated with the single largest number of students achieving **Excellent Grades**, suggesting it may be the most powerful differentiator for top performance.

Proportional Failure Reduction: Schools **lacking** essential infrastructure (especially Electricity and Internet) showed a **higher proportional rate of Failing Grades** compared to schools that had the resources.

4. Recommendations

Based on the evidence, the following strategic priorities are recommended:

1. **Prioritize Teacher Professional Development (Training):** Since training attendance showed the clearest positive impact on reducing failures and boosting excellent grades, investment should be focused on increasing teacher participation in **high-quality, frequent training programs** (aiming for a minimum of 6 sessions).
2. **Ensure Universal Infrastructure Access:** Immediate, targeted investment is needed to ensure **100% availability of Electricity and Internet** in all schools, as these resources are most strongly correlated with higher overall student achievement and are a prerequisite for competitive education.
3. **Investigate the 60\% Math Score Cluster:** A deep-dive analysis is required to understand the cause of the dense cluster of students at the 60% Math score, as

this may indicate an artificial ceiling, a common teaching method, or a test design flaw that is limiting growth for a large group of students.

4. **Targeted Urban-Rural Equity:** Implement programs specifically aimed at boosting resources and outcomes in **Rural schools** to address the current disparity in Excellent and Failing rates observed across districts.

5. Conclusion

This analysis confirms that student Math success is driven less by traditional metrics like class size or teacher tenure, and more by **active inputs**—namely **ongoing teacher training** and the **provision of modern infrastructure**. Future efforts to improve Math performance should strategically allocate resources to these two domains for the greatest possible impact.