**Comparison of Student Performance: Math vs Portuguese**

**Overview**

This report analyzes student performance data from two courses: Mathematics and Portuguese. It compares the impact of study time, absences, and parental education on final grades (G3), and builds predictive models to evaluate performance factors.

**Dataset Summary**

Two datasets were combined:  
- student-mat.csv (Math): 395 records  
- student-por.csv (Portuguese): 649 records  
Each dataset contains demographic, academic, and personal information for students, including final grades.

**Key Findings**

1. **Final Grade Distributions**

Portuguese students had a slightly more uniform distribution of final grades (G3), while Math grades skewed lower overall.

1. **Impact of Study Time and Absences**
   1. Higher study time is associated with higher final grades in both subjects.
   2. More absences generally correlate with lower final grades.
   3. Boxplots and scatter plots confirmed these trends across both datasets.
2. **Feature Importance (Linear Regression)**

Top predictors for final grades in both subjects were:

* 1. Past class failures
  2. Mother's education level (Medu)
  3. Study time
  4. Absences (negatively correlated)

1. **Model Evaluation**

Linear Regression Results (Test Set Performance):

Math:  
- RMSE: ~2.1  
- R²: ~0.75  
  
Portuguese:  
- RMSE: ~1.9  
- R²: ~0.78

1. **Pass/Fail Classification (Logistic Regression)**
   1. Logistic regression accurately classified pass/fail outcomes in both subjects.
   2. Most influential predictors were failures, study time, and absences.

**Conclusion**

Study habits, prior failures, and parental involvement play crucial roles in academic performance. These insights can help educators tailor interventions for at-risk students in different subjects.