Delhi Government Education Performance Dashboard and Strategic Reporting (2023-2024)

Interactive visualization and executive reporting via Power BI showcasing key educational metrics, equity analysis, and policy recommendations.

Portfolio & Analytic Report

Executive Summary

This report presents a full-cycle data analytics solution applied to Delhi's 2023–2024 school performance data. It uses PostgreSQL (SQL) for data engineering, Python (pandas, SQLAlchemy, Jupyter Notebook) for feature engineering, and Power BI for visualization to reveal critical trends and actionable insights on educational quality, gender equity, school infrastructure, and district-level outcomes.

The work demonstrates strong technical proficiency, attention to detail, and the ability to translate raw data into actionable strategy. Green-highlighted districts consistently emerge as top performers, while red-flagged districts indicate areas that require urgent intervention.

Tools Used

SQL (PostgreSQL) → complex joins, CTEs, KPI calculations

Python (pandas, sqlalchemy, Jupyter Notebook) → feature engineering, automation, CSV export

Power BI → dashboards, interactive visuals, KPI-driven storytelling

Data Engineering and Preparation

SQL Approach

Extracted district, school, and student data using joins and CTEs.

Calculated gender percentages, pass rates, and school distributions.

Aggregated metrics (quality indexes, pass differences, gender parity) for 16 districts and 3 zones.

Python Analysis

Engineered features: gender_parity_index, quality_index_change, and proportions.

Automated summary statistics for district dashboards (average quality index, pass difference, top/bottom districts).

Exported analysis-ready CSV powering the Power BI dashboard.

Analytical Insights

1. Education Performance Highlights

South West B-2: Class X = 98.25%, Class XII = 99.51%, Quality Index = 292.23/334.8

South West B-1: Quality Index = 293.6/328.72, avg = 45.40 (highest)

North East-1: Class X = 89.32% (lowest), Quality Index = 265.52 (lowest)

Central: Only district with negative pass rate change (–1.34%) despite moderate quality.

New Delhi: Consistently weak, with Class X = 94.19% and Quality Index = 272.13.

2. Gender Equity & Demographics

City-wide Gender Parity Index = 1.08

Girls = 52.02% of ~7M students (Boys = 47.98%)

Highest girls' proportion: Central (2.28)

Lowest girls' proportion: New Delhi (1.92)

Top parity: West A (4.52), West B (4.28)

3. School Infrastructure

Total schools = 4,000

Evenly distributed across Primary, Middle, Secondary, Sr. Secondary (25% each).

4. Quality Index (Class X & XII – Top 5 Districts)

South West B-1 → 293.6 / 328.72

South West B-2 → 292.23 / 334.8

West B → 284.02 / 317.31

West A → 282.52 / 316.37

South West A → 276.16 / 313.94

5. Pass Rate Differences

Central: –1.34% (only decline)

All other districts: stable or improved.

District Patterns

Green-highlighted leaders (South West B-1, South West B-2, West A/B) consistently top both charts and tables.

Red-flagged districts (Central, North East-1, New Delhi) repeatedly underperform across metrics.

Averages chart visually confirms: strongest averages align with top KPIs, while weakest averages confirm consistent struggles.

Recommendations

Intervention Focus

Prioritize Central, North East-1, and New Delhi for urgent support in pass rates and quality index improvements.

Replication of Best Practices

Scale successful strategies from South West B-2, South West B-1, and West A city-wide.

Diagnostic Deep Dive

Investigate causes of Central's negative pass rate trend.

Examine New Delhi's low girls' proportion for policy action.

Equity Monitoring

Maintain balanced school infrastructure.

Use annual dashboards to proactively track demographic and performance shifts.

Technical Appendix

SQL Script Overview

Used CTEs and joins for aggregations across 16 districts.

Example (simplified):

```
WITH gender_stats AS (
  SELECT district,
       SUM(CASE WHEN gender='F' THEN 1 END) * 100.0 / COUNT(*) AS girls_pct,
       SUM(CASE WHEN gender='M' THEN 1 END) * 100.0 / COUNT(*) AS boys_pct
  FROM students
  GROUP BY district
)
SELECT d.district, g.girls_pct, g.boys_pct, q.quality_index
FROM districts d
JOIN gender_stats g ON d.id=g.district
JOIN quality_scores q ON d.id=q.district;
```

Python Feature Engineering

```
df["gender_parity_index"] = df["girls"] / df["boys"]
df["quality_index_diff"] = df["quality_index_xii"] - df["quality_index_x"]
summary = df.groupby("district").agg({
   "quality_index": "mean",
   "pass_rate": "mean"
})
```

Reflection & Professional Value

This project reflects:

Data Engineering Skill: SQL & Python pipelines with reproducible code.

Analytical Rigor: Automated KPI generation, detailed insights.

Visualization & Storytelling: Clear dashboards highlighting patterns.

Practical Recommendations: Actionable steps for improving equity and quality.

It was approached as a hands-on learning project, not a prebuilt pipeline. All SQL, Python, and dashboards are my own work, and I've kept scripts transparent and well-commented.

I hope this project shows my growing ability to turn raw data into clear insights and strategies.

Attachments

Notebook: project_portfolio.ipynb

Sql: education_script.sql

Dataset: EducationDataset_2023-24.csv

Dashboard images: Power BI visuals

Welcome & Thank

Thank you for reviewing my Delhi Education Performance Dashboard project. This analysis is the result of hands-on work with real educational data. I approached the project as a practical learning experience—writing SQL queries to join multiple tables, calculating key indicators such as gender parity and quality indexes, and preparing the data for further analysis in Python and Power BI. While the workflow is not a fully automated data pipeline, it demonstrates how careful SQL-based preparation and feature engineering can drive meaningful insights.

Each script, query, and dashboard reflects my effort to:

- Understand the data in depth,
- Derive meaningful metrics (beyond off-the-shelf reports), and
- Accurately highlight educational opportunities and challenges across Delhi's districts.

All code, calculations, and conclusions are presented transparently for reviewers and learners to follow. I hope this project showcases my growing ability to translate raw data into clear, actionable insights without overstating results.

I welcome your feedback and am always looking to improve.
Thank you for your time and consideration.