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Empowering Punjab Education: Funding Feasibility

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1. Introduction:

An International Ed-Tech company is investing **USD \$3 billion** in Punjab, Pakistan with a mission to leverage technology for quality education and improved school facilities. As a Junior Data Analyst, my role is to analyze the Punjab School Dataset and conduct a **Marketing Feasibility Analysis**. This report outlines specific initiatives to maximize fund impact and ensure optimal resource utilization, providing a roadmap for enhancing education and bridging the learning gap in the region.

2. Dataset Description

This dataset offers comprehensive insights into schools across Punjab, Pakistan. It includes vital information such as unique School ID, School Name, Location (including district, street, and union councils), Total Student Enrollment, Teacher Count, Years of School-level Upgrades, Original Gender Focus of the School, Present Gender Distribution of students, School Head Details, School Status, Medium of Instruction, Year of Establishment, and Information on the available Infrastructure.

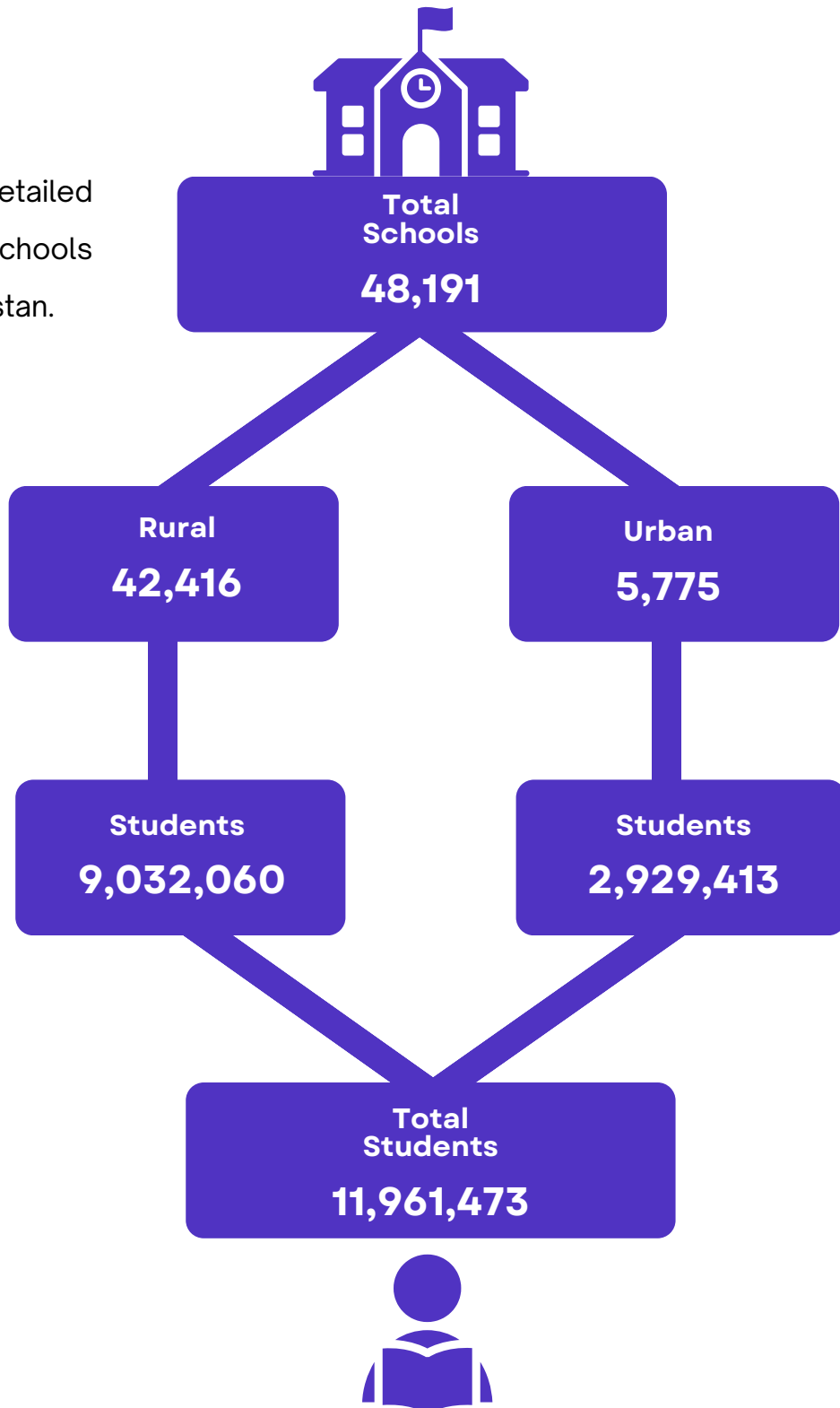
3. Data Cleaning & Pre-processing

1. Copied the whole data into a new sheet and converted it to a table.
2. Checked for duplicate
3. Handled missing and blank values in **Head_Type, School_Type, Upgrade_Primary_Year, Upgrade_Middle_Year, Upgrade_High_Year, Upgrade_High_Sec_Year, School_Ownership, Construct_Type, Bldg_Condition, Electricity_Source, Boundary_Wall_State, Care_Giver** and replaced them with **N/A**.
4. Replaced 1 as Yes and 0 as No in **Bldg_Status, Place_Status, Electricity, Toilets, Boundary_Wall**.
5. I've just considered **Total Area Kanal** and **Uncovered Area Kanal**, and then took their difference and converted them to Sq FT and replaced the values in the Covered Area column with these recalculated values
6. Replaced blank values in **Teachers** as **No Teachers Available** and **Nonteachers** as **None**
7. Replaced N/A values in **School_Ownership** after Filtering Govt Schools from School Type to Educational Dept, as it has the majority of the values that had N/A, a total of 277, out of which 235 were govt schools, and logically, Govt Schools are owned By the Educational Dept.
8. Added 2 New Columns, **Teachers Availability** and **NonTeachers Availability**, and used IF Formula to enter **Filled** if there was any teacher/non-teacher available, and enter **Vacant** if there wasn't any teacher/non-teacher available
9. There are **44** values when we filter No in **Bldg_Status**, where we have some details regarding the infrastructure, but logically, if there's no building, then how can there be other details? This is only **0.09%** of the whole dataset so we can neglect those.

4. Key Insights & Analysis:

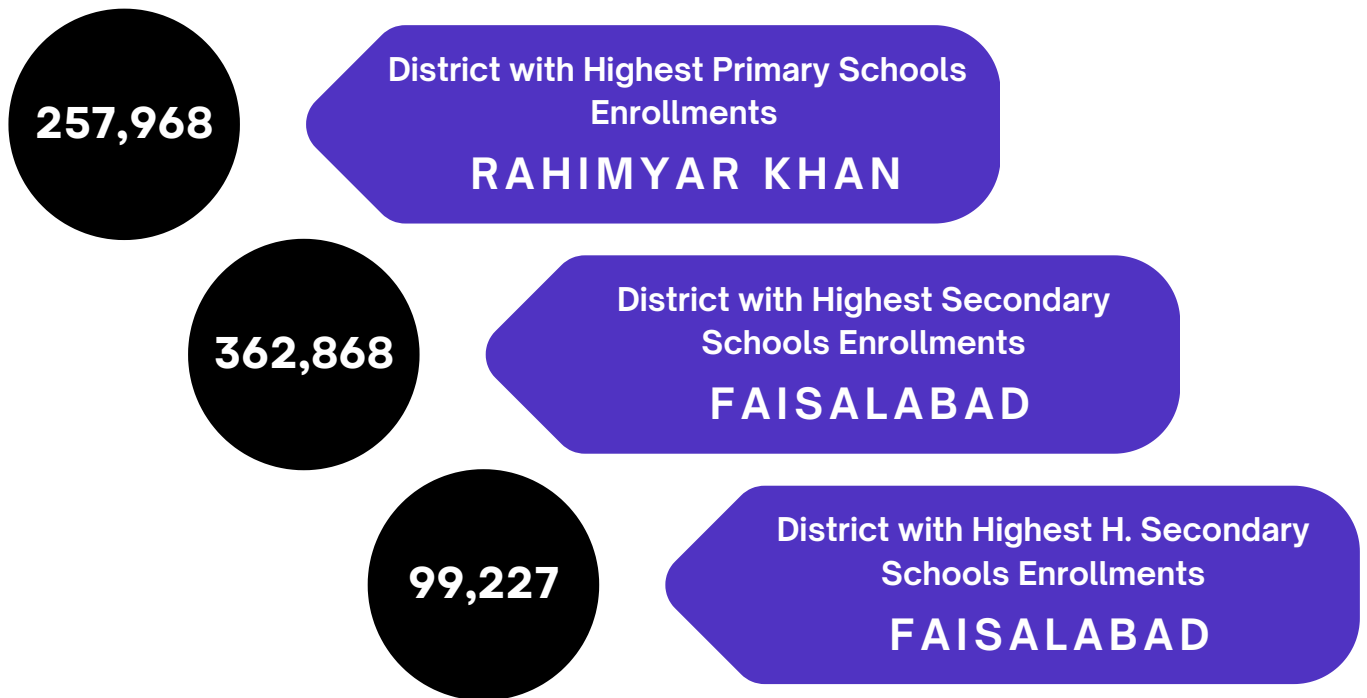
Key Statistics:

- In this dataset, you'll find a detailed record of the **48,191** schools situated across Punjab, Pakistan.
- Among these schools, **42,416** are located in rural areas, and **5,775** are in urban settings
- In rural areas, the student population totals **9,032,060**, while urban areas accommodate **2,929,413** students. Collectively, these figures contribute to a substantial total of **11,961,473** students in Punjab, Pakistan.

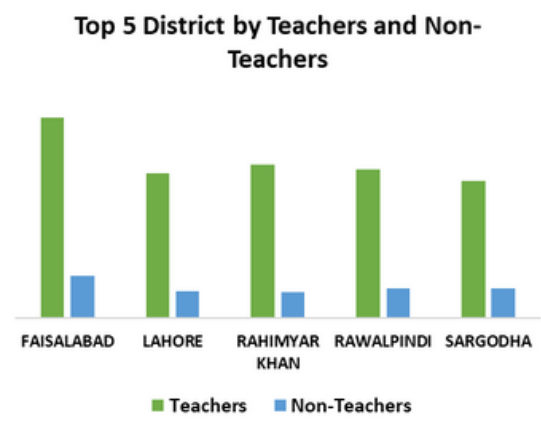


District Level Insights:

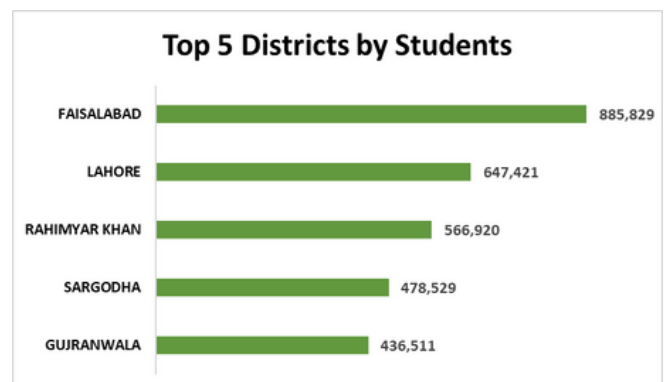
Here you'll find district-level insights, Like the Highest Enrollments across School Levels and Staff (Teachers and Non-Teachers).



The Top 5 Districts that have the Highest number of Staff i.e. Teachers and Non-Teachers, are Faisalabad, Lahore, Rahimyar Khan, Rawalpindi and Sargotha



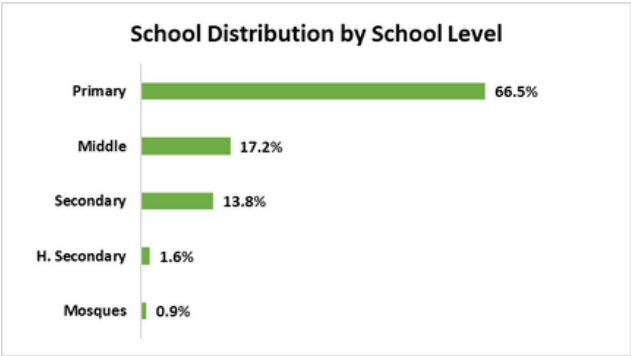
These are the Top 5 Districts with the Highest number of Students Faisalabad, Lahore, Rahimyar Khan, Sargodha and Gujranwala.



School Level, Teachers, and Medium Insights:

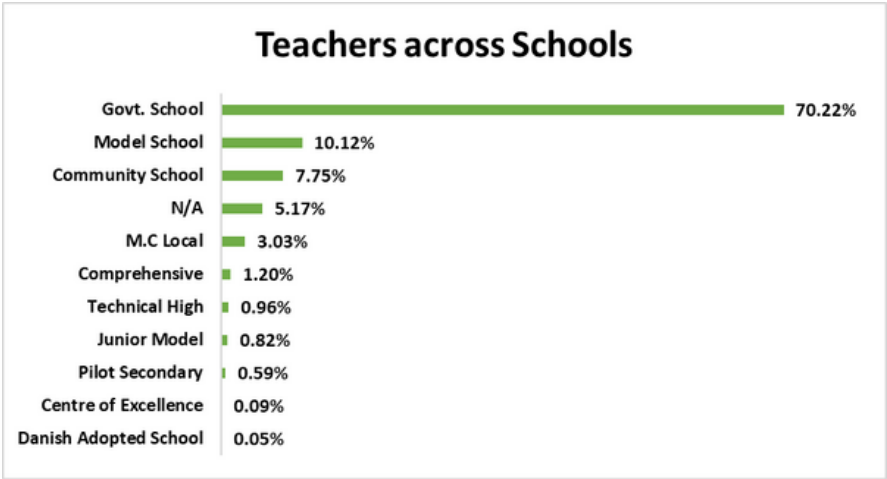
School Distribution by School Level:

The bar chart displays the distribution of schools based on their school level. Punjab's educational landscape is primarily composed of **Primary schools**, representing **66.5%** of all institutions. **Middle schools** make up **17.2%**, followed by **Secondary schools** at **13.8%**. There's a clear need for more **Higher Secondary** options as they only account for **1.6%**, and Mosques make up 0.9%.



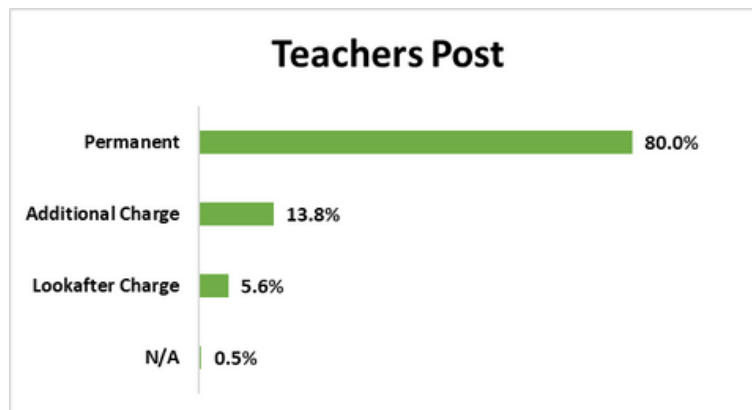
Teacher Distribution across School Types:

In Punjab's educational system, **Government schools** play a vital role, employing a significant **70.22%** of teachers. **Model schools** come next with **10.12%**, and **Community schools** contribute **7.75%**. The remaining teachers are distributed among other school types, emphasizing the prevalence of government schools in the educational landscape.



Teacher's Job Posts:

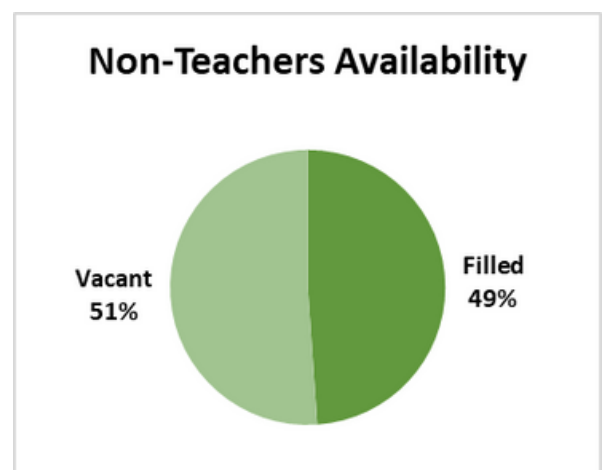
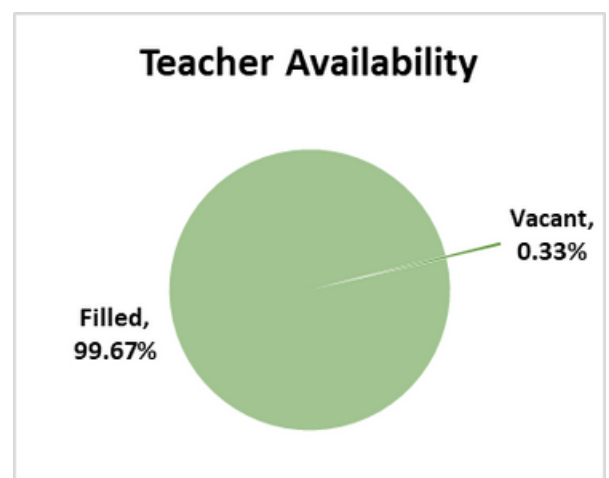
The bar chart visualizes the distribution of teachers based on their respective job posts. The majority, **80%**, holds a **Permanent** position, followed by those with **Additional Charges** at **13.8%**. A smaller percentage has the role of **Lookafter Charge** **5.6%**, while a minimal fraction falls under "N/A" (**0.5%**).



Filled and Vacant Spaces (Teaching / Non-Teaching):

In the pie charts, we can see a significant difference between Teaching and Non-Teaching positions. **Teaching jobs** are nearly all filled, with only a tiny **0.33%** unfilled. On the other hand, **Non-Teaching** roles have a much higher **51% vacancy rate**. This points to the need for more hiring and focus on non-teaching roles in education.

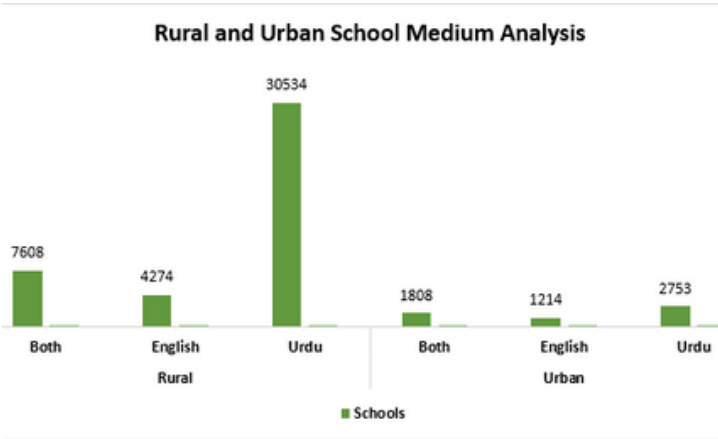
These pie charts are made by adding 2 more columns by using the IF Statement. Details are mentioned in the **Data Cleaning** section.



Rural/Urban School Medium Analysis:

In Punjab, the majority of schools in **Rural areas (88.02%)** choose to provide education in **Urdu**. On the other hand, **Urban areas** exhibit a more diverse landscape. While **11.98%** of urban schools offer both **English and Urdu** as mediums, a substantial **47.67%** use **Urdu** as the primary medium, emphasizing the influence of regional languages in urban education.

| Row Labels | Schools | Mediums Offered |
|-------------|---------|-----------------|
| Rural | 42416 | 88.02% |
| Both | 7608 | 17.94% |
| English | 4274 | 10.08% |
| Urdu | 30534 | 71.99% |
| Urban | 5775 | 11.98% |
| Both | 1808 | 31.31% |
| English | 1214 | 21.02% |
| Urdu | 2753 | 47.67% |
| Grand Total | 48191 | 100.00% |



School Ownership with Respect to Schools:

School Ownership is primarily led by the **Education Department**, which manages a significant **95.26%** of schools in Punjab. Local residents and municipal buildings also contribute with **2.14%** and **1.11%** ownership, respectively.

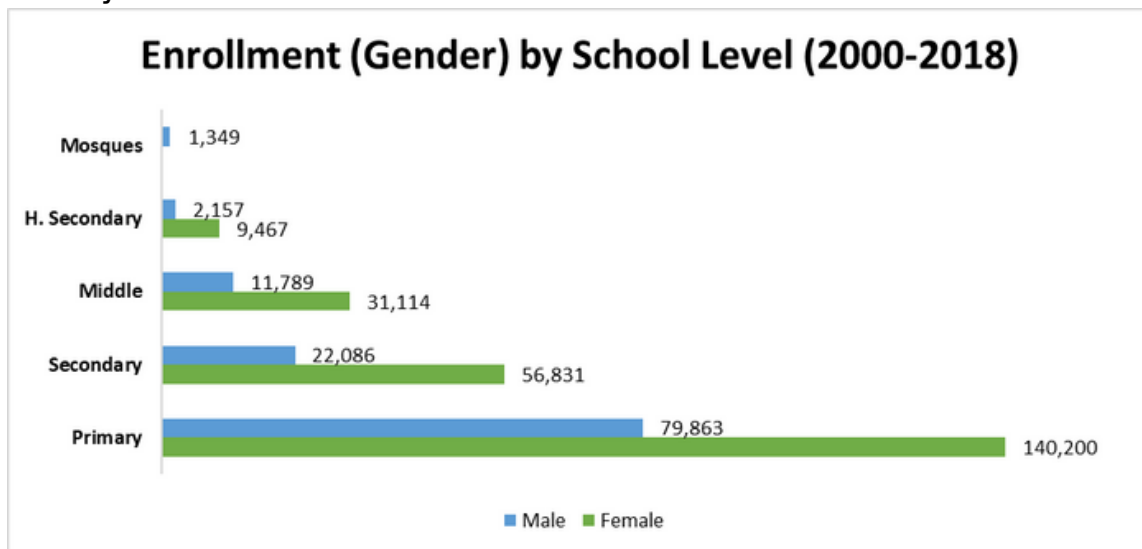
Replaced **N/A** values to **Educational Dept** in **School_Ownership** after Filtering **Govt Schools** from School Type, as it has the majority of the values that had N/A, a total of 277, out of which 235 were Govt Schools, and logically, Govt Schools are owned By the Educational Dept

| Row Labels | Count of School_Id |
|---|--------------------|
| Education Department | 95.26% |
| Building Provided By Local Residents | 2.14% |
| Municipal Building | 1.11% |
| On Rent | 0.38% |
| Some Other Govt. School | 0.31% |
| Property Of Any Other Institution Besides The Municipal Institution | 0.27% |
| Running In The Mosque | 0.27% |
| School Council provided building | 0.17% |
| N/A | 0.09% |
| Grand Total | 100.00% |

Gender Related Insights:

School Gender by Level (2000-2018):

Among schools established in the 2000s, **Mosques** have the lowest enrollment, with **zero** female students and **1,349** male students. In contrast, Primary schools have the highest overall enrollment, with **220,063** students with **140,200** Male and **79,863** Female students, followed by Secondary, Middle, and Higher Secondary schools.



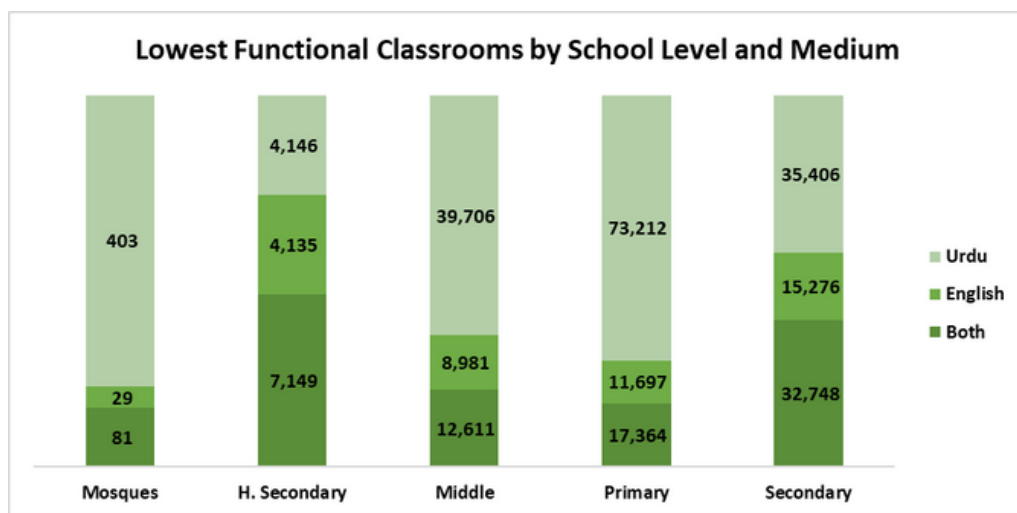
Infrastructure Insights:

Building Availability:

I've identified a critical need for action in **187** schools. These schools have designated locations but lack essential infrastructure. Our mission is clear: we must take action to ensure that these schools have the necessary facilities to provide quality education. On the positive side, there are **47,901** locations where school buildings are already in place, setting the stage for educational improvements.

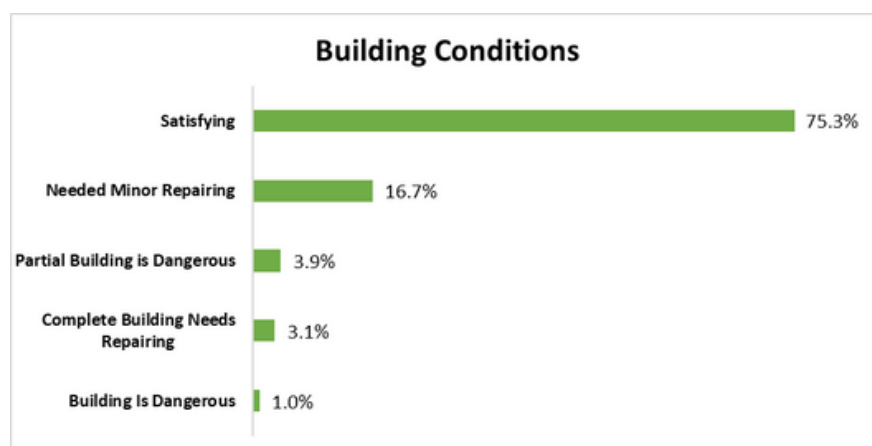
Functional Classrooms:

Here, we have the data for functional classrooms. Mosques, which have a unique place in the community, offer the least number of classrooms. They have **403** for Urdu medium, **29** for English medium, and **81** for both mediums, making a total of **513**. On the bright side, **Primary schools** are setting the bar high with an impressive **102,273** classrooms, reflecting their strong commitment to quality education.



Satisfactory Building Conditions:

75.3% of schools are in **Satisfactory** condition, **16.7%** of schools need minor repairs, **3.9%** of schools have partially dangerous buildings, **3.1%** of schools have buildings that need complete repair, and **1.0%** of schools have buildings that are considered dangerous,



Satisfactory Security Conditions:

A significant number of **33,871** schools have been noted as **Satisfying** in terms of their security measures. However, it's essential to highlight that **11,242** schools **do not have security measures available**, and **3,077** are categorized as **not satisfying**. We must strive to improve the safety of our educational institutions.



33,871

Top 5 Districts with Lowest Availability of Drinking Water

Rawalpindi
28

Bahawalnagar
20

Rahimyar Khan
11

Sargodha
4

Faisalabad
3

Top 5 Districts with Lowest Availability of Electricity

Rahimyar Khan
115

Bahawalnagar
80

Rawalpindi
41

Sargodha
14

Faisalabad
4

Top 5 Districts with Lowest Availability of Boundary Walls

Bahawalnagar
184

Rawalpindi
176

Faisalabad
69

Rahimyar Khan
40

Sargodha
32

Top 5 Districts with Lowest Availability of Toilets

Bahawalnagar
44

Rahimyar Khan
17

Rawalpindi
7

Sargodha
4

Faisalabad
2

5. Data-Driven Marketing Strategies:

Targeted Awareness Campaigns:

Increase Targeted marketing campaigns to regions with the lowest infrastructure, ensuring people are informed about the Ed-Tech company's initiatives and resources.



Interactive School Support:

Introduce online resources that specifically help schools lacking in infrastructure and security, building a sense of partnership with them.

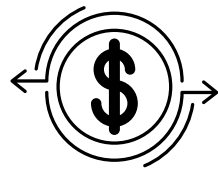


Celebrating Success Stories:

Share stories of schools that have improved through Ed-Tech initiatives to inspire other institutions and communities.



6. Optimized Budget Plan:



**Total Budget
USD \$3 Billion**

Infrastructure Enhancement:

Dedicate a substantial budget portion of **30%** to enhance school infrastructure. This includes the construction of new and advanced schools, fixing buildings, adding more functional classrooms, maintaining facilities, and ensuring necessities like toilets, water, electricity, and safety measures. Make the most of unused land for educational purposes



30%

Primary Education Enhancement:

Allocate **25%** of the budget to enhance primary education by improving infrastructure, constructing classrooms, and using technology for better learning. Ensure safe and comfortable spaces for young students. Additionally, focus on qualified teacher recruitment and training to provide quality education.



25%

Secondary and Higher Secondary Education:

We need to invest **20%** of the budget to enhance the quality of Secondary and Higher Secondary education by providing modern infrastructure and the construction of additional classrooms. Focus on skill development programs for students in higher secondary schools as they are the most crucial years of any person's life as they determine the future career.



Teacher Development and Recruiting:

Invest **15%** in teacher training and development programs. Attract skilled teachers to schools in need through incentives, especially in areas facing teacher shortages. Provide resources to enhance teacher quality and effectiveness. Also, there's a huge gap in No-Teaching staff that needs to be fulfilled by hiring of this staff.



Monitoring and Evaluation:

Invest **10%** in Monitoring Systems to establish a robust monitoring and evaluation plan to ensure effective fund utilization and measure initiative impact. Ongoing monitoring and evaluation enables efficient budget allocation and provide insights for timely adjustments, ensuring optimal fund utilization for positive educational outcomes.



7. Summary:

The dataset on Punjab's schools highlights that focusing on enhancing primary education and quality infrastructure, bridging gender disparities, and developing secondary and higher secondary education should be our top priorities. Teacher development and infrastructure improvement, including unutilized land usage, must be given special attention to create safe and comfortable learning environments. Facilities like drinking water, electricity, and security measures should also be a focus. By allocating our \$3 billion budget strategically to these priorities and establishing a robust monitoring and evaluation system, we can create a more equitable and accessible education system in Punjab, Pakistan, ensuring no money is left unattended and resources are optimally utilized.



8. Sources:

All Datasets and Resources were provided by **Atomcamp** for performing this project.

THANK YOU

I appreciate you for reading this report.
Hope this has been insightful and
informative.

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