PyCity School Analysis

Introduction

As a part of the Data Analytics Bootcamp at the University of Western Australia, we embarked on an analytical review of two datasets related to the educational infrastructure of PyCity. Utilising the Pandas module in Python, this analysis aimed to dissect and understand the multifaceted aspects of the school system within this government area. The datasets encompass detailed information on 15 schools, capturing educational metrics such as total student enrolments, school budgets, per student spending, and academic performances across subjects like mathematics and reading.

The data includes both quantitative and qualitative metrics, such as school type (government or independent), total school budgets, costs per student, and test scores. Through categorisation of the schools into different sizes, spending brackets, and school types, we have been able to provide a nuanced look into how these factors might influence educational outcomes. Metrics on the percentage of students passing math and reading, as well as their overall academic performance, offer insights into the effectiveness of the schools' educational strategies.

This report delineates the methods employed for analysing the data, discusses the resultant findings, draws conclusions and provides recommendations that could help guide policy decisions and strategic planning aimed at enhancing educational outcomes across the school district. Our analysis not only quantifies the educational landscape but also explores the relationships between school funding, type, size, and student performance, thereby providing a comprehensive overview of the factors that contribute to educational success in PyCity.

Results

The results obtained are as follows.

Local Government Area

In the analysis of the school and student data, key metrics were calculated to provide a foundational understanding of the educational landscape within the PyCity district. The following are the results derived from the data:

- **Total Schools:** There are 15 schools listed in the dataset.
- **Total Students:** There are 39,170 students listed in the dataset.
- **Total Budget:** The total budget for the 15 schools is $24,649,428.00.
- **Total Average Maths Score:** The total average maths score is 70.34%.
- **Total Average Reading Score:** The total average reading score is 69.98%.

- **% Passing Maths:** The percentage of total students that passed maths is 86.08%.
- **% Passing Reading:** The percentage of total students that passed reading is 84.43%.
- **% Overall Passing:** The percentage of total students that passed both maths AND reading is 72.81%.

Local Government Area Overview

Table 1: Overview of Total Schools, Students, and Budgets within the Local Government Area.

Total Schools	Total Students	Total Budget	Average Maths Score	Average Reading Score	Passing Maths	Passing Reading	Overall Passing
15	39,170	$24,649,428.00	70.34%	69.98%	86.08%	84.43%	72.81%

Detailed School Summary

Table 2: Comprehensive Summary of All Schools within the Local Government Area.

Index	School Type	Total Students	Total School Budget	Per Student Budget	Average Maths Score	Average Reading Score	% Passing Maths	% Passing Reading	% Overall Passing
Bailey High School	Government	4976	$3,124,928.00	$628.00	72.35	71.01	91.64	87.38	80.08
Cabrera High School	Independent	1858	$1,081,356.00	$582.00	71.66	71.36	90.85	89.07	80.79
Figueroa High School	Government	2949	$1,884,411.00	$639.00	68.70	69.08	81.65	82.81	67.65
Ford High School	Government	2739	$1,763,916.00	$644.00	69.09	69.57	82.44	82.22	67.47
Griffin High School	Independent	1468	$917,500.00	$625.00	71.79	71.25	91.21	88.49	81.34
Hernandez High School	Government	4635	$3,022,020.00	$652.00	68.87	69.19	80.95	81.88	66.36
Holden High School	Independent	427	$248,087.00	$581.00	72.58	71.66	89.93	88.52	78.92
Huang High	Government	2917	$1,910,635.00	$655.00	68.94	68.91	81.69	81.45	66.71

School									
Johnson High School	Government	4761	$3,094,650.00	$650.00	68.84	69.04	82.06	81.98	67.19
Pena High School	Independent	962	$585,858.00	$609.00	72.09	71.61	91.68	86.59	79.21
Rodriguez High School	Government	3999	$2,547,363.00	$637.00	72.05	70.94	90.80	87.40	79.42
Shelton High School	Independent	1761	$1,056,600.00	$600.00	72.03	70.26	91.54	86.71	78.88
Thomas High School	Independent	1635	$1,043,130.00	$638.00	69.58	69.77	83.85	82.63	69.48
Wilson High School	Independent	2283	$1,319,574.00	$578.00	69.17	68.88	82.79	81.30	67.46
Wright High School	Independent	1800	$1,049,400.00	$583.00	72.05	70.97	91.78	86.67	79.72

Top-Performing Schools

Table 3: The Top Five Performing Schools in the Local Government Area.

Index	School Type	Total Students	Total School Budget	Per Student Budget	Average Maths Score	Average Reading Score	% Passing Maths	% Passing Reading	% Overall Passing
Griffin High School	Independent	1468	$917,500.00	$625.00	71.79	71.25	91.21	88.49	81.34
Cabrera High School	Independent	1858	$1,081,356.00	$582.00	71.66	71.36	90.85	89.07	80.79
Bailey High School	Government	4976	$3,124,928.00	$628.00	72.35	71.01	91.64	87.38	80.08
Wright High School	Independent	1800	$1,049,400.00	$583.00	72.05	70.97	91.78	86.67	79.72
Rodriguez High School	Government	3999	$2,547,363.00	$637.00	72.05	70.94	90.80	87.40	79.42

Bottom-Performing Schools

Table 4: The Bottom Five Performing Schools in the Local Government Area.

Index	School Type	Total Students	Total School Budget	Per Student Budget	Average Maths Score	Average Reading Score	% Passing Maths	% Passing Reading	% Overall Passing
Hernandez High School	Government	4635	$3,022,020.00	$652.00	68.87	69.19	80.95	81.88	66.36
Huang High School	Government	2917	$1,910,635.00	$655.00	68.94	68.91	81.69	81.45	66.71
Johnson High School	Government	4761	$3,094,650.00	$650.00	68.84	69.04	82.06	81.98	67.19
Wilson High School	Independent	2283	$1,319,574.00	$578.00	69.17	68.88	82.79	81.30	67.46
Ford High School	Government	2739	$1,763,916.00	$644.00	69.09	69.57	82.44	82.22	67.47

Mathematics Performance by Year

Table 5: Annual Mathematics Scores Across Schools in the Local Government Area.

Index	Year Nine	Year Ten	Year Eleven	Year Twelve
Bailey High School	72.49%	71.90%	72.37%	72.68%
Cabrera High School	72.32%	72.44%	71.01%	70.60%
Figueroa High School	68.48%	68.33%	68.81%	69.33%
Ford High School	69.02%	69.39%	69.25%	68.62%
Griffin High School	72.79%	71.09%	71.69%	71.47%
Hernandez High School	68.59%	68.87%	69.15%	68.99%
Holden High School	70.54%	75.11%	71.64%	73.41%
Huang High School	69.08%	68.53%	69.43%	68.64%
Johnson High School	69.47%	67.99%	68.64%	69.29%
Pena High School	72.00%	72.40%	72.52%	71.19%

Rodriguez High School	71.94%	71.78%	72.36%	72.15%
Shelton High School	72.93%	72.51%	70.10%	72.33%
Thomas High School	69.23%	70.06%	69.66%	69.37%
Wilson High School	69.21%	69.46%	68.38%	69.79%
Wright High School	71.74%	72.18%	73.28%	70.85%

Reading Performance by Year

Table 6: Annual Reading Scores Across Schools in the Local Government Area.

Index	Year Nine	Year Ten	Year Eleven	Year Twelve
Bailey High School	70.90%	70.85%	70.32%	72.20%
Cabrera High School	71.17%	71.33%	71.20%	71.86%
Figueroa High School	70.26%	67.68%	69.15%	69.08%
Ford High School	69.62%	68.99%	70.74%	68.85%
Griffin High School	72.03%	70.75%	72.39%	69.43%
Hernandez High School	68.48%	70.62%	68.42%	69.24%
Holden High School	71.60%	71.10%	73.31%	70.48%
Huang High School	68.67%	69.52%	68.74%	68.67%
Johnson High School	68.72%	69.30%	69.97%	67.99%
Pena High School	70.95%	72.32%	71.70%	71.51%
Rodriguez High School	70.90%	70.14%	71.42%	71.41%
Shelton High School	70.72%	69.88%	71.15%	69.07%
Thomas High School	69.67%	69.74%	70.75%	68.73%
Wilson High School	68.68%	68.41%	68.80%	69.89%
Wright High School	71.82%	71.39%	70.48%	69.82%

Performance by School Spending

Table 7: Academic Performance by Spending Category per Student.

Index	Average Maths Score	Average Reading Score	% Passing Maths	% Passing Reading	% Overall Passing
<$585	71.36	70.72	88.84	86.39	76.72
$585-630	72.07	71.03	91.52	87.29	79.88
$630-645	69.85	69.84	84.69	83.76	71.00
$645-680	68.88	69.05	81.57	81.77	66.76

Performance by School Size

Table 8: Academic Performance by School Size Categories.

Index	Average Maths Score	Average Reading Score	% Passing Maths	% Passing Reading	% Overall Passing
Small (<1000)	72.34	71.64	90.81	87.56	79.07
Medium (1000-2000)	71.42	70.72	89.85	86.71	78.04
Large (2000-5000)	69.75	69.58	84.25	83.30	70.29

Performance by School Type

Table 9: Comparison of Academic Performance Between Government and Independent Schools.

Index	Average Maths Score	Average Reading Score	% Passing Maths	% Passing Reading	% Overall Passing
Government	69.83	69.68	84.46	83.59	70.70
Independent	71.37	70.72	89.20	86.25	76.97

Summary of Performance by Spend, Size and Type

Table 10: Complete Comparison of Academic Performance by Spend, Size and Type.

Index	% Overall Passing	School Type	Spending Ranges (Per Student)	School Size	Average Maths Score	Average Reading Score	% Passing Maths	% Passing Reading
Hernandez High School	66.36	Government	$645-680	Large (2000-5000)	68.87	69.19	80.95	81.88
Huang High School	66.71	Government	$645-680	Large (2000-5000)	68.94	68.91	81.69	81.45

School	Score	Type	Budget	Size				
Johnson High School	67.19	Government	$645-680	Large (2000-5000)	68.84	69.04	82.06	81.98
Wilson High School	67.46	Independent	<$585	Large (2000-5000)	69.17	68.88	82.79	81.30
Ford High School	67.47	Government	$630-645	Large (2000-5000)	69.09	69.57	82.44	82.22
Figueroa High School	67.65	Government	$630-645	Large (2000-5000)	68.70	69.08	81.65	82.81
Thomas High School	69.48	Independent	$630-645	Medium (1000-2000)	69.58	69.77	83.85	82.63
Shelton High School	78.88	Independent	$585-630	Medium (1000-2000)	72.03	70.26	91.54	86.71
Holden High School	78.92	Independent	<$585	Small (<1000)	72.58	71.66	89.93	88.52
Pena High School	79.21	Independent	$585-630	Small (<1000)	72.09	71.61	91.68	86.59
Rodriguez High School	79.42	Government	$630-645	Large (2000-5000)	72.05	70.94	90.80	87.40
Wright High School	79.72	Independent	<$585	Medium (1000-2000)	72.05	70.97	91.78	86.67
Bailey High School	80.08	Government	$585-630	Large (2000-5000)	72.35	71.01	91.64	87.38
Cabrera High School	80.79	Independent	<$585	Medium (1000-2000)	71.66	71.36	90.85	89.07
Griffin High School	81.34	Independent	$585-630	Medium (1000-2000)	71.79	71.25	91.21	88.49

Discussion

The following observations are drawn from the analysis results presented above.

Resource Allocation and School Performance:

- The total budget allocated across the 15 schools is significant ($24,649,428.00), reflecting substantial investment in education within the area.
- Schools with a higher per-student budget do not necessarily perform better in terms of overall passing rates.

Impact of School Size on Performance:

- Smaller schools tend to have higher scores and passing rates across all subjects compared to larger schools. This suggests that smaller class sizes may be more conducive a positive learning environment.

School Type and Performance:

- Independent schools generally outperform government schools in this dataset. For instance, the overall passing rates are higher in independent schools (76.97%) compared to government schools (70.70%). This may be a results of better management, funding allocations, or possibly even educational strategies within the independent school system.

Academic Scores by Spending Categories:

- It is observed that schools with lower per-student spending (less than $585) exhibit higher overall passing rates compared to those with the highest spending levels ($645-$680). This contradicts the common belief that increased spending per student necessarily results in improved academic outcomes. Instead, inefficiencies and poor financial discipline may contribute to higher expenditures without corresponding gains in student performance.

Performance Trends by Year:

- By examining annual performance in mathematics and reading across the four year groups, there does not appear to be significant fluctuation in scores by year, suggesting stability in the academic delivery and performance across the schools.

Top and Bottom Performing Schools:

- The top-performing schools, e.g. Griffin High School and Cabrera High School, both independent, consistently show high performance across all metrics. This reinforces the notion that school management and type can have a significant impact on educational outcomes.
- The bottom performers, which are predominantly government schools, might be suffering from systemic issues that could include overcrowding, underfunding relative to needs, or less effective educational policies.

Recommendations

Based on the observations above, it may be prudent to consider the following:

1. **Policy Review:** Local educational authorities should consider reviewing resource allocation policies to ensure that funds are being utilised effectively, particularly in schools that are underperforming despite high budgets per student.
2. **Support for Larger Schools:** Tailored strategies to support larger schools, possibly focusing on reducing class sizes or enhancing teacher support, could help improve performance metrics.
3. **Investigate and Replicate Success Models:** Further investigation into the management and operational models of top-performing independent schools to identify practices that could be replicated in government schools.