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 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 |
| 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 |
| 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.