Analysis of Reading Proficiency Levels Within Two Middle Schools

Drake Wagner

(I) Introduction

In this analysis, I study two different schools that use the Fountas and Pinnell benchmark assessment system and leveled literacy intervention system, which is used to assess each student's level of mastery in reading. Four levels of proficiency are assigned using this method: remedial, below proficient, proficient, or advanced. The data used is from the F&P_Sample_Data_Set. The dataset contains values of individual fifth and sixth graders attending either Bushwick Middle School or Crown Heights Middle School. Each student also has their beginning of year (BOY) and end of year exam (EOY) scores. Those who have not completed both tests have been omitted for this analysis.

This analysis is intended to answer varying questions about the relationship between the two schools, such as whether there are significant differences in reading mastery between the schools, whether a child's grade level affects their proficiency in reading, and what the future may look like for each school's mastery of reading. Additional questions could also be asked regarding the success of these two programs. To provide answers to these questions, a general overview of the two schools is given first.

It is important to note that because we do not have access to a larger dataset of student proficiencies within other schools, we are unable to perform any significance testing or comparison to the general population. Thus, any findings we view are solely a comparison of one school to the other, and should not be thought of as generalized.

(II) Overview

In *Figure 1*, we see a side by side distribution of proficiency levels in reading among students at Bushwick Middle School and at Crown Heights Middle School. The final proficiency levels were calculated solely by the end of year (EOY) test scores. It will be assumed for this analysis that the EOY tests are a sole predictor of current reading proficiency within the schools, and is also the most recent assessment of reading comprehension. At first glance, we notice that Crown Heights boasts a lower absolute number of students at the remedial level than Bushwick middle school. However, we must also take into consideration that Crown Heights has a smaller number of students, potentially skewing the results through sampling bias. *Figure 2* shows us that Bushwick Middle School has 93 more students enrolled at their school than Crown Heights does, a 160% difference. Because of these differences in sizes, we may want to also look at percentages as a determining factor in the success of each school.

The *% Proficient* column was calculated by taking the number of students that achieved either *proficient* or *advanced* scores on the end of year assessments, divided by the total number

of students at the school. Even though Bushwick has a larger number of proficient and advanced students, we can determine that Crown Heights has a larger percentage of proficient students. Because of Crown Heights' higher percentage of proficient students, one could hypothesize that this school is more efficient at preparing students for the end of year test than Bushwick is. However, because these schools were not part of a randomly sampled population, we cannot make any absolute claims solely from this data, and must remain at a stage of hypotheses. Furthermore, there may be other confounding variables at play. For example, Bushwick may be located in a financially disadvantaged district, resulting in a higher number of students enrolling with lower academic achievement than their current grade level. Because of this, an analysis of year-long improvement may be a more efficient method in determining teaching effectiveness within each school.

Figure 1: Side by side comparison of reading comprehension proficiencies among the two student bodies

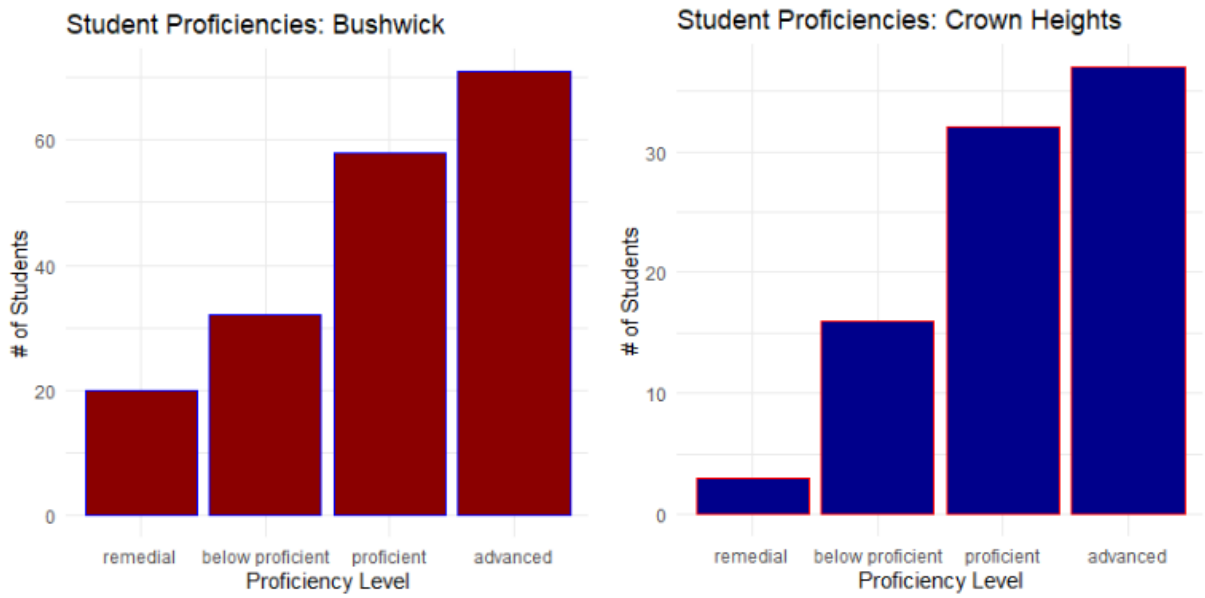


Figure 2

Overview of the Schools

School	# of Students	Avg BOY Score	Avg EOY Score	% Prof
Bushwick MS	181	12.37	15.78	71.27
Crown Heights MS	88	13.99	15.52	78.41

(III) Trends Over Time

Because this dataset includes scores of both the BOY and EOY exams, we are able to calculate improvement over the school year for each individual student. In order to do this, the scores were converted into their respective proficiency levels according to the "F&P Proficiency levels" tab of the data file. Both BOY and EOY tests were converted for each student. For example, consider student X, a fifth grader that scored a 13 on the BOY test and 17 on the EOY test. Student X would be listed as *proficient* within a new "BOY Proficiency" column, and *advanced* within a new "EOY Proficiency" column, since these are the translated scores for each proficiency level. To calculate the difference between proficiency levels, each level was assigned then to a number (remedial = 1, below proficient = 2, proficient = 3, and advanced = 4), and a "Difference" column was added to calculate the difference in proficiency levels over the course of the year, where *Difference = "EOY Proficiency" - "BOY Proficiency"*. Student X would be calculated by 4(advanced) - 3(proficient) = 1 change in proficiency levels. A positive number indicates improvement, while a negative number would indicate regression. Zero shows no change in proficiency levels.

To visualize this new difference column, the two schools were separated and graphed to show the differences over the course of the year. At a quick glance, it is clear that Bushwick outperformed Crown Heights in terms of improvement over the school year, as the majority of their students improved their proficiency levels. *Figure 4* contains data on the exact percentages of improvement within the schools.

Figure 3

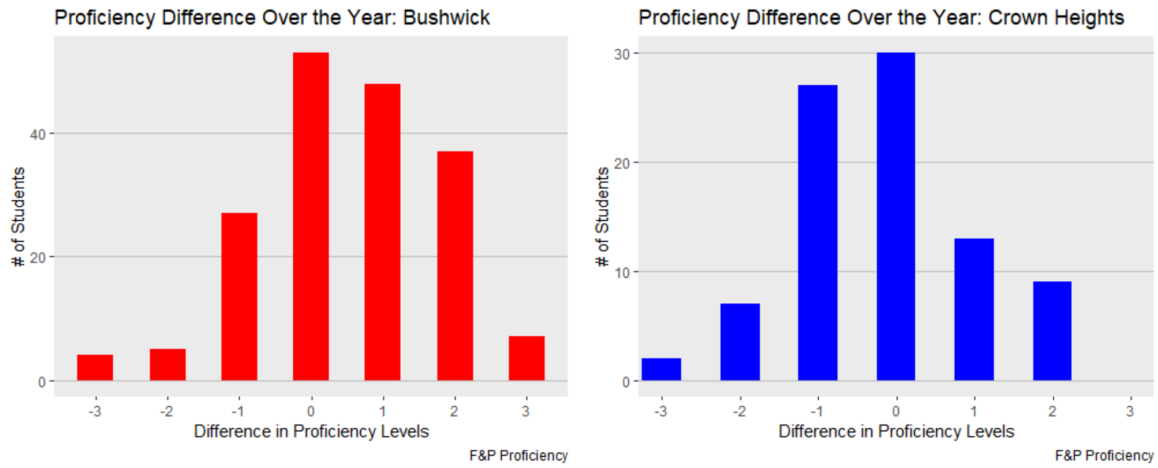


Figure 4

Improvement/Regression in Proficiency Levels

School	% Improvement	% No Change	% Regression
Bushwick MS	50.83	29.29	19.89
Crown Heights MS	25.00	34.10	40.91

These are interesting findings, given that the percentage of remedial students within Bushwick is much larger than the number at Crown Heights, as we discussed in section I. Despite Crown Heights Middle School having a higher percentage of proficient and advanced students, only 25% of their students improved their proficiency levels over the course of the school year, with approximately 40% of their students going down in levels of proficiency! Bushwick Middle School, on the other hand, had approximately 50% of their students show improvement in their level of proficiency, with only about 20% regressing in proficiency levels.

Figure 5

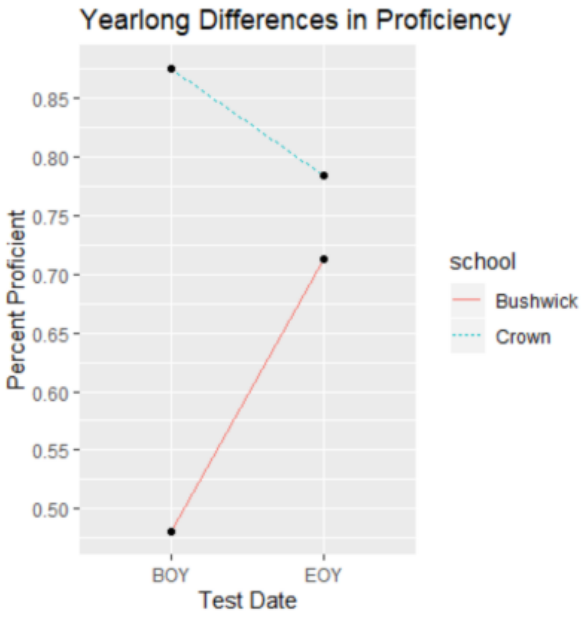
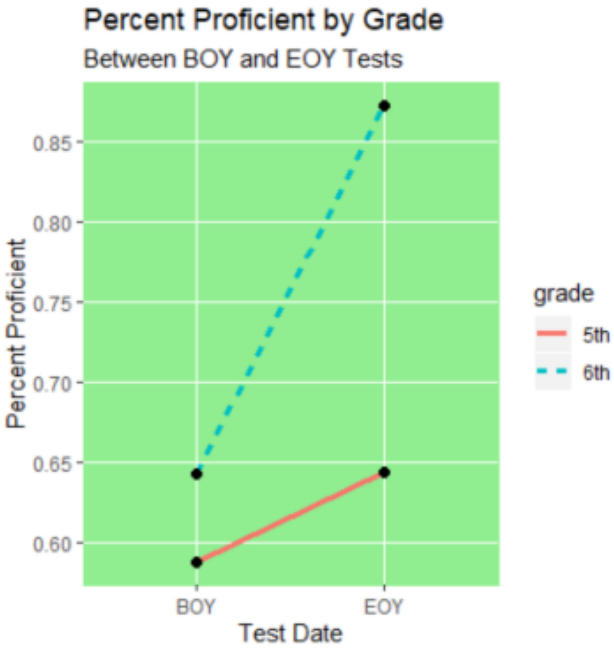


Figure 5 visualizes the percentage of students that tested with either 'proficient' or 'advanced scores at each testing date. While it is tempting to conclude that the achievement gap between the two schools is closing, we must also consider possible confounding variables within these differences. If we calculate the percentage of students at Bushwick that were either proficient or advanced after the BOY test, we see that this comprises 48% of their students. While running this same analysis on Crown Heights students, we see that 87.5% of their students were listed as either proficient or advanced. Higher scores on the BOY test translate into a smaller potential window of improvement, with a much larger potential window for regression. Contrastingly, lower BOY scores allow for much more potential improvement, with a lower chance of regression. Therefore, while Bushwick showed a much higher rate of improvement and much lower rate of regression, we must keep in mind that the potential success was higher to begin with in Bushwick. Additionally, this is a small sample size of only two exams, allowing a higher chance of skewed data. For example, we would be more confident in stating that

Bushwick improved their reading comprehension skills if several other tests were conducted after this, showing similar scores to the shown EOY exam.

Nonetheless, given our current data, this large increase in proficiency should be inferred as a significant improvement in student reading ability at Bushwick Middle School. Continued advancement of reading comprehension should theoretically be expected, leading us to hypothesize that the achievement gap between these two schools may be lessening.

Figure 6

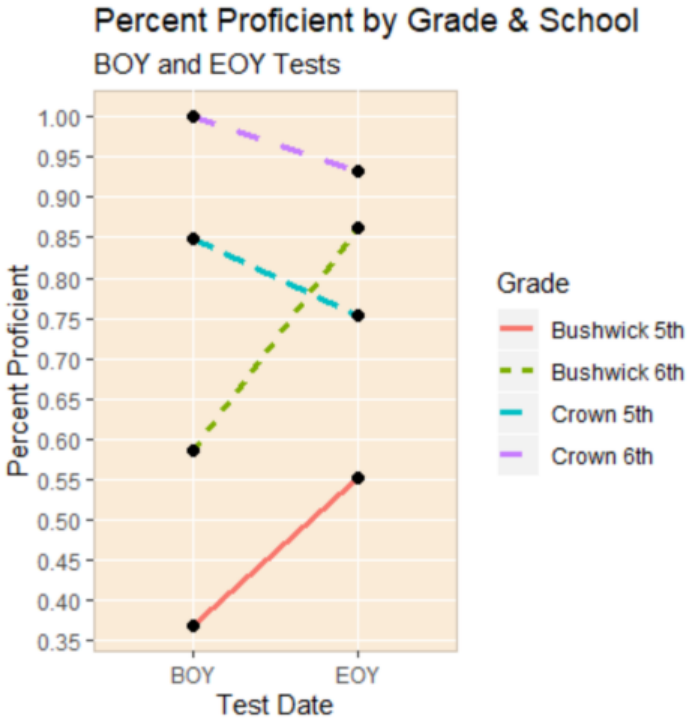


(IV) Differences Among Grade Levels

While we have spent a lot of time looking over the different correlations between each school, we have done little observation pertaining to the grade level of each child. The dataset itself consists entirely of 5th and 6th graders. To start, we can separate the data into two groups based on grade, and look at mean test scores. *Figure 6* achieves this by separating each grade and plotting the percent that achieved either 'proficient' or 'advanced' scores on each of the tests.

As one would expect, 6th graders tend to achieve higher scores on the BOY and EOY exams (assuming the exam difficulties are constant between the grade levels). Interestingly, there is no regression of average test scores between 5th grade EOY exams and 6th grade BOY exams, hinting that there was little regression of reading comprehension ability over the course of summer vacation between 5th and 6th grade. The most interesting point of information provided by this graph is the surge in percentage of proficient test scores between BOY and EOY. Because no additional students were added between the two tests, we can infer that this is due to an improvement within the 6th grade students

Figure 7



throughout the course of the year. However, we cannot tell by this graph alone whether both schools' 6th grade students are excelling, or only one school is.

Figure 7 visualizes this by further dividing the grades by school. The graph confirms the previous statement that Bushwick has improved the percentage of proficient students over the course of the year, while Crown Heights regressed. It is also clear that Bushwick's 6th grade class had the greatest improvement of any of these four classes, followed by Bushwick's 5th grade.

The spike in *figure 6* can be attributed to varying class sizes. Bushwick's 5th and 6th grade classes consisted of 87 and 94 students, respectively. Crown Heights had 73 students enrolled in their 5th grade class, but only 15 in their 6th grade. Therefore, the data for 6th grade within the dataset is heavily influenced by Bushwick's 6th grade class, while 5th grade is somewhat more evenly distributed between the two schools.

(V) Results and Conclusions

To reiterate previous concerns, it is important to note that the measures tested among these two schools should not be compared on a global scale. All tests were performed solely as a way to compare the two schools to each other, rather than to a larger population of schools and normalities. This meant that no true significance testing could be performed on these two samples. Rather than attempt to form any conclusive evidence about either school's raw performance, it is more efficient to compare certain correlations and hypothesize about potential improvements that may be needed, as well as consider further research that could be performed in order to test any hypotheses (see section V).

In this analysis, we notice that a higher percentage of students received proficient scores on their end of year exam at Crown Heights Middle School when compared to Bushwick Middle School. Consequently, there is a smaller portion of students attributed with a *remedial* reading proficiency. We use percentages to measure these since Crown Heights has a much smaller student population.

Trends in improvement during the school year were also observed. Improvement was defined as an increase in assigned proficiency level between the Beginning and End of year tests. These results showed us that Bushwick showed significant improvement in the average student's proficiency level, with approximately 50% of the student body improving their reading proficiency score. Only about 20% of Bushwick's students earned a worse score on the end of year test. In contrast, Crown Heights showed only a 25% improvement rate, with an astounding 41% of students earning a lower level of proficiency at the end of the year. Even though the average student at Crown Heights started with a higher level of proficiency when compared to Bushwick, it is clear that Bushwick showed huge improvement within the student body's average reading proficiency level. Additionally, one could argue that Crown Heights' ability to teach reading proficiency is significantly worse, since one would expect students to either improve or

experience no change in proficiency. *Figure 5* reinforces these hypotheses, as it shows a much smaller gap in the percentage of students with *proficient* or *advanced* reading levels than at the beginning of the year.

While grade level may correlate with reading proficiency levels, it appears that the school is a much stronger factor in this correlation. Figures 6 and 7 reinforce this hypothesis by visualizing this concept. While it appeared in Figure 6 that grade may have played a large role in this specific correlation, separating by school appears to show the significance of which school the students attend, rather than their grade.

Conclusively, I consider this enough evidence to encourage Bushwick Middle School to continue with whatever changes they likely made during the past school year. The spike in proficiency is significant enough that some change was likely made in the school, whether it be teaching style, classroom settings, or some other variable. While Crown Heights Middle School's regression of proficiency levels was not extreme, there should still be an investigation into why the overall percentage of proficient students dropped over the past school year, and what changes may have occurred that could have caused the regression.

(VI) Future Directions

Further analyses between these two schools would prove to be useful in determining whether the achievement gap between the schools is closing. Given additional test scores or larger sample sizes, conclusions between the two schools would become much more plausible, as the risk of a type 1 error would decrease. A future study including a larger population with random sampling of several schools could also prove to be useful. This would allow us to perform significance testing within these two schools, allowing for much stronger claims and conclusions.