

## Popularity \& Offer Scores

Popularity scores and offer / demand scores were calculated for middle schools in District 15 (D15) based upon student choice and enrollment data. The purpose of this memo is to document those calculations and explain how they were produced:

## Data Source

All data were provided by the DOE and describes District 15 middle schools. The analysis described herein only examines 6th graders for the 2017-2018 school year. The summary level of the data used is school. While this document references individual choice, those assertions are derived from school level data; information on individual students was not used in this analysis.

## Total Popularity

The most straight-forward measure we have produced is Total Popularity. Total Popularity is designed to measure how many students choose a school as a first choice compared to the number of students the school eventually enrolls.

The formula is as follows:
Total popularity $=(1 \text { st choice } / \text { students enrolled })^{*} 100$
For example MS51 has 704 first choice and enrolls 427 students. 704/427=1.65 or 165\%.

## Adding second choice

When we add second choice into the Total Popularity calculation, the formula becomes more complex, because there were some students who did not make second choices, but the concept is exactly the same.
((1st choice + 2nd choice) / (Sum of all 1st \& 2nd choice in district/sum of all students in district))/students enrolled

So for example consider MS51 again. It had 704 first choice but only 518 second choice. We add the first and second choice and get 1,222 . This number is then divided by the sum of all 1 st and 2 nd choice in the district $(4,602)$ divided by the sum of all students in that grade 2,420 to get what we call "weighted choice." Weighted choice combines, 1 st and 2nd choices, corrects for the fact some students don't have a second choice, to produce a new single number representing what is effectively the average of first and second choice. Using the example of MS51 again with its 704 first choice and 518 second choice, the weighted choice figure is as follows:
$1,222 /(4,602 / 2,410)=643$.
Weighted choice is then divided by total enrolled students to determine 1 st and 2nd choice popularity:
$643 / 427=1.5$ or $150 \%$

Consequently, when second choice is considered the total popularity of MS51 goes down because there were almost 200 fewer students that selected it as a second choice as did as a first choice.

If every student had a first and second choice, all we would have to do is take the average of the two and divide that by enrollment to determine popularity, but since several students didn't have a second choice this more complicated equation corrects for those missing. observations.

## Group Popularity

This concept of Popularity can be broken into different groups using the same concepts. Group Popularity breaks down Total Popularity by group (namely: FRL, IEP, ELL, White, Hispanic, Black, Asian.) Groups with very small populations are not included because, 1) very small numbers tend to produce extreme results, and 2) our method suppresses results for groups of under five students, which is common for Native Americans and Other groups once they are broken down by school.

For simplicity sake, this documentation describes the method for first choice only. We have also produced results for first and second choice, which uses the more complicated correction method described in Total Popularity to adjust for students who don't have a second choice.

The process for Group Popularity is similar as that for Total Popularity. First, the total students for the group must be determined and then divided by total enrolled students:
(Sum of all students in group)/all students
So for District 15 students in the 6th grade Free and Reduced Lunch (FRL) students are 1,101. There are 2,420 total students, which means 0.47 or $47 \%$ of all students are FRL. This tells us that $47 \%$ of enrolled students are free and reduced lunch. If they selected all schools equally, each school would have $47 \%$ of students that picked the school be FRL.

We then take the number of FRL students that selected an individual school and then divide that number by total enrollment in the school * 47\%, the total number of students in FRL in the district. This effectively shrinks each school so that it matches only FRL students so we can measure how popular the school is among FRL students. So for MS51 this equals:
$282 /\left(427^{*} 0.47\right)=1.42$ or $142 \%$

## Offer Scores

Offer Scores is a concept that merges choice with offers/enrollment. The example below looks only at first choice, but we also made the same adjustments outlined above for first and second choice.

Offer scores are not meant to be "good" or "bad": It merely looks at how much more or less likely different groups get seats at a school. If a group has a score of less than 1 , it is less likely to get a spot in the school. If a group has a score of more than 1 then it is more likely to get a spot in the school. It is calculated as follows:

First, divide students enrolled in the group by the students in the group that selected the school as first choice. So for MS51 for FRL we know that 282 students selected the school as first choice. The school ended up enrolling 119 FRL students. Divide these two and it produces a rate of enrollment:
$119 / 282=0.42$ or $42 \%$ = rate of enrollment
The rate of enrollment of FRL students is $42 \%$. But MS51 is a popular school among all groups, so we have to normalize for total popularity so that rates of enrollment between popular and less popular schools can be compared. This is done by dividing the rate of enrollment we just calculated by total school enrollment divided by first choice for that school, or:

Rate of enrollment / (total enrollment/1st choice)

For MS51 this equals:
$42 \%$ / (427/704) or $0.42 / 0.606$, which equals 0.7 or $70 \%$

## The conceptual difference between Popularity and Offer Scores

While still a score showing how a school performs, offer score is a conceptually different measure than popularity. With popularity, when the popularity scores for each school and group are averaged, that average will be right around 1 or $100 \%$. If all schools were equally popular among the groups they each would get a score of $100 \%$ and the distance from $100 \%$ shows how more or less popular a school is among a group.

The sum of each group's offer score will not be $100 \%$. This is because offer scores are measuring difference not only between schools, but also between the different groups. When the school scores for each group are averaged, the result is the Total Offer Score, which tells us how more or less likely the group are going to get a seat at any school, considering their choice. Unlike the Popularity measures, the differences in Offer Scores between schools in a group is equally important as the differences between groups when compared to each other. The table on the following page shows Offer Scores in all schools in the district looking at only first choice. There we can see that ELL students have the most difficult time finding a seat in their choice school, with only one school near $100 \%$. White students, on the other hand, are much more likely to find a spot in their choice school, with every school near or well over $100 \%$.

