The three qualitative variables I selected were: race, gender and mother’s highest education. The two quantitative variables I selected were MATH IRT base year and MATH IRT first year follow-up. I chose these variables because I thought it would be interesting to investigate the relationship between gender, race and mother’s education on a student’s math scores.

As shown in Figure 1, most of the students’ mothers graduated from H.S. (37%) and very few had a Ph.D., M.D., or other professional degree (2%). Further, most of the participants in the sample were white (67.64%) and the least represented race was American Indian (3.54%). In terms of gender, most of the participants were female (53%).
The average MATH IRT score in the baseline year was 45.79 with a standard deviation of 8.58. As Figure 4 shows, student scores on the test were roughly symmetric but showed a slight skew to the right as evidenced by the fact that there were more data points to the far right of the distribution and the skewness was 0.093 (the positive sign in this statistic indicates a positive skew). The Q-Q plot for the base year shows the skewness more clearly (Figure 5).

The average MATH IRT score for the first-year follow-up was 51.05 with a standard deviation of 9.81. As Figure 7 below shows, the distribution was normal with a slight negative skew. The skewness for the first year follow up was -0.078. The Q-Q plot for the first-year follow-up shows the skewness more clearly (Figure 8). So, in summary, the average math scores in the first-year follow-up was higher than the average in the base year and the scores were also more widely distributed than in the base year. Indeed, the kurtosis in the first-year follow-up was -.705 whereas the kurtosis in the baseline year is -.569. The box plot also illustrates the difference in scores (Figure 6).
Figure 7: Math scores in first year follow-up

Figure 8: Q-Q plot for math scores in the first-year follow-up