

A Scientific Approach to Improving WASL Test Results

Schools across Washington State are under pressure to perform at ever-higher levels. One approach to improvement that has worked in other industries is to find outstanding performers and determine what “best practices” are responsible for their success. These “best practices” can then be copied and used to improve performance across the industry.

In order to determine the outstanding performing schools it is necessary to find a common measure of school performance, determine what physical characteristics of students and schools impact performance, and then normalize the results for these factors. Our research over the past two years has enabled us to identify the truly outstanding performing five to ten percent of elementary, middle, and high schools in Washington.

Research Approach and Results

As our measure of school performance we chose pass rate data from the Washington Assessment of Learning (WASL) due to its wide availability. Initially we used the Washington State Report Card for each individual school. This report card gives the WASL test results individually for reading, writing, math, and science. It also provides data on student demographics, teacher information, and ethnic mix. We have subsequently expanded our database sources.

Our study is based on data for the period 2002 through 2006. Our research covers approximately 1,500 Washington schools. We analyzed each school's average reading, writing, math, and science scores separately for boys and girls.

By using data mining and multiple-regression we are able to discover and quantify what impacts WASL pass rates.

More than 80% of the difference between individual school pass rates can be explained by eight student, school, and district characteristics. These characteristics

“drive” WASL pass rates and will be referred to hereafter simply as “drivers.” These drivers are discussed on page 2, and will be very similar for student performance assessments other than the WASL.

Using these drivers mathematically, we are able to scientifically determine accurate benchmark performance for each individual school. This allows comparisons of all schools on an apples-to-apples basis. We then compare the school's actual performance to their individual benchmark.

We find that 5 to 10% of the school's pass rates significantly exceed their benchmarks. These schools have pass rates from 10 to 20 or more points higher than would be expected based on their individual student and school characteristics. In comparison, improving performance by decreasing the student teacher ratio by 10% only improves math and science WASL pass rates by 2 or 3 points.

These outstanding performing schools are clearly the ones that need to be visited to identify “best educational practices.”

Example Benefits

Each individual school can now see how well they are performing compared to their own expected “benchmark performance.” We calculate individual benchmarks for each school based on their own student, school, and district characteristics. The benchmark represents average performance for each individual school.

There are a small number of schools that have student performance significantly better than their benchmark. These schools should be visited to find out what they are doing that might be

beneficial for other schools to copy. These above-benchmark schools would essentially constitute a “model school” directory. A school with a 65% pass rate that has a benchmark 50% pass rate likely has lessons to share with another school whose 70% pass rate is less than its benchmark of 80%.

By far, the biggest “bang for the buck” would come from identifying the truly best-performing districts and schools in the state (considering their individual demographics), determining what they do that is so

effective, and then urging all schools to use these best practices.

Further, we can calculate the expected impact on school performance when individual drivers change. For example, we can provide the expected impact if a school is working to improve pass rates by reducing its student/teacher ratio (or increasing the percentage of advanced degrees, etc.). Administrators could then compare the costs of alternatives in choosing the most cost-effective approach to attain the desired school improvement.

The Drivers

Percent of Free or Reduced-Price (F/R) Meals

This driver shows the linkage between pupil family income and student performance.

There is a very strong negative correlation between f/r meals and student performance—the higher the f/r meals at a school, the lower the school's average student performance.

The impact of f/r meals on student performance is greater for math and science than for reading and writing.

Teacher Education Level

This driver is the average educational level of teachers at a school defined by the percentage that hold at least a master's degree.

The higher the teacher's education level, the higher the pass rates for 7th and 10th graders. It has no impact for 4th graders.

This driver impacts math and science far more than reading and writing.

Number of Grades in the School

Although there appears to be only a modest variation in school performance relative to the number of grades in any particular school, this driver must be included to have quality model results.

Student/Teacher Ratio

There is a modest negative correlation between students-per-teacher and student performance. Fewer students-per-core teacher at a school results in better student performance.

Math and science are more strongly impacted by this driver than are reading and writing.

Non-core teachers have no impact on pass rates.

School District Funding

Total funding per student in Washington State is approximately \$8,000 per year.

Very disadvantaged school districts have high Federal dollars-per-student and low local non-tax, while affluent districts are the reverse.

Schools with high local non-tax funds or those with high federal funding do better than expected.

School Size

School size is not a driver for student performance at any grade except possibly for the few very large schools. There is a correlation of small schools and smaller class size, but it is the student/teacher ratio as opposed to school size which impacts student performance.

Teacher Experience

Teacher experience has a strong impact on student performance.

The greater the number of years of teaching experience the lower the student performance for 7th and 10th graders. Performance for 4th graders improves with greater teacher experience.

The impact is greater for math and science than for reading and writing.

Ethnic Mix

There is a consistent increase in pass rates as the percentage of Asian students at a school increases.

Where schools are mixed (3 or 4 large ethnic populations in a school) there is a dramatic decrease in pass rates, particularly at 10th grade. There is less impact at lower grades.

Gender

Considering student characteristics, in WASL tests, girls outperform boys in all subjects. About 5% more girls pass math and science than boys, 15% more pass reading, and 35% more pass writing. Overall pass rates would increase by about 10% if boys pass rates were the same as girls.

