How PLA Rankings are Determined

with Technical Detail

Assigning of rankings to identify (federally required) Persistently Lowest Achieving (PLA) Schools in Wyoming is determined using Proficiency Assessment of Wyoming Students (PAWS) results. Schools are ranked against other schools in Wyoming based on how they performed against the state average, both for the most current year of PAWS data and how they have been performing over the last three years on PAWS. The following is how these determinations are made by the Wyoming Department of Education.

> "How PLA Rankings are Determined with Technical Detail" mirrors document "How PLA Rankings are Determined" with the addition of supplementary technical process notes, where required.

School Academic Achievement and Progress Ranking of All Wyoming Schools

Determining "School Academic Achievement and Progress Ranking of All Wyoming Schools" relies upon ranking schools by a single measure. This single measure is the average of four component rankings, all based on PAWS data:

1) Academic Achievement ranking for Math
2) Academic Achievement ranking for Reading
3) Progress ranking for Math
4) Progress ranking for Reading

Academic Achievement rankings are based on the most recent year's PAWS results, and Progress rankings represent the improvement a school has made based on the most recent three years' PAWS results.

All four component rankings, then, rely on the ability to directly compare Wyoming schools' annual PAWS performance. These comparisons must take into account the varying grade configurations served and the relative enrollment-by-grade makeup of each Wyoming school.

To illustrate the process of determining the four component rankings and the overall "School Academic Achievement and Progress Ranking" for each school, fictitious schools A and B will be considered. School A serves grades 7 and 8, and school B serves grades 6, 7, and 8.

PAWS Performance Comparison: Relative Proficiency Performance

Step 1

For these two schools, we first consider the number of students tested and the number tested proficient (proficient or advanced), by subject (**Reading for this example**), grade, and school. We then calculate the percent proficient as the number proficient divided by the number tested.

How PLA Rankings are Determined

with Technical Detail

SCHOOL	Grade	Number Tested	Number Proficient	Percent Proficient
A	7th	135	75	55.56%
	8th	65	36	55.38%
	TOTAL	200	111	55.50%
B	6th	70	35	50.00%
	7th	40	28	70.00%
	8th	160	78	48.75%
	TOTAL	270	141	52.22%

At first glance, it would appear that we can compare the two schools by considering that school A had 55.50% of students test proficient while school B only had 52.22% of students test proficient. **This conclusion, however, does not take into account that PAWS proficiency percentages across different grades are not equivalent, and therefore not directly comparable.**

Step 2

To develop a measure directly comparable across grades and schools, the next step is to compare the percent proficient for each grade against the statewide percent proficient for that grade. For each grade served by a school, the difference between the school and state percent proficient values is calculated.

SCHOOL	Grade	Number Tested	Number Proficient	Percent Proficient	Statewide Percent Proficient	Difference between School and Statewide Percent Proficient
A	7th	135	75	55.56%	60%	-4.44%
	8th	65	36	55.38%	50%	5.38%
	TOTAL	200	111	55.50%		
B	6th	70	35	50.00%	45%	5.00%
	7th	40	28	70.00%	60%	10.00%
	8th	160	78	48.75%	50%	-1.25%
	TOTAL	270	141	52.22%		

Step 3

The difference between school and statewide percent proficient value calculated in Step 2 is a direct comparison of PAWS performance for each grade served in a school with state performance at that grade. For instance, the above result for 7th grade in school A can be stated as, "The percentage of 7th grade students in School A testing proficient is 4.44% less than tested proficient in 7th grade across the state."

These results, however, still do not allow us to make school to school comparisons. The fact that schools serving the same grades have varying enrollments between those grades must be accounted for. We need to know the percent of total number tested by grade at each school, which is calculated as the number tested in each grade divided by the total number of students tested in the school.

SCHOOL	Grade	Number Tested	Number Proficient	Percent Proficient	Statewide Percent Proficient	Difference between School and Statewide Percent Proficient	Percent of Total Number Tested
A	7th	135	75	55.56%	60%	-4.44%	67.50%
	8th	65	36	55.38%	50%	5.38%	32.50%
	TOTAL	200	111	55.50%			
B	6th	70	35	50.00%	45%	5.00%	25.93%
	7th	40	28	70.00%	60%	10.00%	14.81%
	8th	160	78	48.75%	50%	-1.25%	59.26%
	TOTAL	270	141	52.22%			

Step 4

At the end of this step, we will have arrived at a measure that allows for direct comparison of Wyoming schools' PAWS performance.

We have already determined how each grade in a school performed compared against the state average for the grade, and the percentage of students in each school enrolled and tested by grade. We now need to "weight" the performance comparison for each grade by the percentage of students in the corresponding grade.

In school B, for example, we can see that the 7th grade proficiency percentage exceeds the state average for the grade by 10% and that the 8th grade proficiency percentage trails the state average for the grade by only 1.25%. We also notice that 7th grade students only account for 14.81% of students tested in the school, while 8th grade students account for 59.26% of students tested. The performance of 8th grade students in the school clearly must carry more "weight" than the 7th grade performance. How can we combine this information to achieve our goal?

The answer is that we first multiply the difference between the school and statewide percent proficient by the percent of total number tested for each grade. These grade level contributions are then summed, providing the final school level metric, **Relative Proficiency Performance**. This is a school level comparison to a state average percent proficient that takes the grade-by-grade enrollment makeup of each school into account.

How PLA Rankings are Determined

with Technical Detail

SCHOOL	Grade	Number Tested	Number Proficient	Percent Proficient	Statewide Percent Proficient	Difference between School and Statewide Percent Proficient	Percent of Total Number Tested	Relative Proficiency Performance
A	7th	135	75	55.56%	60%	-4.44%	67.50%	-3.00%
	8th	65	36	55.38%	50%	5.38%	32.50%	1.75%
	TOTAL	200	111	55.50%				-1.25%
B	6th	70	35	50.00%	45%	5.00%	25.93%	1.30%
	7th	40	28	70.00%	60%	10.00%	14.81%	1.48%
	8th	160	78	48.75%	50%	-1.25%	59.26%	-0.74%
	TOTAL	270	141	52.22%				2.04%

The Relative Proficiency Performance of -1.25% for school A is most clearly stated as, “The percentage of students testing proficient in School A trailed the state average by 1.25%.” The Relative Proficiency Performance of 2.04% can be expressed as, “The percentage of students testing proficient in School B surpassed the state average by 2.04%.”

School level Relative Proficiency Performance is the valid metric for school-to-school comparison of PAWS performance. As such, Relative Proficiency Performance values are used directly for assigning Academic Achievement Rankings to schools (in both math and reading) and for calculating the progress metric used in assigning Progress Rankings to schools (also in both math and reading).

> Technical Process Note: Academic Achievement Rankings are only assigned in cases where six or more students were tested in the current year to increase statistical reliability.

Use of **Weighted Average Statewide Percent Proficient** values in this process is mentioned in the submission of this process to the U.S. Dept. of Education. For an explanation of the process including **Weighted Average Statewide Percent Proficient** values, please see Appendix A.

Academic Achievement Rankings

Calculation of **Relative Proficiency Performance** values for all Wyoming schools allows the following question to be answered, "How did this school's PAWS performance compare to statewide performance and to other Wyoming schools’ performances?"

As mentioned above, Academic Achievement rankings for both math and reading are straightforward rankings of the Relative Proficiency Performance percentages calculated for each Wyoming school; the higher the percentage, the better the performance and ranking. School B, with a Relative Proficiency Performance of 2.04%, will have a better ranking than School A with a -1.25%.

How PLA Rankings are Determined

with Technical Detail

Progress Trend Percentage

Progress Trend Percentage quantifies a three year trend of improvement or decline in Relative Proficiency Performance and is calculated as follows.

Step 1

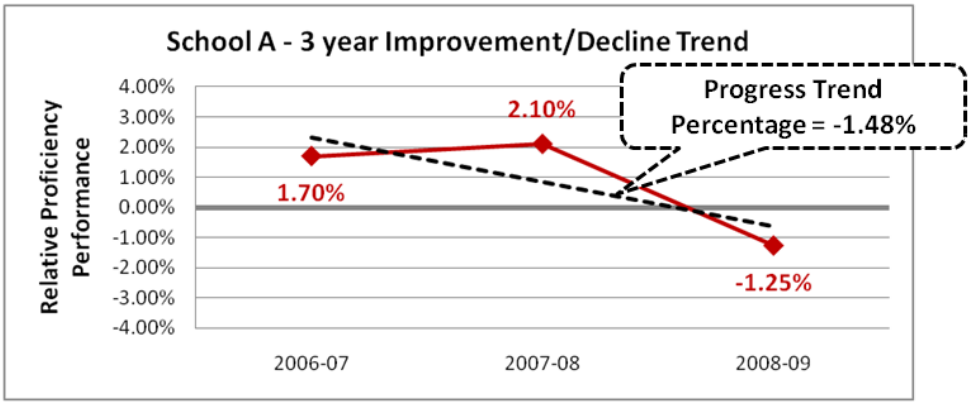
Relative Proficiency Performance values for math and reading are calculated for each school using the most recent three years of PAWS data.

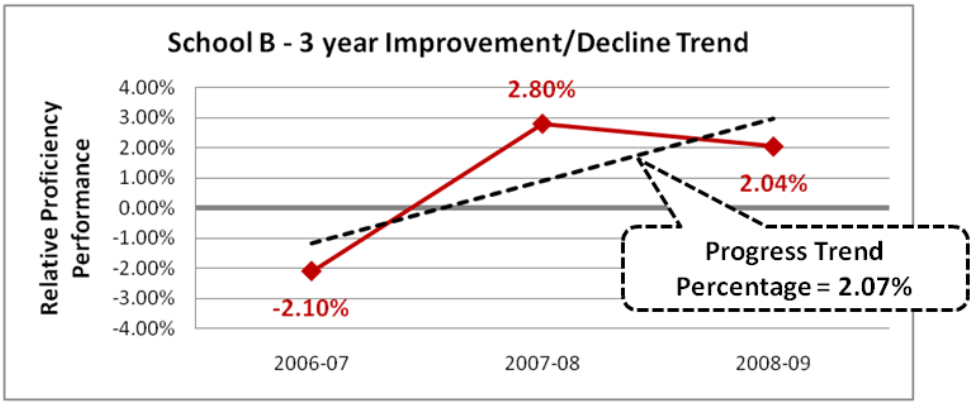
Suppose that for our example schools A and B that the Relative Proficiency Performance values calculated above are the 2008-09, Reading results. Relative Proficiency Performance values for 2007-08 and 2006-07 are calculated in the same manner.

SCHOOL	School Year	Relative Proficiency Performance
A	2006-07	1.70%
	2007-08	2.10%
	2008-09	-1.25%
B	2006-07	-3.50%
	2007-08	2.80%
	2008-09	2.04%

Step 2

Progress Trend Percentage is the slope of a trend line, which can be positive (improvement) or negative (decline), with the higher the slope the better the progress. Trend lines are often referred to as "best fit" lines, in this case illustrating a measure of the improvement or decline in a school's PAWS performance as compared with state performance. The slope of the trend line is best illustrated visually.





The following graphs show three years of Relative Proficiency Performance values along with the trend line and its calculated slope (Progress Trend Percentage) for schools A and B.

School A has a declining Progress Trend Percentage, of -1.48%, while School B has an increasing Progress Trend Percentage of 2.07%.

How PLA Rankings are Determined

with Technical Detail

Technical Process Note: Progress Trend Percentage is determined using "simple linear regression". Simple linear regression fits a straight line through the set of n points in such a way that makes the sum of squared residuals of the model (that is, vertical distances between the points of the data set and the fitted line) as small as possible. The fitted line has the slope equal to the correlation between y and x corrected by the ratio of standard deviations of these variables. The intercept of the fitted line is such that it passes through the center of mass (x, y) of the data points. Progress Trend Percentage calculations can be duplicated using the SLOPE(known_y's,known_x's) function in Excel, with four digit school years as Y values (school year "2006-07" represented as "2006", for example), and corresponding Relative Proficiency Percentages as the X values.

Progress Rankings

Calculation of a three year **Progress Trend Percentage** for each school allows the following question to be answered, "How does this school's progress in PAWS performance over the last three years compare to other schools' progress?" For this purpose, "progress" refers to gaining or losing ground as compared with state performance averages.

Progress Rankings for both math and reading are straightforward rankings of Progress Trend Percentage values calculated for each Wyoming school; the higher the percentage, the better the improvement over time and ranking. School B, with a Progress Trend Percentage of 2.07%, will be ranked higher than School A with a value of -1.48%.

Technical Process Note: Progress Trend Percentages and Rankings are only determined in cases where 6 or more students are tested in the current year and 6 or more students are also tested in at least one of the previous two years.

School Rankings

With Academic Achievement and Progress rankings now calculated, we circle back to determining a single ranking for each school.

Step 1

The following four component rankings are averaged:

1) Academic Achievement ranking for Math
2) Academic Achievement ranking for Reading
3) Progress ranking for Math
4) Progress ranking for Reading

For example, suppose Schools A and B are two of eighty schools statewide. In our examples, school B had better Academic Achievement for Reading and Progress for Reading, so will have better rankings in these two areas than school A. A rank of one is assigned to the school with the best performance in each of the four categories.

How PLA Rankings are Determined

with Technical Detail

The following table illustrates the four component rankings for the two schools in our example, along with the average of the four rankings for each school.

	Ranking	
	School A	School B
1) Academic Achievement ranking for Math	17	19
2) Academic Achievement ranking for Reading	49	27
3) Progress ranking for Math	25	32
4) Progress ranking for Reading	52	39
AVERAGE RANKING:	35.75	29.25

Technical Process Note: In a very limited number of cases, six or more students tested in the current year, but not in either of the two previous years. In these cases, Progress Rankings cannot be assigned, so calculation of Average Ranking includes only the Academic Achievement Rankings.

Step 2

A final ranking for each school, between one and eighty for the eighty schools in this example, is assigned to each school. The school with the lowest average ranking will have the best rank of one, and so forth. In our example, School B has an average ranking of 29.25, indicating better performance and a better final ranking than will be assigned to school A with an average ranking of 35.75.

Technical Process Note: Schools in their first year of operation will not be identified as PLA.

How PLA Rankings are Determined

with Technical Detail

Appendix A

Use of **Weighted Average Statewide Percent Proficient** values in the determining schools' **Relative Proficiency Performance** is mentioned in the submission of this process to the U.S. Dept. of Education. The following are process steps for calculating and using **Weighted Average Statewide Percent Proficient** values.

Recall that Relative Proficiency Performance was just described as a school level comparison to a state average percent proficient that takes the grade-by-grade enrollment makeup of each school into account. This school-specific state average can be calculated, and is identified as the **Weighted Average Statewide Percent Proficient** for each school.

First, the statewide percent proficient for each grade is multiplied by the percent of total number tested in each grade. These are the grade level contributions, which are then summed to calculate the Weighted Average Statewide Percent Proficient specific to each school.

SCHOOL	Grade	Number Tested	Number Proficient	Percent Proficient	Statewide Percent Proficient	Difference between School and Statewide Percent Proficient	Percent of Total Number Tested	Relative Proficiency Performance	Weighted Average Statewide Percent Proficient
A	7th	135	75	55.56%	60%	-4.44%	67.50%	-3.00%	40.50%
	8th	65	36	55.38%	50%	5.38%	32.50%	1.75%	16.25%
	TOTAL	200	111	55.50%				-1.25%	56.75%
B	6th	70	35	50.00%	45%	5.00%	25.93%	1.30%	11.67%
	7th	40	28	70.00%	60%	10.00%	14.81%	1.48%	8.89%
	8th	160	78	48.75%	50%	-1.25%	59.26%	-0.74%	29.63%
	TOTAL	270	141	52.22%				2.04%	50.19%

Subtracting the school-specific Weighted Average Statewide Percent Proficient from the school's percent proficient yields the Relative Proficiency Performance for a school, and is simply an alternate way to calculate this value. In the case of school B, subtracting the Weighted Average Statewide Percent proficient of 50.19% from the school's percent proficient of 52.22% yields an alternate way to arrive at the school's 2.04% Relative Proficiency Performance.