Article for WSTA Journal

Washington State LASER -- Evaluation Results

July 22, 2005

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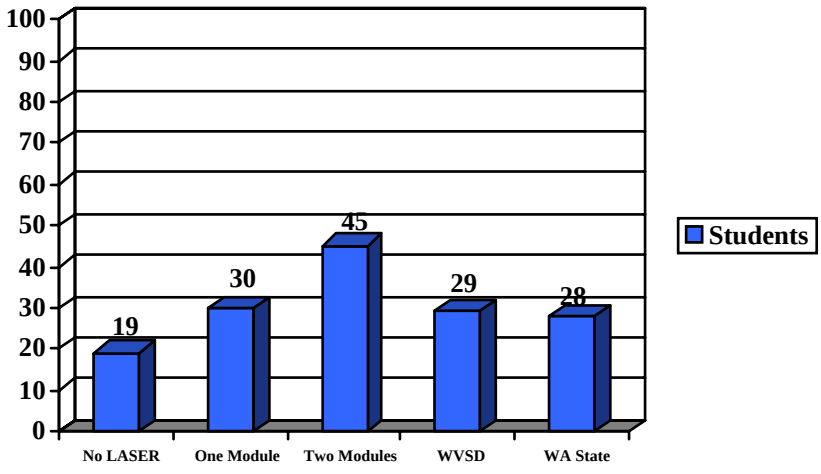
Washington State LASER began operating in Washington State in 1999, with the first Strategic Planning Institute occurring in June of that year. There have been six more Institutes since then and now 131 school districts, representing more than 60% of the students in the state, are at various stages of implementing an inquiry-base science program in their schools. More information about Washington State LASER activities and its seven Regional Alliances can be found at www.WaStateLASER.org.

Since 2001, when LASER became a partnership activity with OSPI and received funding from the State Legislature, RMC Corporation has conducted the external evaluation of Washington State LASER's activities. This year for the first time, RMC has been able to begin assessing LASER's impact on student achievement on the 5th grade Science WASL. RMC Corporation's research provides solid evidence that effective professional development of the type supported by Washington State LASER has a positive impact on student achievement. Specifically:

- There is a significant positive relationship between the amount of professional development that the teachers in a school have had and the percentage of Grade 5 students who met the science standard on the 2004 WASL, beyond what can be explained by the percentage of students who qualified for free and reduced lunch and the percentage of Asian students -- see more details in Appendix 1.
- Schools that implemented to a high degree the classroom practices promoted by Washington State LASER did better than the low-implementing schools at meeting the needs of students who qualified for free or reduced-price lunch -- based on the pre- and post-performance of students on the nationally used science assessment developed by Horizon Research Incorporated (HRI) -- see more details in Appendix 2.

The RMC Corporation research shows how well students perform on the 5th grade Science WASL in schools where teachers had significant amounts of professional development compared to schools where teachers experienced little professional development. The number of students scoring at the proficient level was 20% higher in schools where teachers received significant professional development.

Some indication of LASER's impact on students in a specific classroom can be seen in a study done by Peter Finch in the West Valley School District (WVSD) near Yakima. As you can see from the graph below, Peter was able to document differences in student achievement on the 5th Grade Science WASL based on how many inquiry-based modules 5th grade teachers used during the past year.



Next year, the evaluation will again examine student scores on the 5th grade WASL to see what can be learned from looking at the changes from the first year. More work will be done to better quantify the quality of program implementation, which will hopefully include observations of student-teacher interaction in the classroom. WVSD will also have more teachers further along in the district's program implementation, which should result in even more students scoring above the state average. We look forward to reporting back in a year with new results.

Appendix 1 -- Impact of Professional Development on Science WASL Results

In this analysis, RMC Research explored the relationship between the amount of professional development that teachers in each school received and the science WASL scores of the Grade 5 students in their building. Because the data could not be disaggregated by student or class and because the student data could not be linked with a particular teacher, the school was the unit of analysis.

The professional development level for each school was determined using an index (PD Index) that represented the total professional development hours per 100 students that were provided over a 3-year period to the teachers of the cohort of Grade 5 students who took the WASL in spring 2004. The index was calculated according to the following formula:

> The sum of the professional development hours of all 2003–2004 Grade 5 teachers between 9/1/99 and 8/31/04, 2002–2003 Grade 4 teachers between 9/1/99 and 8/31/03, and 2001–2002 Grade 3 teachers between 9/1/99 and 8/31/02; times 100; and divided by the sum of the Grade 5 enrollment in 2003–2004, the Grade 4 enrollment in 2002–2003, and the Grade 3 enrollment in 2001–2002.

Initially, schools that had a PD Index greater than 0 were divided into three equal-sized groups of schools that received high, medium, and low levels of professional development. A simple calculation of mean percentage of students who met the science standard revealed that students in the schools whose staff participated in the most professional development scored higher than students in schools whose staff received less professional development (see Exhibit 1). Although this finding is encouraging, it does not control for other factors that are known to influence the results.

Exhibit 1
Mean WASL Scores by Professional Development Grouping

PD Index Group	*N*	Mean	*SD*
Low	59	21.92	1.58
Medium	57	26.21	1.95
High	56	32.21	2.59
Total	172	26.69	1.23

Next, RMC Research examined the bivariate correlations of demographic data and student assessment results to determine what demographic factors should be included in a model as control variables. The bivariate correlations showed that seven demographic factors were significantly correlated with the percent of students meeting the science standards: percent of the students who are (1) White, (2) Asian (% Asian), (3) Black (% Black), (4) Hispanic (% Hispanic), (5) English language learners (% ELL), (6) special education, and (7) who qualify for

free or reduced price lunch (% FRL). A regression analysis was conducted that included all of these factors except % ELL and % Black (% ELL was too highly correlated with % Hispanic and % Black was too highly correlated with % Asian) to determine the factors that contributed uniquely to variance in the outcome. The two factors that emerged were % Asian and % FRL and together accounted for the majority of the variance (approximately 66%). For the purpose of this study % FRL serves as a proxy for the socioeconomics of the community that the school served.

By controlling for the effect of % FRL and % Asian and by examining the percentage of students who met the science standard (% Met Standard) as the dependent variable, RMC Research conducted a regression analysis of the data. This analysis revealed a significant positive relationship between the professional development index for the school and the percentage of Grade 5 students who met the science standard on the 2004 WASL beyond what can be explained by the percentage of students who qualified for % FRL and % Asian (see Exhibit 2).

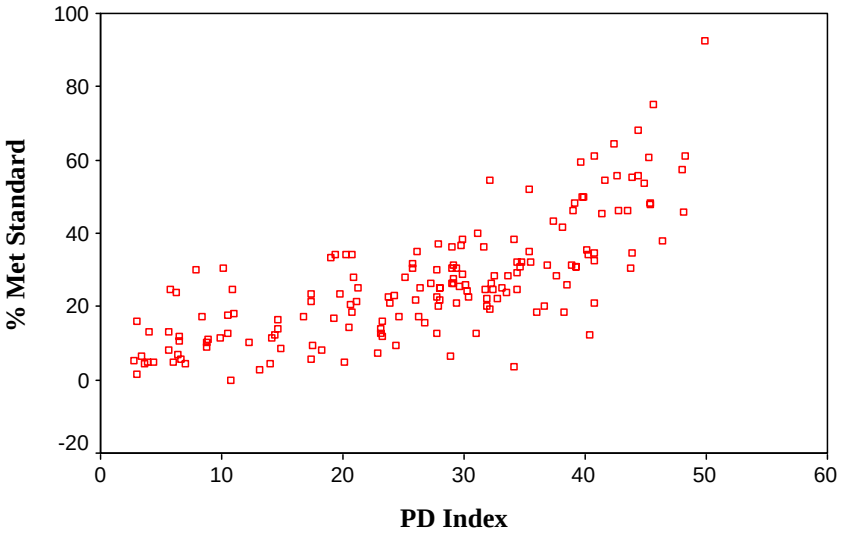
Exhibit 2
Regression Analysis of PD Index to % Met Standard

Variable	Coefficient	Standard Error	*p* (Significance)
% FRL	-0.467	0.034	< 0.001
% Asian	0.189	0.068	0.006
PD Index	0.012	0.005	**0.014**

Note. By convention, factors with *p* values less than 0.05 are considered statistically significant.
N = 166 schools.

Exhibit 3 shows a scatter plot graph of the PD Index versus the % Met Standard after the adjustments for the influence of % FRL and % Asian had been made. The scatter plot shows a gradual increase in the percentage of students meeting the science standard as the PD Index increases. In addition, the graph suggests that the rate of increase accelerated after teachers received a critical amount of professional development. The exact point at which this change occurred cannot be determined without access to classroom-level aggregates and the ability to track the professional development of the teachers of individual students.

Exhibit 3
Scatter Plot of PD Index Versus the % Met Standard Data After Correction



Appendix 2 -- Impact of Level of Implementation on Grade 6 HRI Assessment Results

RMC Research also explored the relationship between the levels of implementation of inquiry-based instructional materials and the results of the pilot test of the LSC student assessment instrument developed by Horizon Research Inc. Although this is not as directly related to Washington state as the WASL, it is another measure of student understanding of important science concepts and the pre/post design of the test allows us to get growth in understanding by individual students.

Forty-two classes were selected for participation based on their level of implementation as measured using the science reform rubrics. Half of the classes were rated as being in high- or medium-implementation schools and the other half were rated as being in low- or nonimplementation schools. In addition, high- and medium-implementation schools were paired with demographically similar low- or nonimplementation schools.

An analysis of the changes in student scores from the preassessment (fall 2003) to the postassessment (spring 2004) for the schools in each implementation level group revealed that students in all groups except nonimplementation schools demonstrated significant gains from the preassessment to the postassessment. Furthermore, the high-implementation schools did better than the low-implementation schools at meeting the needs of students who qualified for free or reduced-price lunch. Exhibit 4 shows the change in mean scores from the preassessment to the post-assessment for the FRL students and all other students. Students who qualified for free and reduced-price lunch demonstrated a greater growth than the other students and the difference was significantly ($p < 0.01$) greater for the students in the high-implementation classes.

Exhibit 4
Comparison of Changes in Mean Scores Student Groups