

In 1999, a partnership between Battelle/Pacific Northwest National Lab and Pacific Science Center launched the statewide LASER initiative. Washington State LASER established a network of Regional Alliances to support the implementation of the National Science Resource Center's LASER Model and Theory of Action for science education reform. The nine Regional Alliances provide ongoing professional development, program and student assessment support, curriculum materials supplied to teachers in ready-to-use condition, and the development of strong administrative and community support.

Principal Survey—In spring 2009 and 2010 RMC Research administered an online survey to principals in schools that were highly involved in professional development through the Regional Alliances. Schools invited to participate in the survey were those whose teachers participated in the most professional development during the 5-year period prior to the administration of the survey. Schools with 15 or more hours of professional development per FTE were invited to participate in the survey. For the 2009 Principal Survey administration, 319 schools were invited to complete the survey and 293 were invited in 2010. The schools invited included mostly elementary schools and some middle schools. A total of 62 principals completed the Principal Survey in 2009 (19.4% return rate) and 57 completed the Principal Survey in 2010 (19.5% return rate). Principal Survey respondents represented all nine of the Regional Alliances. Of those who responded, there were 69 elementary schools that had sufficient data for analysis. Schools were omitted from the analysis if their survey responses were either incomplete, the responses could not be linked to student achievement data, or the schools did not represent a subset of sufficient size for analysis (schools that served Grade 8 students).

Methods—The Washington Office of Superintendent of Public Instruction (OSPI) reports student achievement data in terms of the percentage of students who meet the Science Learning Standards as assessed by the Measurements of Student Progress (MSP, formerly the Washington Assessment of Student Learning). Since elementary schools represented the largest group of respondents, the analysis focused on the Grade 5 student achievement results. The statewide Grade 5

science MSP scores decreased nearly 11% from 2009 to 2010. This inconsistency in assessment results complicated a comparison of the results of a particular school from one year to the next. To address this issue, RMC Research used the percentage of Grade 5 students who met the science standard to rank schools on a scale of 1 to 100 for both 2009 and 2010. This ranking applied to all schools in Washington State that assessed 10 or more Grade 5 students in 2009 and 2010. The school ranking neutralized the inconsistencies in the assessment and facilitated a comparison of schools across years.

Because the Principal Survey was administered in spring 2009 and 2010, RMC Research combined 2 sets of school level data into a single set for analysis. One dataset included the 2009 Principal Survey results linked to the school's 2009 science achievement rank and the other dataset included the 2010 Principal Survey results linked to the school's 2010 science achievement rank. The combined dataset also included the level of professional development participation since July 1, 2007 per FTE, and school demographic data from the 2009–2010 school year.

RMC Research developed a linear regression model to control for the percentage of students who qualified for free or reduced-price lunch (a proxy for the socioeconomic conditions of the school setting) to test whether the principals' survey responses were significant predictors of school rank or change in school rank from one year to the next. The regression model was used to test all of the Principal Survey items and several scales developed from logical clusters of survey items.

Findings—The following statements summarize the findings from this analysis of Principal Survey data linked to student science achievement.

Principals of high ranking schools were more likely to observe the following characteristics among science students:

- **Clarity of Purpose**—Students clearly understood why they were performing each activity.
- **Intellectual Engagement**—Students were intellectually engaged with the science content.
- **Science Discourse**—Students had opportunities to make claims, use evidence to support their claims, or critique others' claims.

- **Closure**—Students had an opportunity to make sense of how the lesson related to science concepts and most drew the appropriate conclusions.
- **Metacognition**—Students had an opportunity to reflect on their thinking and most could identify ways in which their thinking about the science concepts had changed.

Other significant predictors of school rank include the following:

- The number of instructional modules the typical teacher uses over the course of a school year.
- Whether time was scheduled during regular work hours for teachers to participate in organized, school-based professional development specifically for science.
- The degree to which the school-based professional development activities focused on improving science teaching and learning.
- The percentage of the school-based professional development devoted to science teaching and learning.
- The degree to which the school-based professional development provided opportunities for teachers to observe science lessons taught by peers.
- The percentage of teachers who participated in professional development that surpassed initial use and further developed their expertise with the instructional modules.
- The degree to which parents support inquiry-based science instruction.

The Regional Alliances have successfully established the infrastructure to support inquiry-based science instruction at the elementary level; however, these factors alone are not significant predictors of school rank, or gains in school rank. The following Principal Survey results support this statement:

- More than 3 out of 5 principals (62%) indicated that the typical science teacher used 3 instructional modules per year.
- Fully 98% of the principals indicated that the instructional modules were the core instructional materials for science, and 93% indicated that an established sequence determined which modules to use at each grade level.
- The decision regarding the sequence of the instructional modules for each grade was made at the district level in 60% of the schools and at the Regional Alliance level in 26% of the schools.

- Three out of 4 principals believed that the teachers in their school completed all of the activities in the instructional modules.
- Nearly 2 out of 3 principals (64%) reported that their school or district had established a policy requiring teachers to participate in professional development prior to using each instructional module with students.
- Two thirds (68%) of the principals indicated that approximately 90% of the teachers in their school had participated in the foundational training on all of the instructional modules they used with students.
- According to 78% of the principals, the instructional modules were refurbished at a science materials center.
- Most (81%) of the principals reported that teachers never or seldom experienced problems with the condition of the instructional modules.
- The instructional modules were always or almost always delivered on time, according to 90% of the principals.
- Most (96%) of the principals reported that the district administration was very supportive (76%) or somewhat supportive (20%) of inquiry-based science instruction.
- More than 3 out of 4 principals (77%) indicated that students' parents were very supportive (46%) or somewhat supportive (31%) of inquiry-based science instruction.
- Overall, Principal Survey respondents were very satisfied with the services provided by their Regional Alliance: 95% of the principals rated the services that their school had received in the past year as excellent (61%) or good (34%).

Recommendations—RMC Research makes the following recommendations based on the results of this evaluation:

- Continue to work with the science leadership in Washington State to ensure that science professional development focuses on helping teachers implement the effective science learning experiences for students in a consistent and explicit manner across all of the Regional Alliances.
- Continue to encourage Regional Alliances to support school-based professional development that helps teachers (a) assume accountability for student learning that results from using the modules and (b) collaboratively implement the elements of effective science instruction.