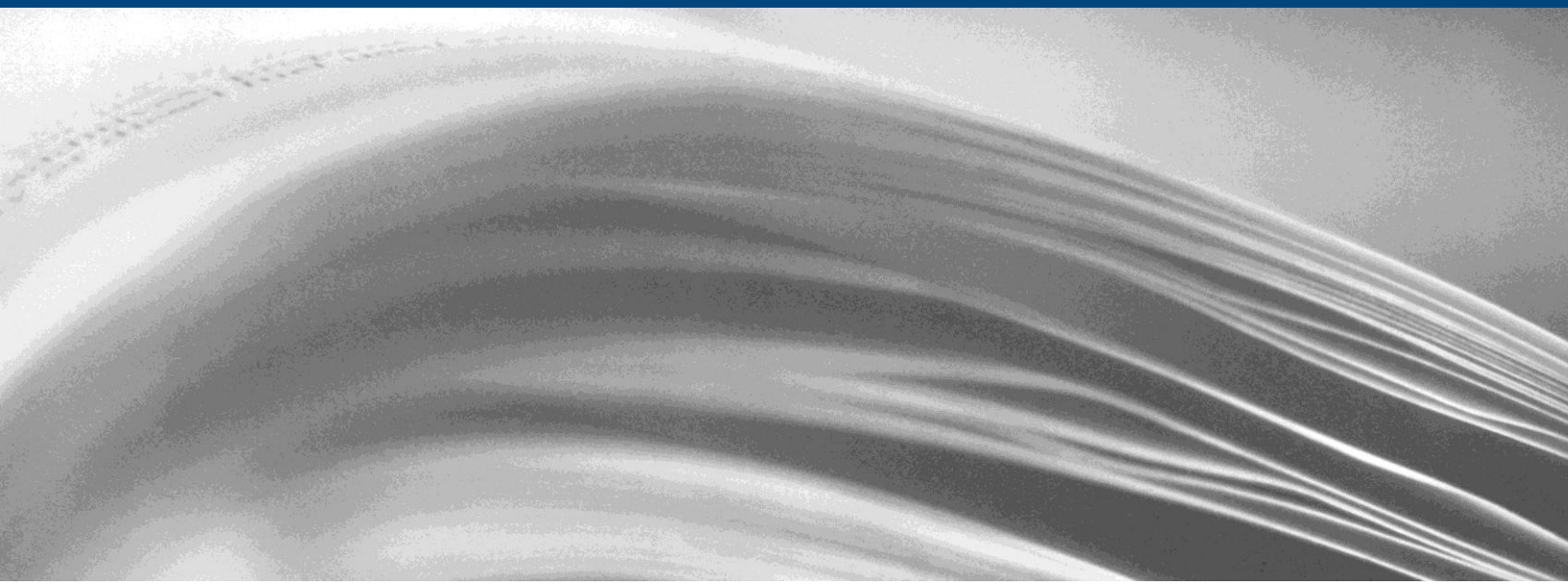

Washington State LASER

2009–2010 Evaluation Report

Prepared for

Washington State LASER
Pacific Science Center
200 Second Avenue North
Seattle, WA 98109

Prepared by

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February 2010

RMC RESEARCH

Washington State LASER

2009–2010 Evaluation Report

Prepared for

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Acknowledgements

RMC Research thanks the many people who contributed to the evaluation of Washington State LASER, particularly the directors of the 9 Regional Alliances and their staff who diligently maintained the Washington State LASER professional development database with accurate, current information. Special thanks to the Leadership Team of Dennis Schatz, Jeff Estes, Sonia Siegel Vexler, Lonnie Keown, Peggy Willcuts, and Anne Kennedy for their continued support and guidance.

Executive Summary

The Leadership and Assistance for Science Education Reform (LASER) initiative, launched by the National Science Resources Center in 1998, has the overarching goal of promoting a sustainable, inquiry-based model for kindergarten through Grade 12 science education reform. The use of hands-on science instructional modules (kits) and inquiry-based pedagogy are hallmarks of the LASER approach. Other key elements of LASER are ongoing professional development, effective program and student assessment, curriculum materials supplied to teachers in ready-to-use condition, and the development of strong administrative and community support.

In 1999 a partnership between Battelle/Pacific Northwest National Lab and Pacific Science Center launched a statewide LASER initiative modeled after the national LASER initiative. Support from the Washington State Legislature started in 2001. Washington State LASER supports annual strategic planning institutes, curriculum showcases, and a statewide network of Regional Alliances, which provide the ongoing professional development, materials support, and technical assistance needed to implement inquiry-based science instruction in the participating schools. In 2009–2010, a combination of state, school district, and private sources supported Washington State LASER. Washington's Office of Superintendent of Public Instruction, Battelle (the world's largest nonprofit research and development organization), and the Pacific Science Center (a family center for science education located in Seattle) provide the leadership for Washington State LASER.

Each Regional Alliance is a coalition of school districts, educational service districts (ESDs), universities, and businesses. At the time of this report 9 Regional Alliances served Washington State:

- Mountain to Harbor Alliance, coordinated by ESD 113 in Olympia.
- North Central Alliance, coordinated by North Central ESD in Wenatchee.
- North Sound Alliance, coordinated through Institute for Systems Biology.
- Northeast Alliance, coordinated by ESD 101 in Spokane.
- Northwest Alliance, coordinated by Northwest ESD 189 in Anacortes.
- South Central Alliance, coordinated through ESD 105 in Yakima.
- South Sound Alliance, coordinated through Puyallup School District.
- Southeast Alliance, coordinated through Pacific Northwest National Laboratory and Kennewick School District, and ESD 123 in the Tri Cities.
- Southwest Washington Alliance, coordinated by the ESD 112 in Vancouver.

Background

At the conclusion of the 2007–2009 biennium the evaluation report included recommendations encouraging Washington State LASER to rethink its approach to professional development to achieve greater impact on student science achievement. As a result, Washington State LASER assumed the leadership role in the development of a more coherent and research-based vision of effective science instructional practices that would guide future professional development. This work involved the development of a theory of action and a logic model that has been adopted as the statewide model for science professional development (see Appendix D). The theory of action embedded in the logic model describes effective science learning experiences for students that will be the focus of future science professional development. To implement the logic model, Washington State LASER began hosting a series of 5 Science Partnership Academies: 3 occurred during the 2009–2010 project year and 2 will occur in 2010–2011. These academies convened teams of science education leaders from each region of the state to operationalize the logic model.

The 2009–2010 project year was the first year of a 2009–2011 legislative biennium and funding for the Washington State LASER project. During this time, economic challenges for Washington State resulted in substantial cutbacks in LASER's operating budget. As a result, far fewer resources were available to support direct services to districts and schools. Nevertheless, Washington State LASER retained its leadership role of helping the science education community understand and implement the new direction articulated in the logic model..

Summary of Findings

This report summarizes the research and evaluation findings for the period from July 1, 2009, to June 30, 2010. RMC Research conducted 3 data collection activities during the 2009–2010 project year:

- **Online Professional Development Database**—Maintained the online database that the Regional Alliances use to document all of the science professional development conducted by the organizations participating in Washington State LASER.
- **Principal Survey**—Administered the second annual principal survey, combined the results with the first administration of the principal survey in 2009, linked the survey data to school-level achievement data and professional development data from the online database, and analyzed the data for relationships between project activities and student science achievement. See Appendix A and the section Principal Survey Results for greater detail about the survey administration and data analysis methods.
- **Evaluation of the Science Partnership Academy**—Developed and administering pre- and postsurveys to Science Partnership Academy participants and analyzing the data for significant changes in responses between the 2

survey administrations. See Appendix B and C and the section Science Partnership Academy Survey Results for greater detail about the survey.

The remainder of this section summarizes the findings from these 3 evaluation activities.

Participation in Professional Development

During the 2009–2010 project year the Regional Alliances conducted 448 professional development events focused on inquiry-based science instruction for a total of 3,666 hours of professional development. These events garnered 5,765 attendees and served 3,099 educators (unduplicated count). These educators received nearly 50,000 contact hours of professional development (see Exhibit 2).

Since the beginning of the Washington State LASER project in July 1, 1999, the Regional Alliances conducted 6,697 distinct professional development events that totaled 42,949 hours of professional development serving 91,495 participants (see Exhibit 3). The professional development represented more than 20,600 educators who logged a total of 596,670 contact hours of professional development during the project.

Principal Survey Results

A total of 62 principals completed the 2009 principal survey (a return rate of 19.4%) and 57 submitted surveys in 2010 (a return rate of 19.5%). The respondents represented schools whose staff have participated in professional development conducted by the Regional Alliances, and all 9 Alliances were represented among the respondents (see Exhibit 4).

Finding 1—Overall the principals' survey responses indicate that the Regional Alliances have successfully established the infrastructure to support inquiry-based science instruction at the elementary level. Principal survey results that support this statement include these:

- More than 3 out of 5 principals (62%) indicated that the typical science teacher used 3 instructional modules per year (see Exhibit 6).
- 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 in 26% of the schools (see Exhibit 7).
- 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.
- Three out of 4 principals believed that the teachers in their school completed all of the activities in the instructional modules (see Exhibit 8).
- 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 (see Exhibit 12).
- According to 78% of the principals, the instructional modules were refurbished at a science materials center (see Exhibit 19).
- Most (81%) of the principals reported that teachers never or seldom experienced problems with the condition of the instructional modules (see Exhibit 20).
- The instructional modules were always or almost always delivered on time, according to 90% of the principals (see Exhibit 21).
- 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%) indictated that students' parents were very supportive (46%) or somewhat supportive (31%) of inquiry-based science instruction.
- Overall, the survey respondents were very satisfied with the services provided by their Regional Alliance: 95% of the principals (see Exhibit 26) rated the services that their school had received in the past year as excellent (61%) or good (34%).

Impact on Student Achievement

RMC Research linked the principal survey responses to the Grade 5 science student achievement data from the Measurements of Student Progress (MSP). The achievement data was used to rank participating schools relative to schools statewide on a scale from 1 to 100. The school ranking was the dependent variable and principal survey items were independent variables in the analysis. Regression analysis methods were used to control for the effect of socioeconomics (percentage of students who qualified for free or reduced-price lunch) and to identify principal survey items that were significant predictors of school rank or changes in school rank across years. For more details on the analytic methods, see the section Analysis of Science Measurements of Student Progress Results. Highlights from this analysis include these:

Finding 2—The following characteristics were more likely to be observed among students by principals in science classes in high ranking schools (see Exhibit 28):

- **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 out of how the lesson related to science concepts, and it was clear that 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.

Finding 3—The number of instructional modules the typical teacher uses over the course of a school year is a significant predictor of the school's science achievement rank and of positive change in rank from one year to the next.

Finding 4—Several characteristics of the professional development are predictors of the overall science achievement rank:

- 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.

Finding 5—An important predictor of a significant increase in a school's science achievement rank is the percentage of teachers who participated in professional development that surpassed initial use and further developed their expertise with the instructional modules.

Finding 6—The degree to which parents support inquiry-based science instruction is a significant predictor of a school's science achievement rank.

Finding 7—Several important aspects of Washington State LASER are not significantly related to student achievement:

- The number of science professional development hours per full-time equivalent (FTE) that the teachers in the school had participated in since July 1, 2007.
- The percentage of teachers who participated in the initial training on all of the instructional modules they used with students.
- Instructional materials implementation factors such as the sequence of the materials, the percentage of the units that teachers typically completed, and the amount of adaptations teachers typically made.

Science Partnership Academy Survey Results

A total of 53 respondents completed the demographic section of the Science Partnership Academy survey in December 2009 or May 2010. Key characteristics of the Science Partnership Acadamy participants include these:

- More than 40% of the participants were Regional Alliance directors or ESD science coordinators (see Exhibit 29).
- All areas of the state were represented and nearly 60% of the participants were from western Washington and the Seattle-Tacoma metropolitan area (see Exhibit 30).
- Two out of 3 participants held a master's degree (see Exhibit 31) and 62% of those held a degree in science. Of those with science degrees, most were in biology or life sciences (see Exhibit 32).
- Many of the participants had taught at the K–12 level and nearly 2 out of 3 (64%) had taught at the middle school level (see Exhibit 33).
- Half of the participants who taught science did so for between 6 and 15 years (see Exhibit 34).
- Approximately a fourth of the participants with science teaching experience were teaching in 2009–2010 or 2008–2009 and 2 out of 3 had taught science within the past 5 years (see Exhibit 35).
- Nearly a third (30%) of those participants who taught science had done so for more than 10 years (see Exhibit 36).

Finding 8—Science Partnership Academy participants reported a significant increase from presurvey to postsurvey in their knowledge of important literature on science teaching and learning, how students learn science, and highly effective professional development (see Exhibit 37).

Finding 9—The degree of change in the Science Partnership Academy participants' understanding of the elements of effective science learning is uncertain (see Exhibit 38). Very slight increases occurred from presurvey to postsurvey on all but one item and only one increase was statistically significant: on the postsurvey participants reported increased ability to recognize when students were communicating and critiquing their scientific ideas and others' ideas.

Finding 10—Participation in the Science Partnership Academy resulted in some adjustment to the developing expertise professional development offered but had little impact on the foundational professional development. As Exhibit 39 shows, a statistically significant increase from presurvey to postsurvey occurred in only 1 of the 8 areas of the foundational professional development: helping teachers implement formative assessment practices that effectively inform instruction. Conversely, participants reported significant increases in all but one survey item regarding the developing expertise professional development.

Finding 11—Regional teams had established a mechanism to develop a cadre of trainers for both the foundational and developing expertise professional development; a shared vision of effective science teaching and learning, and a school-based professional development implementation process. Science Partnership Academy participants did not report any progress in some of the more challenging and complex

tasks such as influencing district and school policies and practices or establishing a mechanism for identifying and nurturing instructional leadership (see Exhibit 40).

Conclusion

These findings use an entirely different dataset and analytical approach to provide further support for the conclusion and recommendations presented in the evaluation report from the 2007–2009 project years. In that report RMC Research concluded:

> *The results of the visits to sentinel site schools with a recent history of staff participation in science professional development indicate that the infrastructure to support the use of a core curriculum of inquiry-based science instructional modules is in place and is functioning adequately in the schools visited. Although these conditions are necessary for the implementation of inquiry-based science instruction, they are not sufficient to significantly raise student achievement as measured by the science Washington Assessment of Student Learning [MSP].*[1]

Findings 1 and 3 provide further evidence of the effectiveness of the infrastructure established by Washington State LASER and the Regional Alliances. Although this infrastructure was a necessary condition for inquiry-based science instruction at the elementary level, infrastructure alone is not sufficient to produce the desired gains in student science achievement (see Finding 7).

These findings also support the new direction articulated in the logic model (see Appendix D), which the project leadership developed to guide and strengthen future efforts to improve science teaching and learning and was the focus of the Science Partnership Academy. Specifically, Finding 2 closely matches the effective science learning experiences for students defined in the logic model. These characteristics of highly ranked schools provide a model for improving science teaching and learning that must be replicated through professional development. Findings 4 and 5 emphasize the importance of establishing school-based professional learning communities of teachers who are improving instructional practices by consistently engaging students in the effective learning experiences defined in the logic model.

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 manner that is consistent and explicit across all of the Regional Alliances. The professional development should endeavor to help teachers understand the elements of effective science

[1]Weaver, D., Lewis, C., & Raya-Carlton. (2010). *Washington State LASER 2008–2009 evaluation report*. Portland, OR: RMC Research Corporation.

instruction and adopt the practice of using the inquiry-based instructional modules to actualize the elements with their students.

- 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. The professional learning communities must have an adequate structure and leadership to fulfill their intended purpose and be sufficiently flexible to allow all participants to be vested and realize the benefits.

Participation in Professional Development

RMC Research developed an online database that Washington State LASER Regional Alliances used to track teachers' professional development participation. The database contains each participating teacher's contact information, school, grade level taught, an indication of whether the teacher is a teacher leader, and documentation of professional development participation (including the date, location, facilitator, focus, and duration). Exhibits 1 and 2 display the participation in professional development conducted by the 9 Regional Alliances between July 1, 2009, and June 30, 2010.

Exhibit 1
Teacher Participation in Professional Development:
July 1, 2009, Through June, 30 2010

Alliance	< 18 Hours	18–35 Hours	36–54 Hours	> 54 Hours	Total
Mountain to Harbor	188	182	33	20	423
North Central	52	12	14	24	102
North Sound	46	43	50	16	155
Northeast	343	107	10	2	462
Northwest	221	99	4	0	324
South Central	176	151	52	9	388
South Sound	308	62	9	10	389
Southeast	181	82	11	0	274
Southwest	461	108	11	1	581
Total	1,976	846	194	82	3,098
Percentage	63.8%	27.3%	6.3%	2.6%	

During the 2009–2010 project year the Regional Alliances served more than 3,000 teachers. More than 3 out of 5 (64%) participated in fewer than 18 hours of professional development—a finding attributable to the fact that Washington State LASER has been operating since 1999 and many teachers participated in the foundational training prior to July 1, 2009. Many teachers attended professional development to expand their knowledge or to learn new instructional modules. Analysis of the participation distribution by Regional Alliance suggests that (a) some teachers received training on the use of instructional modules through sources such as the district or the vendor (these professional development types were not consistently included in the Washington State LASER database) and (b) some districts did not ensure that teachers participated in the professional development for the instructional modules they use.

Exhibit 2
Professional Development Participation:
July 1, 2009, Through June, 30 2010

Alliance	Sessions	Hours Offered	Attendance	Participants[a]	Contact Hours
Mountain to Harbor	47	427	764	423	9,850
North Central	37	388	328	102	3,082
North Sound	32	436	308	155	4,287
Northeast	53	368	876	462	6,186
Northwest	22	165	401	324	3,574
South Central	72	562	969	388	7,361
South Sound	39	326	637	389	4,558
Southeast	47	374	492	274	3,741
Southwest	99	620	990	581	6,786
Total	448	3,666	5,765	3,098[a]	49,425

[a]Unduplicated count.

During 2009–2010 the Regional Alliances conducted 448 professional development sessions focused on inquiry-based science instruction for a total of 3,666 hours. These sessions garnered 5,765 attendees and served 3,098 educators (unduplicated count). Altogether, these educators received nearly 50,000 professional development contact hours.

The number of Regional Alliance organizations ranged from 4 in 1999 to 10 in 2007. Since the beginning of the Washington State LASER project in July 1, 1999, these organizations have conducted 6,697 distinct professional development events totaling 42,949 hours of professional development serving 91,495 participants (see Exhibit 3). The professional development represented more than 20,600 individual educators who logged a total of 596,670 contact hours of professional development throughout the project history.

Exhibit 3
Professional Development Participation:
July 1, 1999, Through June, 30 2010

Alliance	Sessions	Hours Offered	Attendance	Participants[a]	Contact Hours
Mountain to Harbor	194	1,495	2,944	824	26,267
North Central	205	1,960	3,167	785	28,952
Northeast	292	1,838	4,594	916	29,216
North Sound	1,041	5,784	15,619	4,591	83,820
Northwest	552	4,220	6,862	2,206	61,008
Olympic **	188	1,110	2,138	816	11,414
South Central	595	5,377	10,194	2,236	93,273
Southeast	488	3,757	5,987	1,503	45,860
South Sound	985	5,002	14,334	3,285	70,873
Southwest	2,157	12,406	25,656	3,774	145,987
Total	6,697	42,949	91,495	20,936[a]	596,670

[a]Unduplicated count. ** Prior to 2009 the Olympic ESD operated a Regional Alliance but it was not part of Washington State LASER Beginning July 2009.

Principal Survey Results

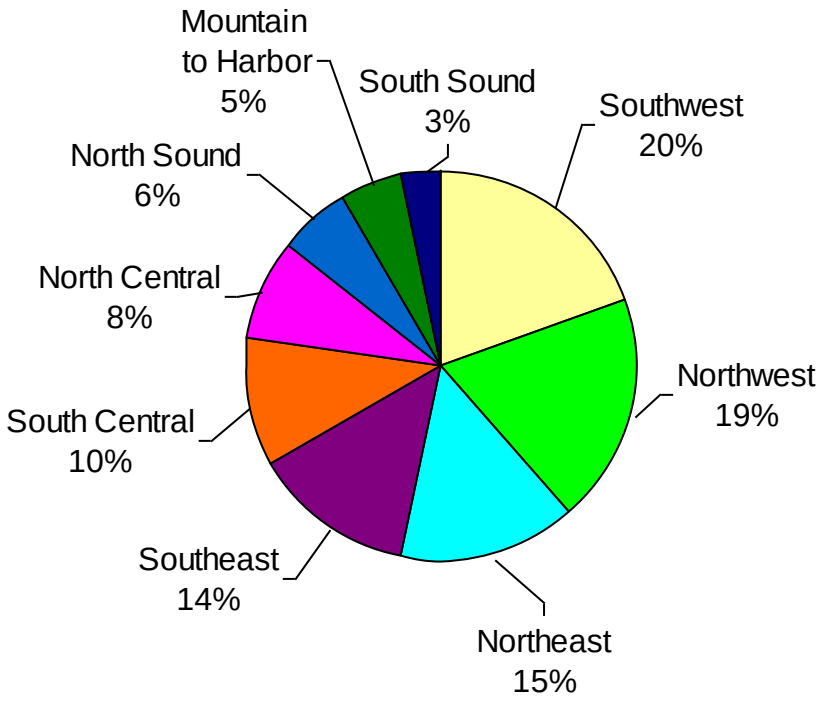
In spring 2009 and 2010 RMC Research administered an online survey to principals in schools that were highly involved in professional development through the Regional Alliances (see Appendix A for survey items). RMC Research used data from the Washington State LASER professional development database to identity schools whose teachers participated in the most professional development through the Regional Alliances. For each school a Regional Alliance had served within the 5 years prior to the survey administration, RMC Research calculated the professional development hours per teacher by dividing the total number of professional development hours completed during the past 5 years by the teachers' FTE. RMC Research used this value to rank the schools from highest to lowest professional development participation and then selected for principal survey participation all of the schools with 15 or more hours of professional development per FTE. For the 2009 principal survey administration 319 schools were included in the sampling frame and 293 were included in 2010.

RMC Research sent the principals of the selected schools a letter and an email urging them to complete the online survey. The letter explained why the schools had been selected and emphasized the relationship between the services provided through the Regional Alliance and the need for the survey data. A total of 62 respondents completed the principal survey in 2009 (19.4% return rate) and 57 completed the principal survey in 2010 (19.5% return rate). Exhibit 4 shows the distribution of the principal survey respondents by Regional Alliance. The following statements summarize the findings from the survey section that described the respondents and their use of the instructional modules:

- Principal survey respondents represented all 9 of the Regional Alliances (see Exhibit 4) with the least representation from the South Sound Regional Alliance (3%) and the most representation from the Southwest Regional Alliance (20%).
- The respondents demonstrated a wide range of experience using the modules with 14% representing schools that had been using the modules since the beginning of the Washington State LASER project and 10% with 2 years or less of experience (see Exhibit 5).
- More than 3 out of 5 (62%) indicated that the typical science teacher used 3 modules per year (see Exhibit 6).
- The decision regarding the sequence of instructional modules (kits) used for each grade was made at the district level in 60% of the schools and at the Regional Alliance in 26% of the schools (see Exhibit 7).
- Fully 98% of the principals indicated that the instructional modules were the core instructional materials for science, and 93% indicated that an established sequence prescribed which instructional modules to use at each grade level.
- Three out of 4 principals reported that they believed the teachers in their school completed all of the activities in the instructional modules (see Exhibit 8).

- Approximately a quarter of the principals reported that when the instructional modules were not available for use with students, 90% of the teachers in their school continued to teach science using other science materials and another quarter reported that 10% of the teachers or less continued to teach science (see Exhibit 9).
- The degree to which the principals reported that the teachers used the instructional modules with fidelity varied considerably. According to 29% of the principals, the teachers used the materials exactly as prescribed, whereas 31% reported that the teachers modified the lessons in an effort to improve them (see Exhibit 10).
- Nearly half of the principals indicated that their school or district had made an organized effort to identify instructional materials to fill the gaps in required content not addressed by the instructional modules (see Exhibit 11).

Exhibit 4
Principal Survey Respondents by Regional Alliance



Science Curriculum Materials

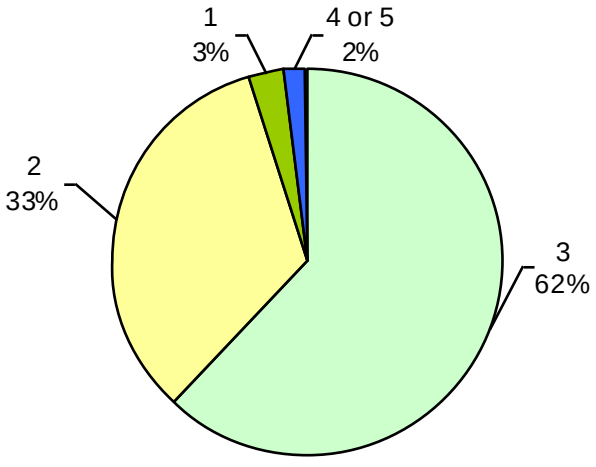
The following data exhibits represent the distribution of responses to principal survey items related to the science curriculum.

Exhibit 5
First School Year Using Instructional Modules

First School Year	Percent
1999–2000	14.3
2000–2001	8.8
2001–2002	8.8
2002–2003	6.6
2003–2004	4.4
2004–2005	14.3
2005–2006	9.9
2006–2007	12.1
2007–2008	11.0
2008–2009	7.7
2009–2010	2.2

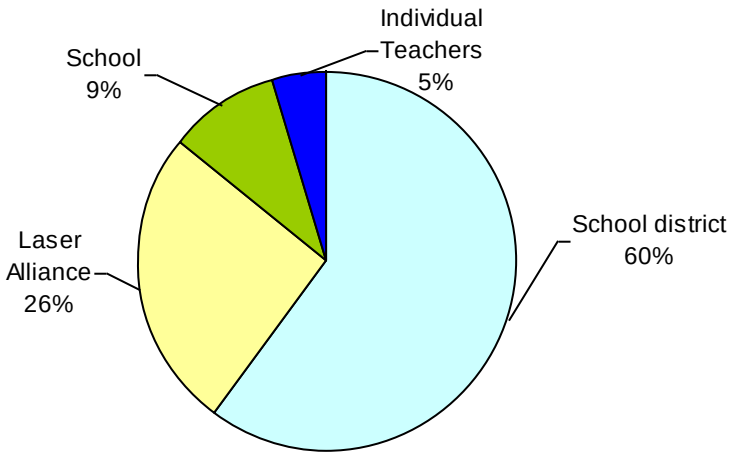
Note. Survey item: "During which school year did your school first begin using the inquiry-based instructional modules (kits) for science?" *n* = 96.

Exhibit 6
Instructional Modules per School Year



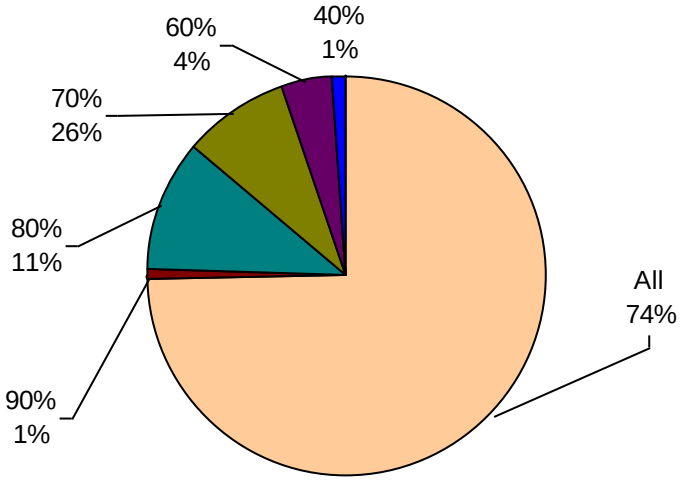
Note. Survey item: "How many instructional modules (kits) did the typical teacher who teaches science in your school use over the course of the current school year?" *n* = 95.

Exhibit 7
Decision Regarding Instructional Module Sequence



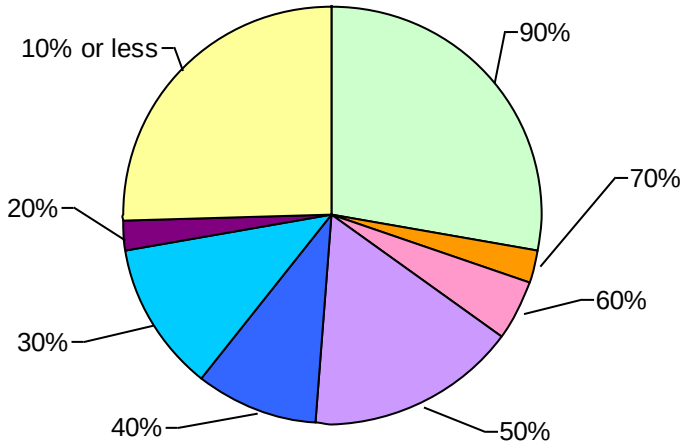
Note. Survey item: "At what level is the decision ultimately made about the sequence of instructional modules (kits) that are used at each grade level?" *n* = 85.

Exhibit 8
Instructional Modules Typically Completed



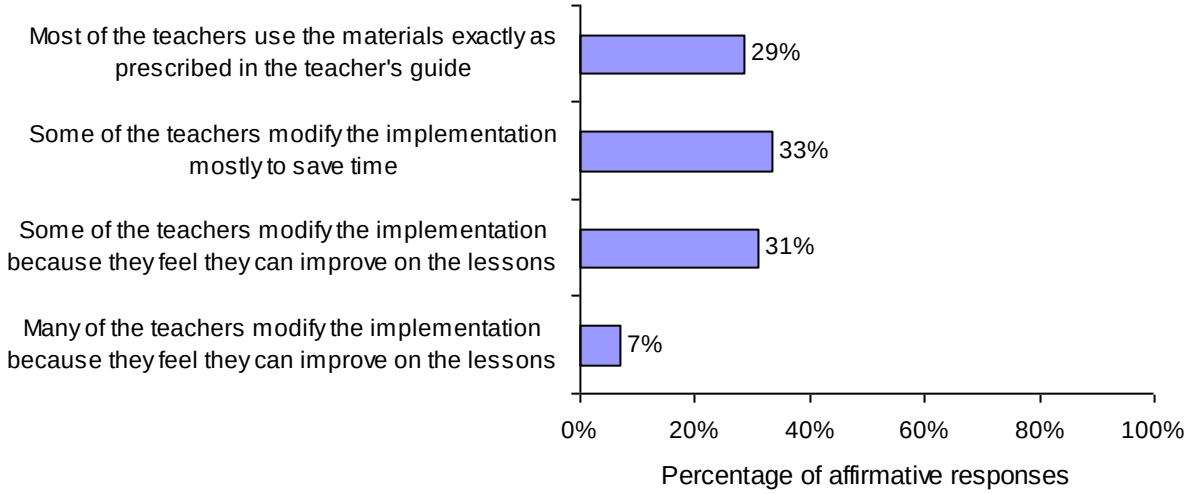
Note. Survey item: "Approximately what percentage of the modules would you say that teachers typically complete on average?" *n* = 94.

Exhibit 9
Teachers Who Teach Science Between Instructional Modules



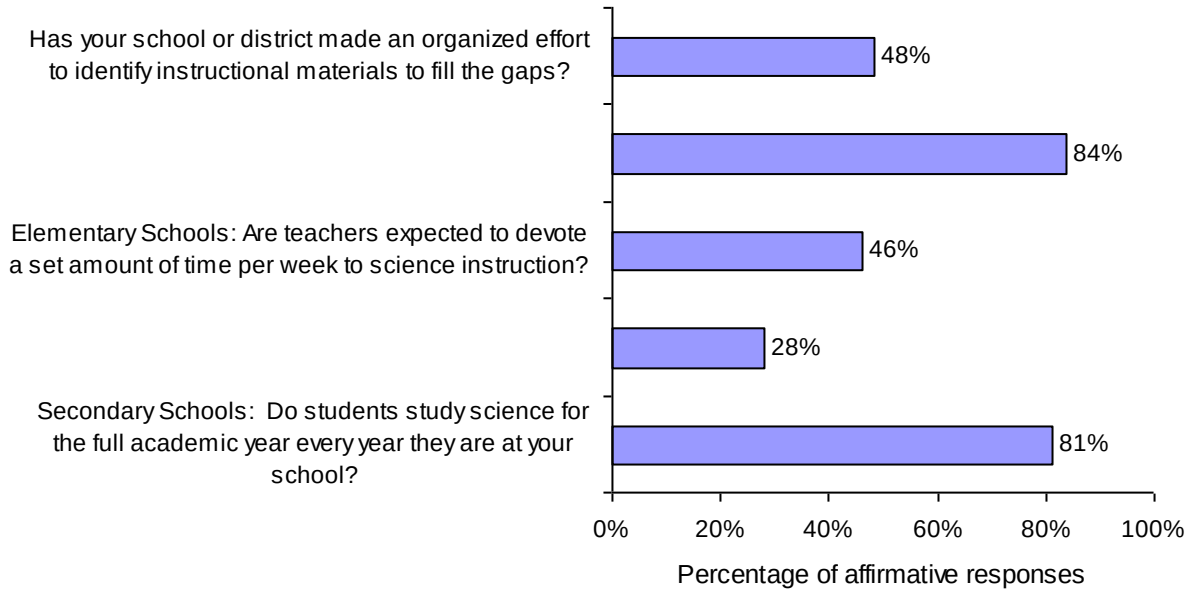
Note. Survey item: "When the modules are not available for use with students, approximately what percentage of the teachers in your school would you say continue to teach science during those periods using other science materials?" *n* = 43.

Exhibit 10
Fidelity of Instructional Module Use



Note. Survey Item: "Which of the following best describes the degree to which you believe that teachers implement the modules as prescribed in the teachers guide?" *n* = 87.

Exhibit 11
Instructional Module Usage



Professional Development

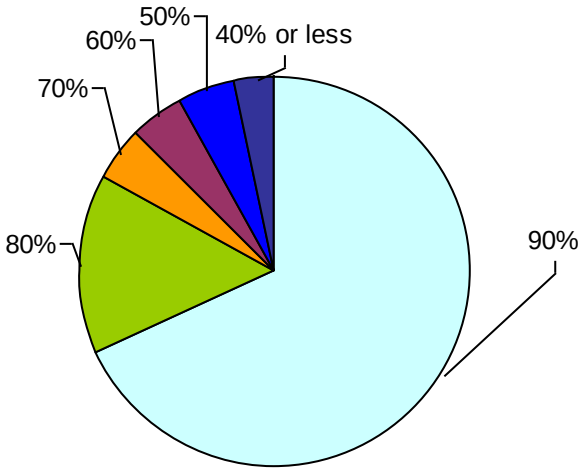
Another section of the principal survey concerned the Regional Alliances' provision of professional development that prepares teachers to effectively use the inquiry-based instructional modules. Exhibits 12–16 show the frequency distribution of the responses to these items. The key findings from this portion of the principal survey include these:

- 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 reported 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 (see Exhibit 12).
- According to 88% of the principals, teachers had ample opportunity to participate in the foundational training on the instructional modules they used, and 60% reported that teachers had ample opportunity to participate in additional professional development on advanced use of the instructional modules. The percentage of teachers who participated in advanced training varied considerably (see Exhibit 13).
- According to 38% of the principals, time was scheduled during regular work hours for teachers to participate in organized, school-based professional development in science. The frequency varied from weekly to annually (see Exhibit 14).
- Nearly 3 out of 4 principals (73%) reported that teachers participated in professional learning communities that met regularly to conduct professional

development, and 59% of those principals reported that approximately 90% of their school's staff actively participated. Half (50%) of these professional learning communities met weekly (see Exhibit 15), but nearly 2 out of 3 (64%) devoted 30% or less of their meeting time to improving science instruction (see Exhibit 38).

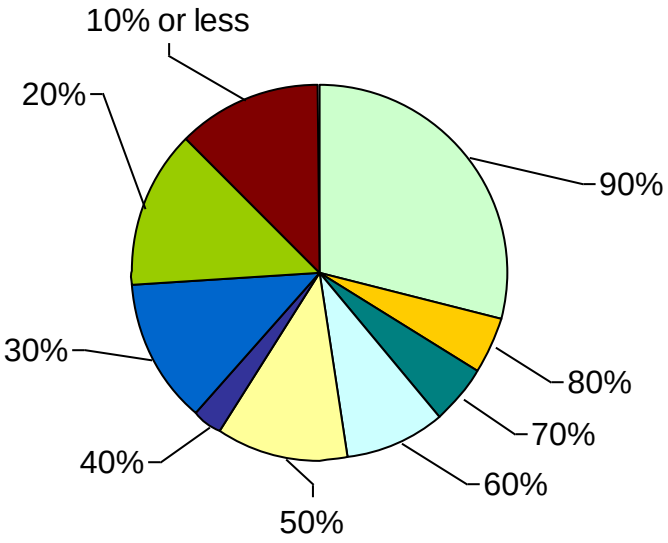
- The professional learning community sessions involved teams of teachers collaboratively examining samples of student work to gain insight into how students learn science, according to 71% of the principals.

Exhibit 12
Foundational Training Participation



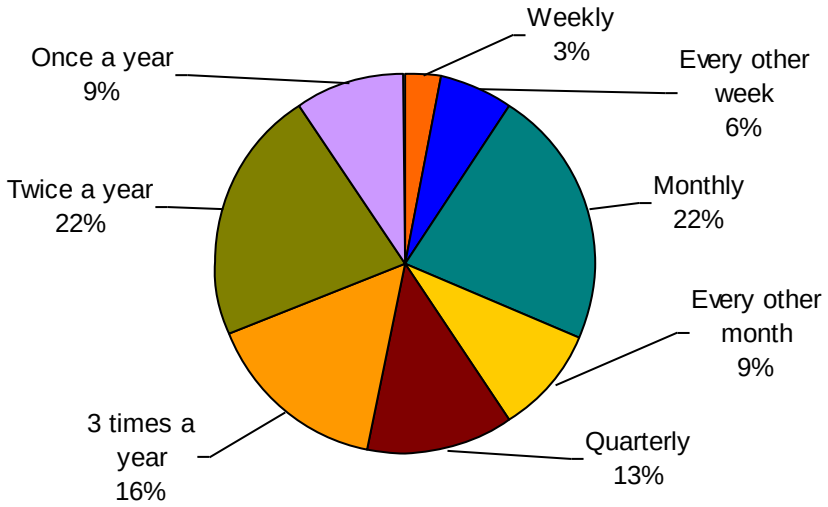
Note. Survey item: "Approximately what percentage of the teachers in this school have participated in the foundational training on all of the instructional modules they are using with students?" *n* = 88.

Exhibit 13
Advanced Training Participation



Note. Survey item: "Approximately what percentage of the teachers in this school have participated in professional development that goes beyond foundational and further develops their expertise in the use of the instructional modules?" *n* = 80.

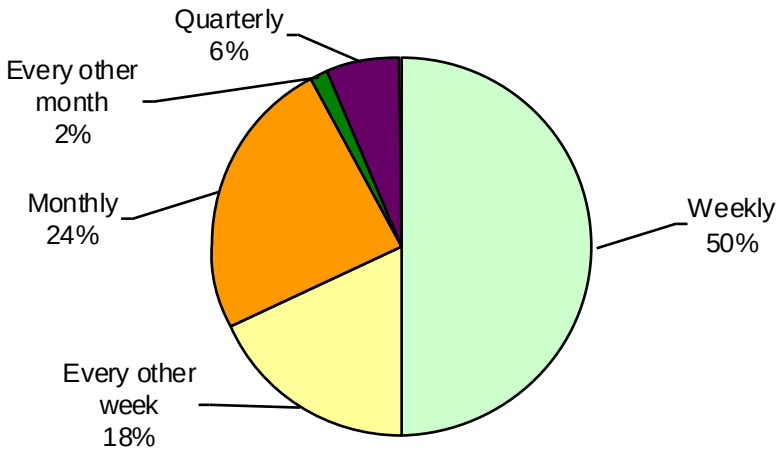
Exhibit 14
Frequency of School-Based Professional Development



Note. Survey item: "How often do teachers participate in school-based professional development specifically for science?" *n* = 32.

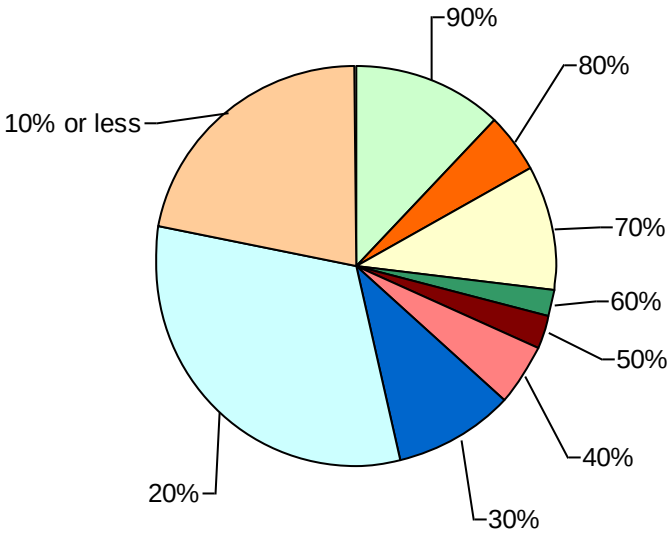
Of the principal survey respondents, 73% indicated that their school had established professional learning communities involving teams of teachers who met regularly to conduct their own professional development activities.

Exhibit 15
Frequency of Professional Learning Community Meetings



Note. Survey item: "How often do professional learning communities meet?"
n = 62.

Exhibit 16
Professional Learning Community Time Devoted to Science



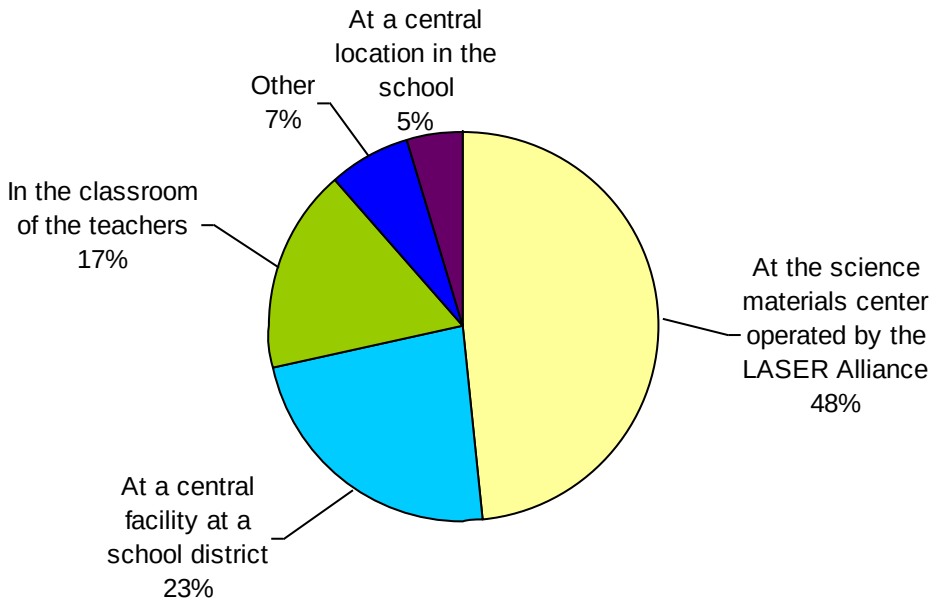
Note. Survey item: "Approximately what percentage of the professional learning community time is devoted to science teaching and learning?"
n = 41.

Materials Support

The principal survey addressed the methods for storing, delivering, and maintaining the science instructional modules. Exhibits 17–21 show the frequency distribution of the responses to these items. The key findings include these:

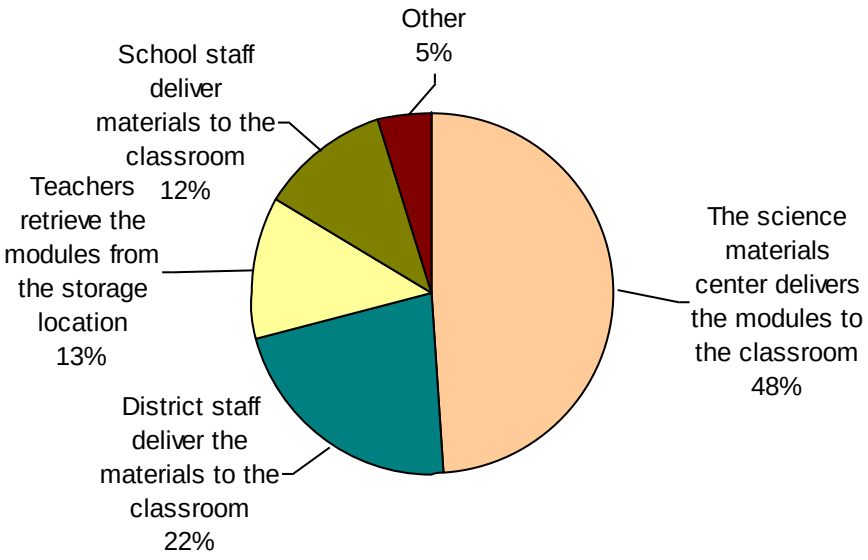
- Nearly half (48%) of the principals reported that the instructional modules were stored at a science materials center that delivered the modules to the classrooms (see Exhibits 17 and 18).
- The instructional modules were refurbished at a science materials center, according to 78% of the principals (see Exhibit 19).
- Most (81%) of the principals reported that teachers never or seldom experienced problems with the condition of the instructional modules (see Exhibit 20).
- The instructional modules were always or almost always delivered on time, according to 90% of the principals (see Exhibit 21).

Exhibit 17
Instructional Module Storage



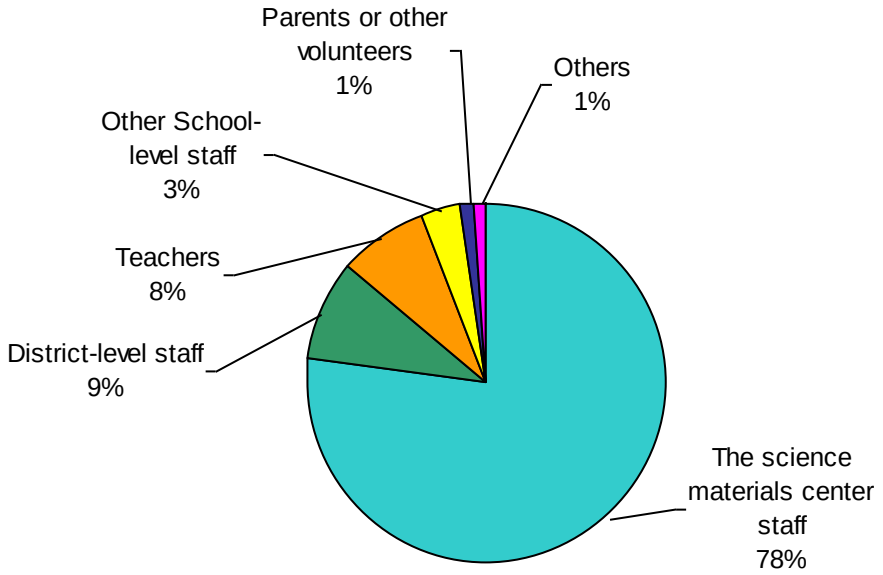
Note. Survey item: "Where are the instructional modules stored when they are not being used?" *n* = 87.

Exhibit 18
Access to Instructional Modules



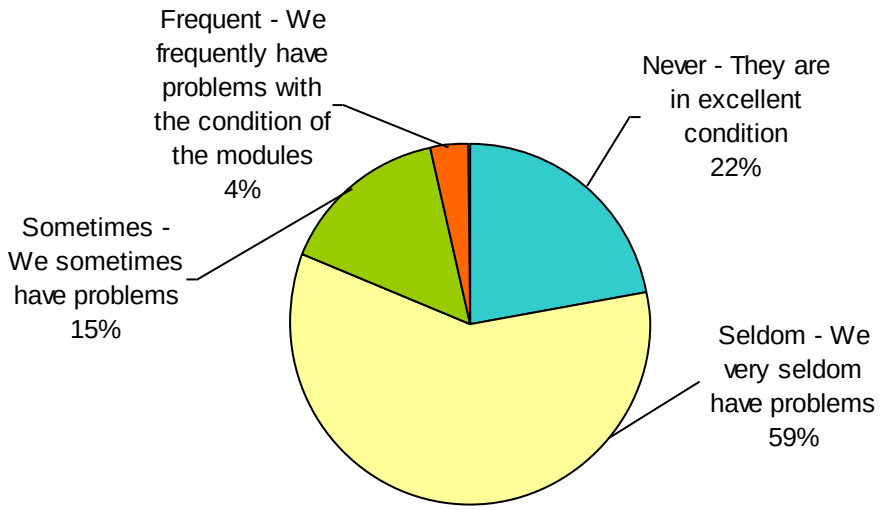
Note. Survey item: "How do teachers obtain the instructional modules when they are ready to use them with students?" *n* = 86.

Exhibit 19
Instructional Module Refurbishment



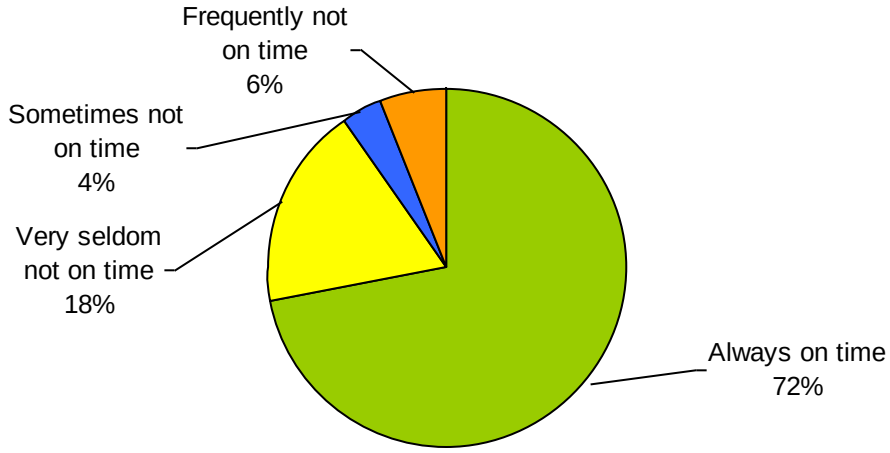
Note. Survey item: "How are the instructional modules refurbished after use?" *n* = 87.

Exhibit 20
Frequency of Problems With Instructional Module Condition



Note. Survey item: "How frequently do your teachers have problems with the condition of the modules?" *n* = 85.

Exhibit 21
Timeliness of Instructional Module Delivery



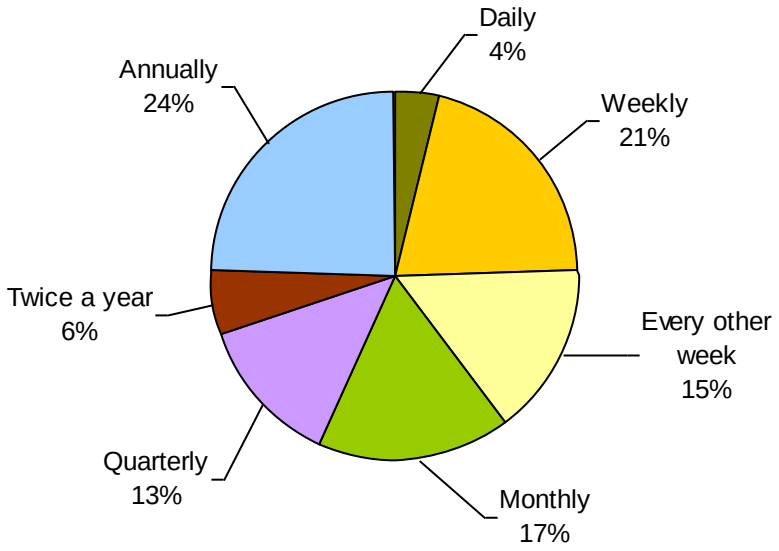
Note. Survey item: "How timely do the modules arrive?" *n* = 82.

Classroom Instruction

The principal survey solicited the respondents' perspectives on science instruction based on their classroom observations (see Exhibits 22 and 23). The key findings include these:

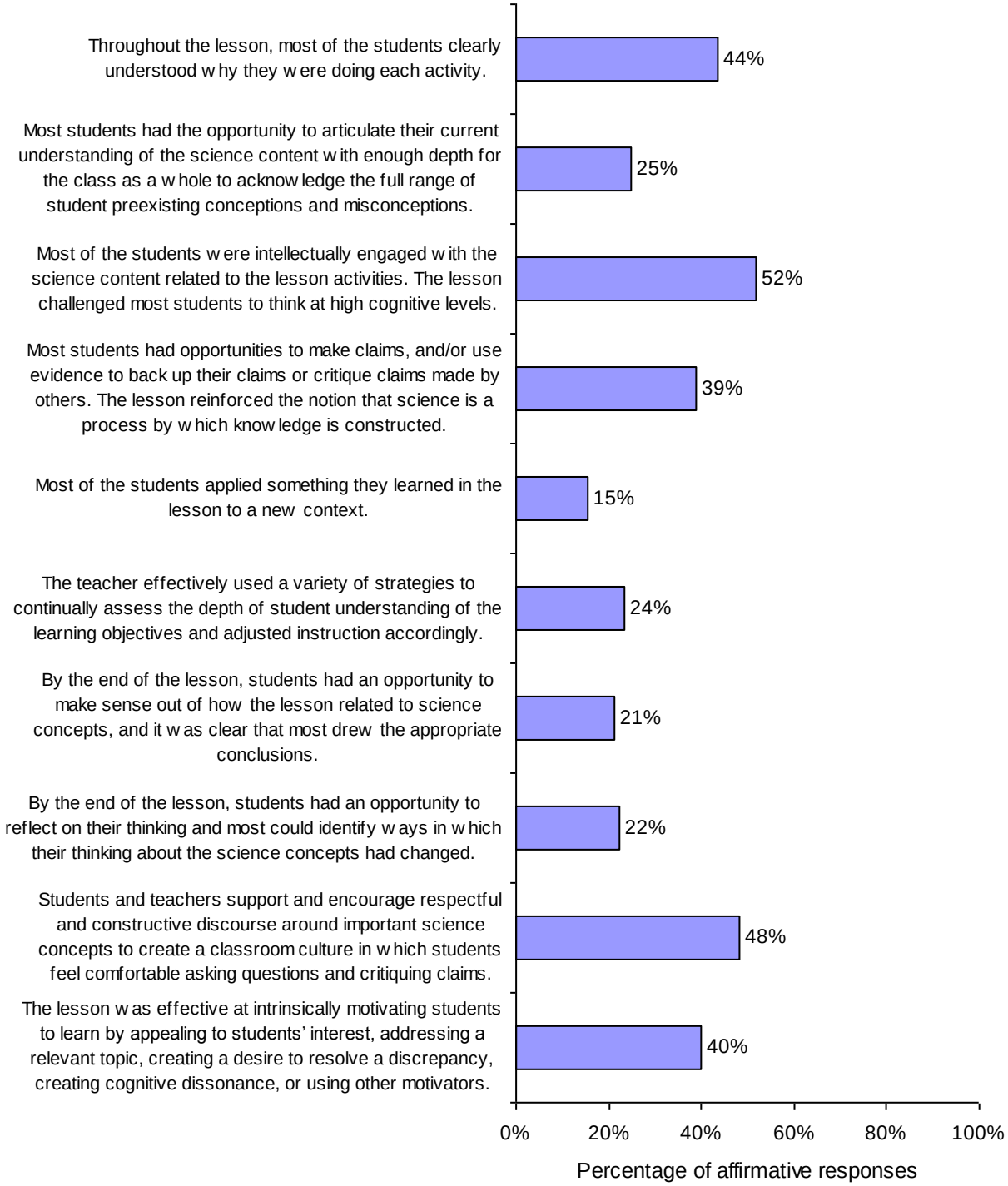
- Most (89%) of the principals reported that they had observed science classes at least once during the school year—66% of those principals did so at least monthly (see Exhibit 22).
- The science instruction traits that principals observed most frequently (see Exhibit 23) were the intellectual engagement of students (52%), a classroom climate supportive of constructive discourse (48%), and student understanding of the rationale for each activity (44%).
- Principals observed least frequently the application of science (15%), opportunities for sense making (21%), reflection and metacognition (22%), and teacher use of formative assessment strategies (24%).

Exhibit 22
Frequency of Principal Observation of Science Classes



Note. Survey item: "How frequently do you observe science classes?"
n = 85.

Exhibit 23
Classroom Observation Perceptions of Principals



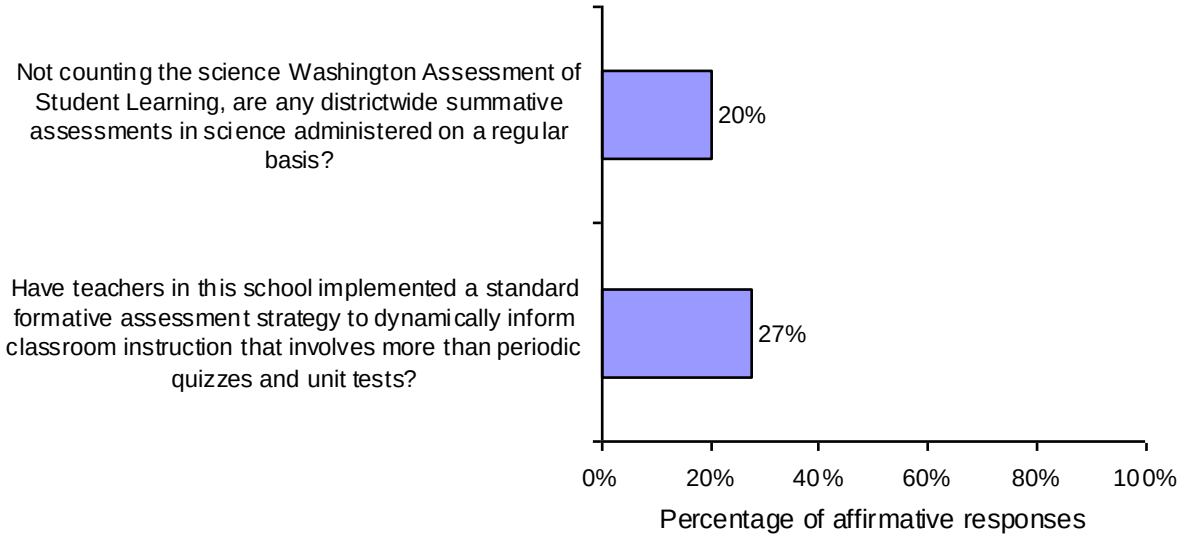
Note. Percentages indicate that the given trait was very evident in most of the science classes observed. *n* = 79 to 85.

Student Assessment

The principal survey included a brief section on summative and formative science assessments (see Exhibit 24). The key findings include these:

- One fifth (20%) of the principals reported that their school regularly administered some form of standard summative assessment in science. The most commonly cited assessment was Measures of Academic Progress. Others cited were end-of-unit assessments provided by a science instructional materials publisher and teacher-developed unit assessments.
- According to 27% of the principals teachers in their school implemented a standard formative assessment strategy (not including quizzes and unit tests) to inform classroom instruction.

Exhibit 24
Summative and Formative Assessment



Note. Summative assessment: *n* = 85; formative assessment: *n* = 84.

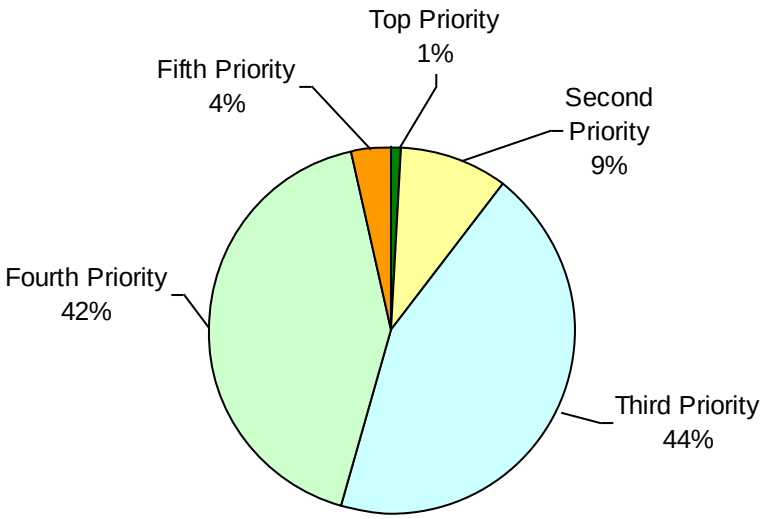
Community and Administrative Support

Another section of the principal survey solicited information about the support for science compared to other subjects in the school (see Exhibit 25). The key findings include these:

- Few principals (10%) indicated that science was the first or second priority, whereas 86% indicated that science was a third or fourth priority in their school.
- According to 96% of the principals the district administration was very supportive (76%) or somewhat supportive (20%) of inquiry-based science instruction.

- Students' parents were very supportive (46%) or somewhat supportive (31%) of inquiry-based science instruction, according to 77% of the principals.
- Approximately one third (31%) of the principals indicated that their school maintained a partnership concerning science education with a local business, informal science organization, or institution of higher education.

Exhibit 25
Priority of Science

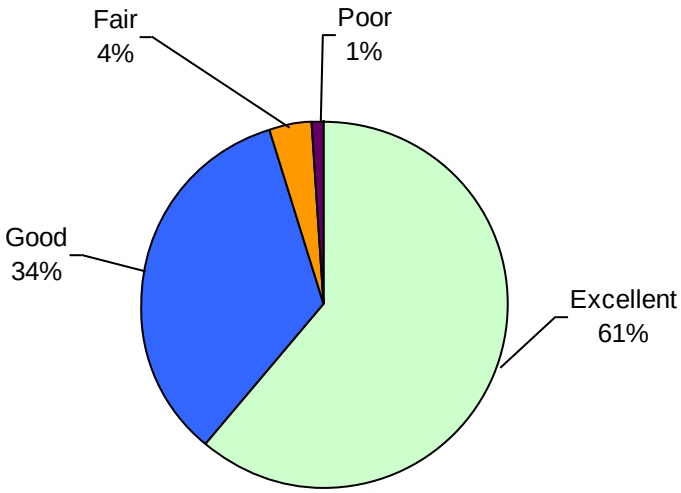


Note. Survey item: "Of these 5 subjects—reading/language arts, writing, mathematics, science, and social studies—what priority do you personally believe science should be for the students in your school?" *n* = 85.

Overall

The survey respondents were very satisfied with the services they received through their Regional Alliance. Exhibit 26 shows that 95% of the principals rated the services their school had received in the past year as excellent (61%) or good (34%).

Exhibit 26
Overall Rating of Regional Alliance Services



Note. Survey item: "How would you rate the services that your school received from your Regional Alliance this past year?"
n = 85.

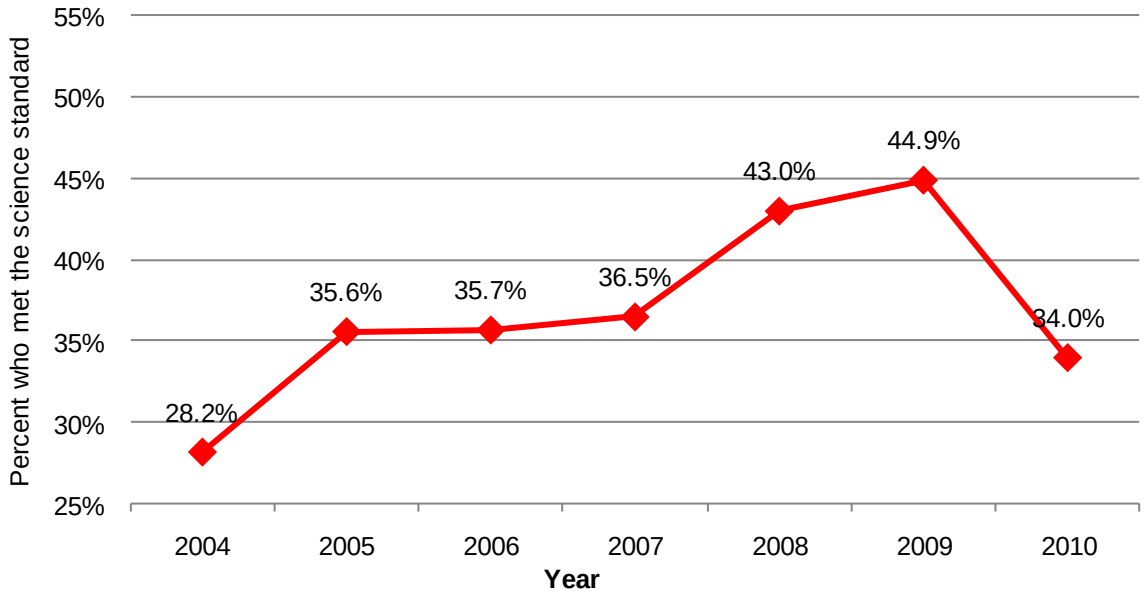
Science Measurements of Student Progress Results

To further assess the impact of Washington State LASER, RMC Research analyzed the school-level student science achievement data in connection with teacher participation in science professional development and principal survey responses. This section describes the analysis methods and findings.

Methods

The Washington Office of Superintendent of Public Instruction reports student achievement data in terms of the percentage of Grade 5 students who meet the science standards as assessed by the Measurements of Student Progress (formerly the Washington Assessment of Student Learning).

Exhibit 27
Statewide Grade 5 Science Measurements of Student Progress Results



The statewide Grade 5 science Measurements of Student Progress scores decreased nearly 11% from 2009 to 2010 (see Exhibit 27). This inconsistency in assessment results encumbers 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 the 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. For example, a school with a smaller percentage of students who met the standard from one year to the next could achieve a higher rank if its Measurements of Student Progress results decreased less than other schools' results. That is, a school's Measurements of Student Progress results must decrease more than other schools' results to cause a lower ranking. Schools whose results decreased by the same amount as the other schools in the state would maintain the same ranking across years. Therefore, for this analysis the school ranking was used as the dependent variable.

Because the principal survey was administered in spring 2009 and 2010, RMC Research linked the results of each survey administration with the student achievement data from the corresponding year. Doing so necessitated combining 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. The regression model was used to test all of the principal survey items and several scales developed from logical clusters of survey items. Although none of the scales proved to be significant predictors of school rank, several principal survey items were significant.

Findings

Exhibit 28 shows the regression results for the principal survey items that proved to be significant predictors of either the school's science achievement rank or ranking gains across years.

The following characteristics were more likely to be observed among students by principals in science classes in high ranking schools (see Exhibit 28):

- **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 out of how the lesson related to science concepts, and it was clear that 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.

Exhibit 28
Principal Survey Item Predictors of High Science Achievement Rank

Survey Item	*n*	Adjusted R^2	β
Classroom Characteristics Observed by Principals			
Throughout the lesson, most of the students clearly understood why they were doing each activity.	61	.249	.273
Most of the students were intellectually engaged with the science content related to the lesson activities. The lesson challenged most students to think at high cognitive levels.	62	.241	.253
Most students had opportunities to make claims, and/or use evidence to back up their claims or critique claims made by others. The lesson reinforced the notion that science is a process by which knowledge is constructed.	61	.276	.286
By the end of the lesson, students had an opportunity to make sense out of how the lesson related to science concepts, and it was clear that most drew the appropriate conclusions.	60	.301	.309
By the end of the lesson, students had an opportunity to reflect on their thinking and most could identify ways in which their thinking about the science concepts had changed.	61	.256	.251
Instructional Materials			
How many instructional modules (kits) did the typical teacher who teaches science in your school use over the course of the current school year?	69	.047[b]	.248[b]
Professional Development			
Approximately what percentage of the teachers in this school have participated in professional development that goes beyond initial use and further develops their expertise in the use of the instructional modules?	59	.085[a]	.317[a]
Is time scheduled during normal work hours for teachers in this school to participate in organized, school-based professional development specifically for science?	63	.275	.220*
Has any of the professional learning community activities focused on improving science teaching and learning?	46	.422	.266
Approximately what percentage of the professional learning community is devoted to science teaching and learning?	34	.445	.084*
Have any of the professional learning community sessions provided an opportunity for teachers to observe science lessons taught by their peers?	14	.560	.396*
Community and Administrative Support			
How supportive of inquiry-based science instruction are the parents of your students?	59	.252	.221*

Note. Analysis conducted using Grade 5 MSP data. Unless otherwise noted, β values are significant at .05 level.
[a]Significant change in school rank from prior year. [b]Significant change in school rank (R2 was .248 and β was .258). All other findings correlate with highly ranked schools for the year of survey administration.
* $p<.08$

Finding—The number of instructional modules the typical teacher uses over the course of a school year is a significant predictor of the school's science achievement rank and of positive change in rank from one year to the next.

Finding—Several characteristics of the professional development are predictors of the overall science achievement rank:

- 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.

Finding—An important predictor of a significant increase in a school's science achievement rank is the percentage of teachers who participated in professional development that surpassed initial use and further developed their expertise with the instructional modules.

Finding—The degree to which parents support inquiry-based science instruction is a significant predictor of a school's science achievement rank.

Finding—Factors that might be expected predictors of school rank—but were not observed in this analysis—include these:

- The number of science professional development hours per FTE that the teachers in the school had participated in since July 1, 2007.
- The percentage of teachers who participated in the initial use training on all of the instructional modules they use with students.
- Materials implementation factors such as the sequence of the materials, the percentage of the units that teachers typically completed, and the amount of adaptations teachers typically made.

Science Partnership Academy Survey Results

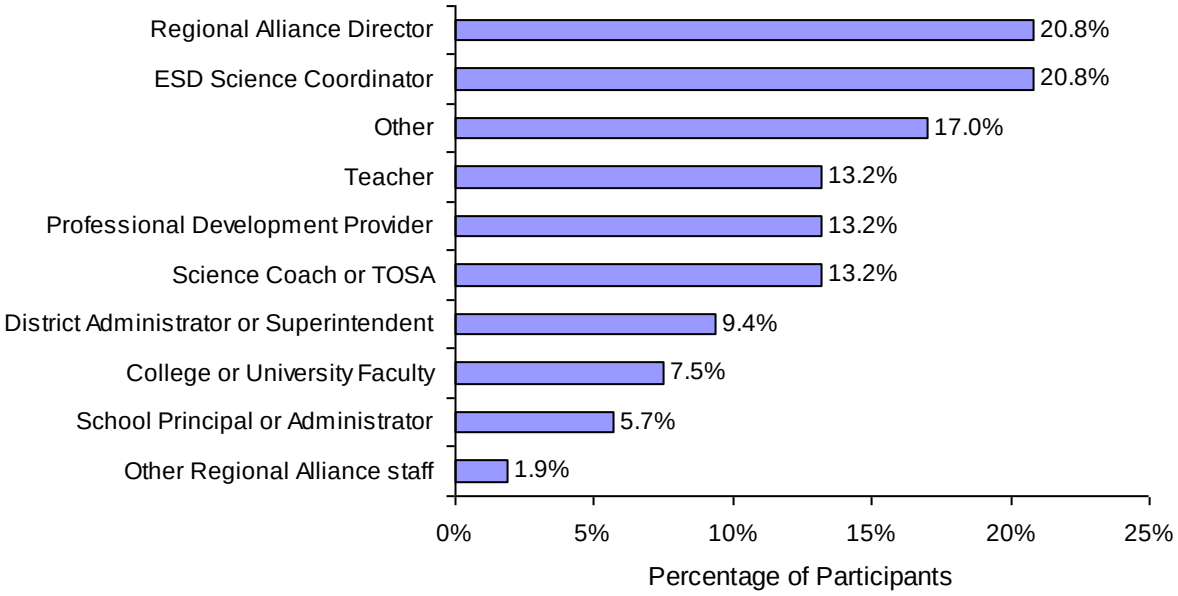
During the 2009–2010 school year Washington State LASER hosted a series of 3 Science Partnership Academies attended by science education leaders in Washington State. Each academy lasted 2 to 3 days, and participants completed a presurvey at the beginning of the first academy in fall 2009 and a postsurvey near the end of the third academy in spring 2010 (see Appendix C). Although the surveys were anonymous, participants provided the last 4 digits of their home telephone number, the digits of the day of their birth (not month or year), and the number of letters in their last name. These digits were used to match responses from the presurvey with the postsurvey and maintain the respondents' anonymity. RMC Research calculated comparative data using the presurvey and postsurvey completed by the same individuals (see Appendix B).

Science Partnership Academy Participation

A total of 53 people completed the demographic section of the Science Partnership Academy survey in December 2009 or May 2010. Key characteristics of the Science Partnership Academy participants include these:

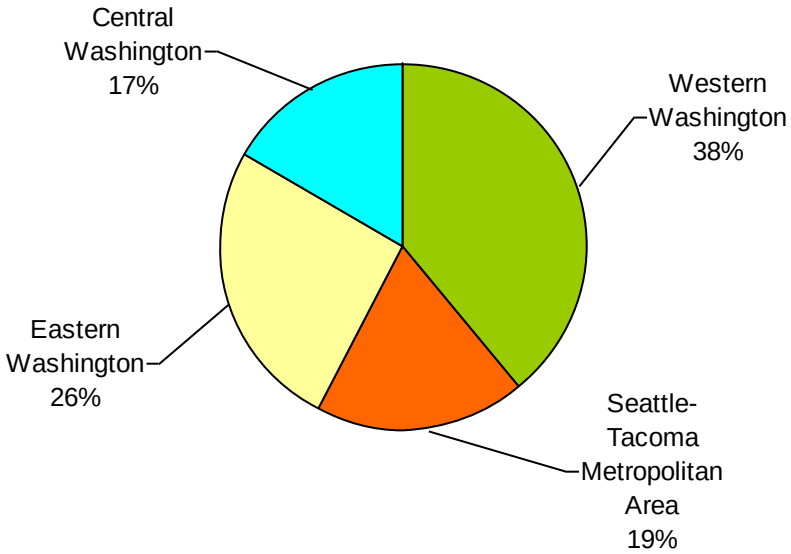
- More than 40% of the participants were Regional Alliance directors or ESD science coordinators (see Exhibit 29).
- All areas of the state were represented and nearly 60% of the participants were from western Washington and the Seattle-Tacoma metropolitan area (see Exhibit 30).
- Two out of 3 participants held a master's degree (see Exhibit 31) and 62% of those held a degree in science. Of those with science degrees, most were in biology or life sciences (see Exhibit 32).
- Many of the participants had taught at the K–12 level and nearly 2 out of 3 (64%) had taught at the middle school level (see Exhibit 33).
- Half of the participants who taught science did so for between 6 and 15 years (see Exhibit 34).
- Approximately a fourth of the participants with science teaching experience were teaching in either 2009–2010 or 2008–2009 and 2 out of 3 had taught science within the past 5 years (see Exhibit 35).
- Nearly a third (30%) of those who had taught science education had done so for more than 10 years (see Exhibit 36).

Exhibit 29
Positions Held by Science Partnership Academy Participants



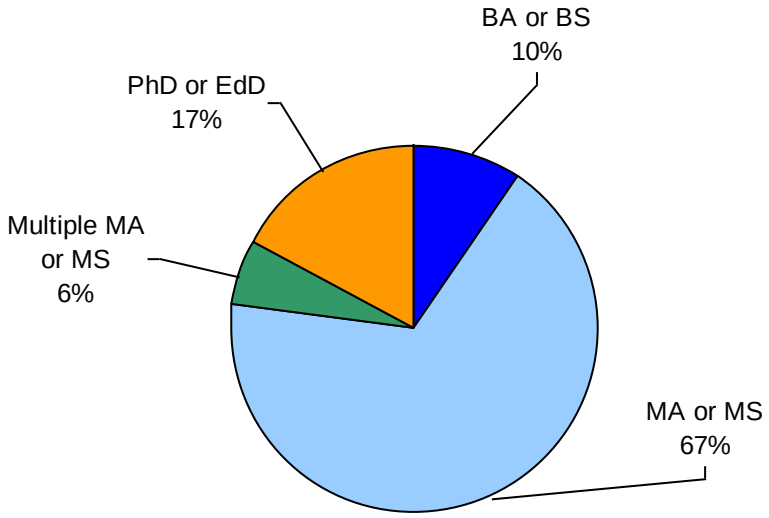
Note. Survey item: "Which of the following best describes the position that you currently hold with respect to the regional team that you represent at this Science Partnership Academy?" *n* = 53.
Percentages are greater than 100% because some participants were classified in more than one category.

Exhibit 30
Representation of State Regions



Note. Survey item: "Which of the following best describes the region of the state that your team serves?" *n* = 53.

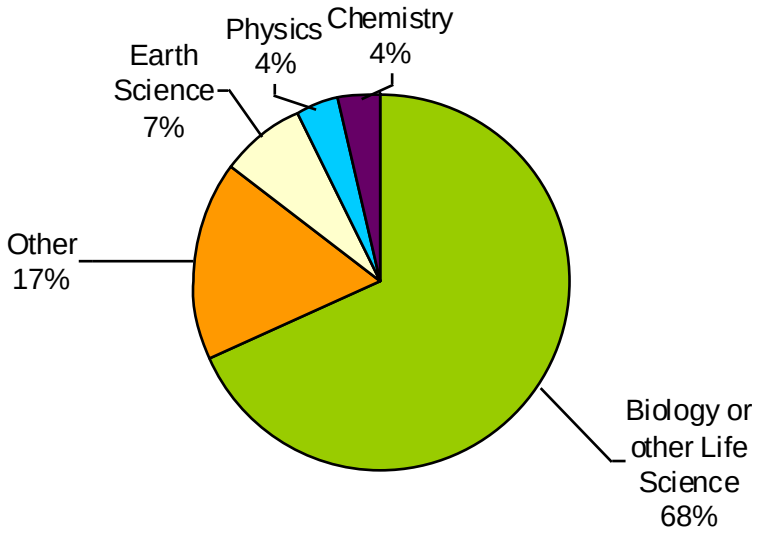
Exhibit 31
Education Level



Note. Survey item: "What is the highest degree that you hold?" *n* = 52.

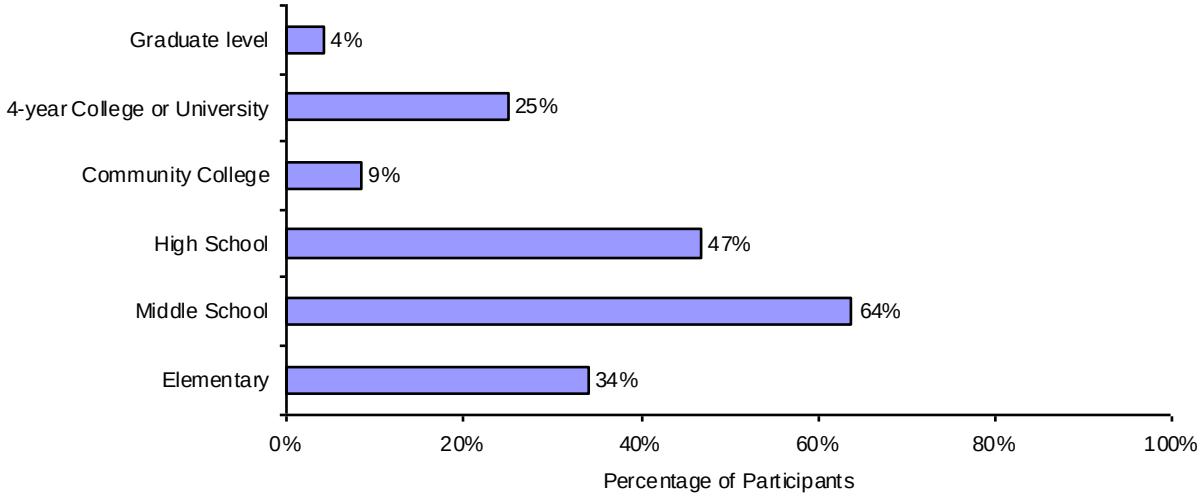
Of the Science Partnership Academy survey respondents, 62% held a degree in a science discipline. Exhibit 32 shows the distribution of those degrees according to science discipline.

Exhibit 32
Science Discipline



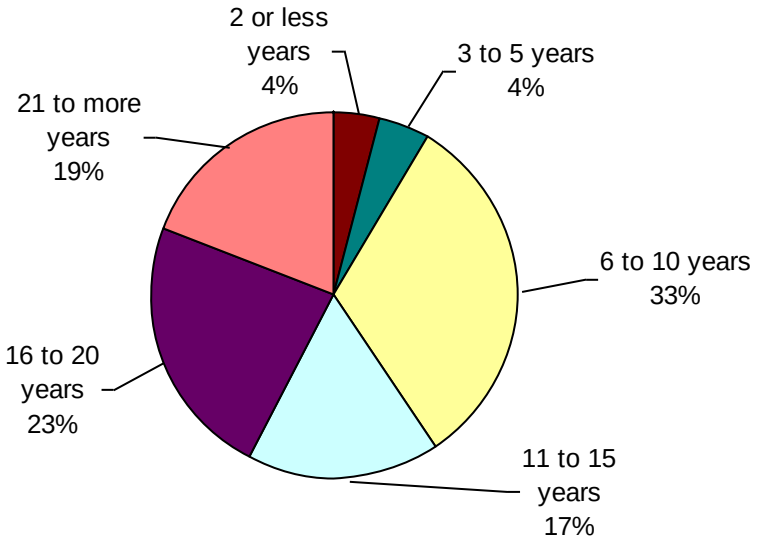
Note. Survey item: "In what science discipline?" *n* = 28.

Exhibit 33
Teaching Level



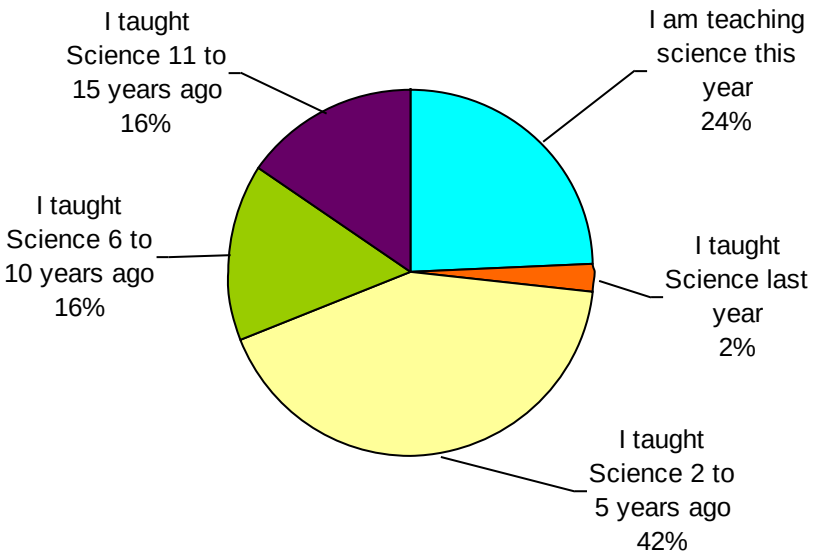
Note. Survey item: "At what level did you teach or are you teaching science?" *n* = 47. Percentages are greater than 100% because some participants were classified in more than one category.

Exhibit 34
Teaching Experience



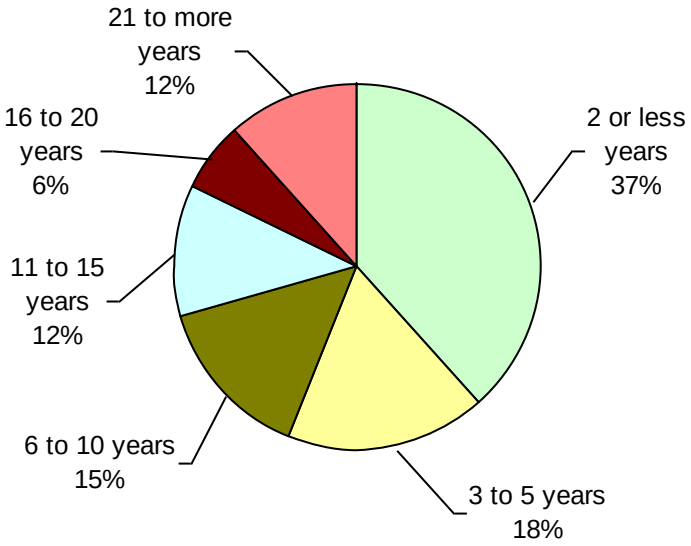
Note. Survey item: "How many years did you teach science content at any level?" *n* = 47.

Exhibit 35
Years Since Last Teaching Experience



Note. Survey item: "When was the last time you taught science?" *n* = 45.

Exhibit 36
Experience Teaching Science Education



Note. Survey item: "How many years have you taught science education?" *n* = 34.

Understanding the Research

One of the Science Partnership Academy objectives was to help participants understand recent literature and its relationship to the work of Washington State LASER. The pre- and postsurveys asked participants to rate their familiarity with a list of references. Exhibit 37 lists those references for which participants reported significant increases in their content knowledge.

Exhibit 37
Knowledge of the Literature

Item	*n*	Mean	
		Pre	Post
How familiar are you with each of the references listed below?			
Banilower, E., Cohen, K., Pasley, J., & Weiss, I. (2008). *Effective science instruction: What does research tell us?* Portsmouth, NH: RMC Research Corporation, Center on Instruction.	23	2.78	4.13*
Cohen, D.K., Raudenbush, S.W., & Ball, D.L. (2003). Resources, instruction, and research. *Educational Evaluation & Policy Analysis, 25*(2), 119–142.	23	1.65	2.17*
Donovan, S.M., & Bransford, J.D. (2005). *How students learn: history, mathematics, and science in the classroom*. Washington DC: The National Academies Press.	23	3.25	4.00*
Fullan, M., Hill, P., & Crévola, C. (2006). *Breakthrough*. Thousand Oaks, CA: Corwin Press.	23	1.22	1.61*
Loucks-Horsley, S., Love, N., Stiles, K.E., Mundry, S., & Hewson, P.W. (2010). *Designing professional development for teachers of science and mathematics, Third edition*. Thousand Oaks, CA: Corwin Press.	23	3.00	4.09*
Thompson, C.L., & Zeuli, J.S. (1999). The frame and the tapestry: Standards-based reform and professional development. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 341–375). San Francisco, CA: Jossey-Bass.	23	2.83	4.26*

Note. Rating scale: 1 = *No familiarity*; 5 = *Very familiar.*
Exhibit includes only the items with a statistically significant change from the pre- to postsurvey.
*$p < .05$.

Washington State Science Logic Model

Another objective of the Science Partnership Academy was to familiarize participants with the logic model content developed by Washington State LASER leadership to clarify the direction for future professional development. One portion of the logic model provides a definition—interpreted from research—of the effective science learning experiences for students. The pre- and postsurvey asked participants to assess the degree to which they could recognize each element of effective science learning experiences if observed among students. Exhibit 38 shows the pre- and postsurvey means for each element. Some observations regarding the results are:

- Very slight increases occurred from pre- to postsurvey on all but one item and only one increase was statistically significant: On the postsurvey participants reported increased ability to recognize when students were communicating and critiquing their scientific ideas and others' ideas.
- Participants demonstrated a statistically significant decrease in their ability to recognize when students were intellectually engaged and motivated. This decrease is most likely related to confusion between student motivation and intellectual engagement, which are not necessarily correlated. The term *motivation* was removed from later versions of the logic model.

Exhibit 38
Understanding of Effective Science Learning Experiences for Students

		Mean	
Elements of Effective Science Learning Experiences for Students	***n***	**Pre**	**Post**
Draw upon a deep foundation of usable knowledge within the context of a conceptual framework to build scientific understanding	23	3.52	3.87
Are intellectually engaged and motivated	23	4.17	3.65*
Reveal preconceptions and their initial reasoning	23	4.09	4.22
Use evidence to generate explanations	23	4.14	4.27
Communicate and critique their scientific ideas and the ideas of others	23	3.78	4.22*
Engage in activities and sense-making discussions to develop scientific understandings	23		4.17
Reflect on how personal understanding has changed over time and recognize cognitive processes that lead to changes	23	3.70	3.82

Note. Rating scale: 1 = *Not at all able to recognize the trait among students*; 5 = *Very able to recognize the trait among students*.
*$p < .05$.

Professional Development

The surveys included items about the professional development provided by the participants' Regional Alliances organizations. One set of items pertained to the foundational professional development that helps teachers learn to use the instructional modules (frequently referred to as *initial use training*). The second set focused on further developing teachers' expertise and effectiveness using the materials. In both cases, participants indicated the degree to which they believed that particular aspects of the professional development helped teachers. Whereas the presurvey concerned the professional development conducted prior to the first Science Partnership Academy, the postsurvey concerned the professional development conducted prior to the third Science Partnership Academy.

Participation in the Science Partnership Academy resulted in the Regional Alliances making some adjustments to the developing expertise professional development but

had little impact on the foundational professional development. As Exhibit 39 shows, a statistically significant increase occurred from pre- to postsurvey in only 1 of the 8 areas of the foundational professional development: Helping teachers implement formative assessment practices that effectively inform instruction. Conversely, participants' rating of the developing expertise professional development significantly increased for all but one survey item.

Exhibit 39
Knowledge and Skills Gained by Professional Development Types

		Mean	
Knowledge and Skill	***n***	**Pre**	**Post**
Foundational Professional Development			
Helps teachers implement formative assessment practices that effectively inform instruction	17	2.35	2.94*
Developing Expertise Professional Development			
Prepares teachers to engage students in effective learning experiences	21	2.76	3.29*
Develops a deep science content knowledge in area of assignment	20	2.65	3.30*
Provides teachers with a solid understanding of what the cognitive sciences tells us about how students learn science	21	2.52	3.43*
Helps teachers understand the Science standards and how they influence curriculum and how they relate specifically to the module	21	2.71	3.33*
Prepares teachers to effectively use the curriculum materials to provide effective science learning experiences (curricular reasoning)	19	2.68	3.21*
Helps teachers develop content specific pedagogical skills	20	2.85	3.40*
Helps teachers implement formative assessment practices that effectively inform instruction	20	2.70	3.50*

Note. Rating scale: 1 = *Not at all*; 5 = *Very well*
Exhibit includes only the items with a statistically significant change from the pre- to postsurvey.
*$p < .05$.

Capacity to Support Professional Development

The survey concluded with a section asking participants to assess the capacity of their regional team to implement the key elements of the logic model. Exhibit 40 displays the areas in which participants reported significant increases in team capacity from pre- to postsurvey.

During the first year of the Science Partnership Academy (first 3 meetings) the regional teams began the process of redesigning and refocusing their professional development to align with the logic model. Teams reported that they had established a mechanism for developing a cadre of trainers for both the foundational and developing expertise professional development, a shared vision of effective science teaching and learning and effective professional development, and a process for implementing school-based professional development. Participants did not report any progress in some of the more

challenging and complex tasks such as influencing district and school policies and practices or establishing a mechanism for identifying and nurturing instructional leadership.

Exhibit 40
Capacity to Support Professional Development

Item	*n*	Mean	
		Pre	Post
Our regional team has a shared vision of effective science teaching and learning practices.	22	3.00	3.41*
Our regional team has a shared vision of effective professional development for science teachers.	20	2.70	3.30*
Our regional team has a shared vision of a process for implementing effective school-based professional development that will help teachers use research-based instructional practices, materials, and assessments to engage students in the Effective Science Learning Experiences.	19	2.21	2.68*
Our regional team has a mechanism for developing a cadre of trainers capable of providing foundational professional development on the modules.	21	2.57	2.90*
Our regional team has a mechanism for developing a cadre of trainers capable of providing developing expertise professional development on the modules.	18	2.22	2.83*

Note. Rating scale: 1 = *Strongly disagree* 5 = *Strongly agree*
Exhibit includes only the items with a statistically significant change from the pre- to postsurvey.
*$p < .05$.

Appendix A
Principal Survey

NOTE: The principal survey was administered online; therefore, the format for the survey cannot be completely replicated for this report. This appendix comprises the design specification for each survey item.

LASER Principal Survey

Description—In order to improve services and to better understand the relationship between key components of science teaching and learning and student achievement, Washington State LASER is conducting a survey of school principals. Your school was selected for this survey because the staff has actively participated in professional development provided through LASER. The information we collect with this survey is for program evaluation purposes only and will be used to gain insight regarding the effects of the LASER program. The information will not be used to single out your school. The results of this survey will be made available in aggregate form in a way that conceals the identity of the individual schools and principals. As a result, there is little or no risk to anyone responding to this survey.

Curriculum

CU101 During which school year did your school first begin using the inquiry-based instructional modules (kits) for science?

0 1999-2000
1 2000-2001
2 2001-2002
3 2002-2003
4 2003-2004
5 2004-2005
6 2005-2006
7 2006-2007
8 2007-2008
9 2008-2009

CU102 How many instructional modules (kits) did the typical teacher who teaches science in your school use over the course of the current school year?

0 None
1 1 module per school year
2 2 modules per school year
3 3 modules per school year
4 4 modules per school year
5 5 modules per school year

CU103 Are there grades where the teachers use a different number of kits?

1 Yes
0 No

If 1 Then CU104 Else CU105

CU104 On the previous question, you indicated that there were grades that used a different number of modules. Describe what grades and the number of modules use at that grade level.

CU105 Are the inquiry-based instructional modules (kits) used as the core science curriculum materials for this school?

1 Yes
0 No

If 0 Then CU106 Else CU201

CU106 In the previous question you indicated that the inquiry-based instructional modules were not the core science curriculum materials. What instructional materials does serve as the core science instructional materials?

CU201 Is there a set sequence of instructional modules (kits) that prescribes which modules are used at each grade level?

1 Yes
0 No

If 1 Then CU202 Else CU301

CU202 At what level is the decision ultimately made about the sequence of instructional modules (kits) that are used at each grade level?

1 The LASER Alliance
2 The School District
3 The School
4 Individual teachers
9 Others

If 9 Then CU203 Else CU301

CU203 In the previous question you indicated that the sequence is determined at some other level. Please explain.

CU301 Do you believe that teachers generally complete all of the activities and concepts contained in the instructional modules?

1 Yes
0 No

If 0 Then CU302 Else CU304

CU302 Why do you believe the teachers do not generally complete the all of the activities?

CU303 Approximately what percentage of the modules would you say that teachers typically complete on average?

1 10% or less
2 Approximately 20%
3 Approximately 30%
4 Approximately 40%
5 Approximately 50%
6 Approximately 60%
7 Approximately 70%
8 Approximately 80%
9 Approximately 90%
0 I do not have enough information to make a judgment

CU304 The instructional modules do not always cover all of the content to be addressed at any given grade band as identified in the science standards. Has your school or district made an organized effort to identify instructional materials to fill the gaps?

1 Yes
0 No

If 1 Then CU305 Else CU306

CU305 Describe those efforts to identify materials to fill the gaps.

CU306 When the modules are not available for use with students, approximately what percentage of the teachers in your school would you say continue to teach science during those periods using other science materials?

1 10% or less
2 Approximately 20%
3 Approximately 30%
4 Approximately 40%
5 Approximately 50%
6 Approximately 60%
7 Approximately 70%
8 Approximately 80%
9 Approximately 90%
0 I do not have enough information to make a judgment

CU401 Regarding the degree to which teachers implement the modules the way it is prescribed in the modules, which of the following statements best describes your opinion?

1 Most of the teachers use the materials exactly as prescribed in the teacher's guide
2 Some of the teachers modify the implementation mostly to save time
3 Some of the teachers modify the implementation because they feel they can improve on the lessons
4 Many of the teachers modify the implementation because they feel they can improve on the lessons
0 I do not have enough information to make a judgment

CU501 Is your school an elementary school where science is taught mostly in self-contained classrooms?

1 Yes
0 No

If 1 Then CU502 Else CU504

CU502 Are teachers expected to devote a set amount of time per week to science instruction?

1 Yes
0 No

If 1 Then CU503 Else CU504

CU503 How many minutes per week are expected for science?

CU504 Is your school a secondary school where science is taught mostly by science teachers?

1 Yes
0 No

If 1 Then CU505 Else End

CU505 Radio 21 Do students study science for the full academic year every year they are at your school?

1 Yes
0 No

If 1 Then CU507 Else CU506

CU506 How many weeks of science instruction do students typically receive during the school year?

CU507 How many minute of science instruction do the students in your school typically have per week?

Professional Development

PD501 Does this school or district have a policy that requires teachers to participate in professional development prior to their use of each instructional module with students?

1 Yes
0 No

If 1 Then PD502 Else PD601

PD502 How many hours of professional development do you require for each instructional module?

PD503 How do you monitor to make sure that teachers participate in the required training for each instructional module they use?

PD601 Approximately what percentage of the teachers in this school have participated in the initial use training on all of the instructional modules they are using with students?

1 10% or less
2 Approximately 20%
3 Approximately 30%
4 Approximately 40%
5 Approximately 50%
6 Approximately 60%
7 Approximately 70%
8 Approximately 80%
9 Approximately 90%
0 I do not have enough information to make a judgment

PD101 Do you feel that teachers have ample opportunity to participate in the initial use workshops for the instructional modules they use?

1 Yes
0 No

PD102 Do you feel that teachers have ample opportunity to participate in professional development that goes beyond initial use and focuses on more effective use of the instructional modules?

1 Yes
0 No

PD103 Approximately what percentage of the teachers in this school have participated in professional development that goes beyond initial use and further develops their expertise in the use of the instructional modules?

1 10% or less
2 Approximately 20%
3 Approximately 30%
4 Approximately 40%
5 Approximately 50%
6 Approximately 60%
7 Approximately 70%
8 Approximately 80%
9 Approximately 90%
0 I do not have enough information to make a judgment

PD104 What additional assistance is available to help teachers learn to use the instructional modules more effectively?

PD201 Is time scheduled during normal work hours for teachers in this school to participate in organized, school-based professional development specifically for **science**? This includes early or late release or common planning time but not individual planning time.

1 Yes
0 No

If 1 Then PD202 Else PD301

PD202 How many hours of school-based professional development specifically for **science** do teachers have?

PD203 How often do teachers participate in school-based professional development specifically for **science**?

1 Weekly
2 Every other week
3 Monthly
4 Every other month
5 Quarterly
6 3 times a year
7 Twice a year
8 Once a year
0 Never

PD301 At this school, are there established professional learning communities that involve teams of teachers who meet regularly to conduct their own professional development activities?

1 Yes
0 No

If 1 Then PD302 Else End

PD302 Approximately what percentage of the teaching staff are active participants in these professional learning communities (PLC)?

1 10% or less
2 Approximately 20%
3 Approximately 30%
4 Approximately 40%
5 Approximately 50%
6 Approximately 60%
7 Approximately 70%
8 Approximately 80%
9 Approximately 90%
0 I do not have enough information to make a judgment

PD303 How often do the PLCs meet?

1 Weekly
2 Every other week
3 Monthly
4 Every other month
5 Quarterly
6 3 times a year
7 Twice a year
8 Once a year
0 Never

PD304 Has any of the PLC activities focused on improving science teaching and learning?

1 Yes
0 No

PD305 Approximately what percentage of the PLC is devoted to science teaching and learning?

1 10% or less
2 Approximately 20%
3 Approximately 30%
4 Approximately 40%
5 Approximately 50%
6 Approximately 60%
7 Approximately 70%
8 Approximately 80%
9 Approximately 90%
0 I do not have enough information to make a judgment

PD401 Have any of the PLC sessions involved teams of teachers collaboratively examining samples of student work for the purpose of gaining insight into student learning of science?

1 Yes
0 No

Materials Support

MS101 Where are the instructional modules stored when they are not being used?

1 At the science materials center operated by the LASER Alliance
2 At a central facility at a school district
3 At a central location in the school
4 In the classroom of the teachers
5 Other

MS102 How do teachers obtain the instructional modules when they are ready to use them with students?

1 The science materials center delivers the modules to the classroom
2 District staff deliver the materials to the classroom
3 School staff deliver materials to the classroom
4 Teachers retrieve the modules from the storage location
5 Other

MS103 How are the instructional modules refurbished after use?

1 The science materials center staff
2 District-level staff
3 Teachers
4 Other School-level staff
5 Parents or other volunteers
6 Others

MS104 How frequently do your teachers have problems with the condition of the modules?

1 Never - They are in excellent condition
2 Seldom - We very seldom have problems with the condition of the modules
3 Sometimes - We sometimes have problems with the condition of the modules
4 Frequent - We frequently have problems with the condition of the modules
0 Don't know
9 Not applicable

MS105 How timely do the modules arrive?

1 Always on time
2 Very seldom not on time
3 Sometimes not on time
4 Frequently not on time
0 Don't know

Classroom Instruction

CI101 How frequently do you observe **science** classes?

1 Daily
2 Weekly
3 Every other week
4 Monthly
5 Quarterly
6 Twice a year
7 Annually
0 Never

If 0 Then End Else CI102

CI102 Throughout the lesson, most of the students clearly understood why they were doing each activity.

1 Very evident at most all science classes observed
2 Evident in some of the science classes observed
3 Evident only on occasion in the science classes observed
4 Very seldom evident in the science classes observed
5 Never evident in the science classes observed

CI103 Most students had the opportunity to articulate their current understanding of the science content with enough depth for the class as a whole to acknowledge the full range of student preexisting conceptions and misconceptions.

1 Very evident at most all science classes observed
2 Evident in some of the science classes observed
3 Evident only on occasion in the science classes observed
4 Very seldom evident in the science classes observed
5 Never evident in the science classes observed

CI104 Most of the students were intellectually engaged with the science content related to the lesson activities. The lesson challenged most students to think at high cognitive levels.

1 Very evident at most all science classes observed
2 Evident in some of the science classes observed
3 Evident only on occasion in the science classes observed
4 Very seldom evident in the science classes observed
5 Never evident in the science classes observed

CI105 Most students had opportunities to make claims, and/or use evidence to back up their claims or critique claims made by others. The lesson reinforced the notion that science is a process by which knowledge is constructed.

1 Very evident at most all science classes observed
2 Evident in some of the science classes observed
3 Evident only on occasion in the science classes observed
4 Very seldom evident in the science classes observed
5 Never evident in the science classes observed

CI106 Most of the students applied something they learned in the lesson to a new context.

1 Very evident at most all science classes observed
2 Evident in some of the science classes observed
3 Evident only on occasion in the science classes observed
4 Very seldom evident in the science classes observed
5 Never evident in the science classes observed

CI107 The teacher effectively used a variety of strategies to continually assess the depth of student understanding of the learning objectives and adjusted instruction accordingly.

1 Very evident at most all science classes observed
2 Evident in some of the science classes observed
3 Evident only on occasion in the science classes observed
4 Very seldom evident in the science classes observed
5 Never evident in the science classes observed

CI108 By the end of the lesson, students had an opportunity to make sense out of how the lesson related to science concepts, and it was clear that most drew the appropriate conclusions.

1 Very evident at most all science classes observed
2 Evident in some of the science classes observed
3 Evident only on occasion in the science classes observed
4 Very seldom evident in the science classes observed
5 Never evident in the science classes observed

CI109 By the end of the lesson, students had an opportunity to reflect on their thinking and most could identify ways in which their thinking about the science concepts had changed.

1 Very evident at most all science classes observed
2 Evident in some of the science classes observed
3 Evident only on occasion in the science classes observed
4 Very seldom evident in the science classes observed
5 Never evident in the science classes observed

CI110 Students and teachers support and encourage respectful and constructive discourse around important science concepts to create a classroom culture in which most students feel comfortable asking questions, backing up their own claims, and/or critiquing claims made by others.

1 Very evident at most all science classes observed
2 Evident in some of the science classes observed
3 Evident only on occasion in the science classes observed
4 Very seldom evident in the science classes observed
5 Never evident in the science classes observed

CI111 The lesson was effective at intrinsically motivating students to learn by appealing to students' interest, addressing a relevant topic, creating a desire to resolve a discrepancy, creating cognitive dissonance, or employing other intrinsic motivators.

1 Very evident at most all science classes observed
2 Evident in some of the science classes observed
3 Evident only on occasion in the science classes observed
4 Very seldom evident in the science classes observed
5 Never evident in the science classes observed

Student Assessment

SA101 Not counting the science WASL (Washington Assessment of Student Learning), are any districtwide summative assessments in science administered on a regular basis?

1 Yes
0 No

If 1 Then SA102 Else SA105

SA102 Describe the assessments.

SA103 How frequently are they administered?

SA104 At what grade levels?

SA105 Have teachers in this school implemented a standard formative assessment strategy to dynamically inform classroom instruction that involves more than periodic quizzes and unit tests?

1 Yes
0 No

If 1 Then SA106 Else End

SA106 Describe this strategy.

Community/Administrative Support

SC101 Rank the subject areas in order of school priority starting with the top priority (1) and numbering to the lowest priority (5).

Reading/Language Arts
Writing
Mathematics
Science
Social Studies

SC107 Of those 5 subjects (Reading/Language Arts, Writing, Mathematics, Science, and Social Studies) what priority do you **personally** believe science should be for the students in your school?

1 Top priority
2 Second priority
3 Third priority
4 Fourth priority
5 Fifth priority

SC108 When you observe a science class, what are the major things that you look for as indicators of effective science instruction? Briefly describe the top one or two indicators that come to mind.

SC109 How supportive of inquiry-based science instruction is your district administration?

1 Very supportive
2 Somewhat supportive
3 Neutral
4 Somewhat opposed
5 Actively opposed

SC110 How supportive of inquiry-based science instruction are the parents of your students?

1 Very supportive
2 Somewhat supportive
3 Neutral
4 Somewhat opposed
5 Actively opposed

SC111 Does your school currently maintain a partnership with a local business, informal science organization, or institution of higher education around science education?

1 Yes
0 No

If 1 Then SC112 Else End

SC112 Describe this partnership and the interactions with the teaching staff.

SC113 How has the partnership benefited teachers and students?

Overall

OV101 How would you rate the services that your school receives from your LASER Alliance this past year?

1 Excellent
2 Good
3 Fair
4 Poor

OV102 What has been the best aspect of your schools's participation in the LASER Alliance consortium?

OV103 What could the LASER Alliance do to improve services for your school?

OV104 What other comments do you have regarding Washington State LASER?

Appendix B
Science Partnership Academy Survey Results

Washington State LASER Leadership and Assistance for Science Education Reform

Science Partnership Academy Final Results

June 2010

Background

A total of 53 people completed the demographic section of the survey at either the December or the May Science Partnership Academy

1. Which of the following best describes the position that you currently hold with respect to the regional team that you represent at this Science Partnership Academy? Check all that apply.

20.8%	Regional Alliance Director
1.9%	Other Regional Alliance staff
20.8%	ESD Science Coordinator
9.4%	District Administrator or Superintendent
5.7%	School Principal or Administrator
13.2%	Science Coach or TOSA
13.2%	Professional Development Provider
13.2%	Teacher
7.5%	College or University Faculty
17.0%	Other

2. Which of the following best describes the region of the state that your team serves? Check all that apply.

39.6%	Western Washington
18.9%	Seattle–Tacoma Metropolitan Area
17.0%	Central Washington
26.4%	Eastern Washington
3.8%	N/A

3. What is the highest degree that you hold? (*n* = 52)

9.6%	BA or BA
67.3%	MA or MS
5.8%	Multiple MA or MS
17.3%	PhD or EdD

4. Do you have a degree (major) in a science discipline? (*n*=52)

61.5%	Yes
38.5%	No

5. In what science discipline? (*n* = 28)

67.9%	Biology or other Life Science
3.6%	Physics
3.6%	Chemistry
7.1%	Earth science
0.0%	Astronomy or other space science
17.0%	Other

6. At what level did you teach or are you teaching Science? Check all that apply. (*n*=47)

34.0%	Elementary
63.8%	Middle School
46.8%	High School
8.5%	Community College
25.0%	4-year College or University
4.3%	Graduate level

7. How many years did you teach science content at any level? (*n* = 47)

4.3%	2 or less years
4.3%	3 to 5 years
31.9%	6 to 10 years
17.0%	11 to 15 years
23.4%	16 to 20 years
19.1%	21 to more years

8. When was the last time you taught science? (*n* = 45)

24.4%	I am teaching science this year (2009–2010 school year)
2.2%	I taught Science last year (2008–2009 school year)
42.2%	I taught Science 2 to 5 years ago
15.6%	I taught Science 6 to 10 years ago
15.6%	I taught Science 11 to 15 years ago

9. How many years have you taught science education? (*n* = 34)

38.2%	2 or less years
17.6%	3 to 5 years
14.7%	6 to 10 years
11.8%	11 to 15 years
5.9%	16 to 20 years
11.8%	21 to more years

The Research Behind the Washington State Science Logic Model

How familiar are you with each of the references listed below?	*n*	Mean Pre	Mean Post
10. American Association for the Advancement of Science (1991). *Science for all Americans.* Washington D.C.: AAAS.	23	3.57	3.52
11. Banilower, E., Cohen, K., Pasley, J., & Weiss, I. (2008). *Effective science instruction: What does research tell us?* Portsmouth, NH: RMC Research Corporation, Center on Instruction.	23	**2.78**	**4.13**
12. Cohen, D. K., Raudenbush, S. W., & Ball, D. L. (2003). Resources, instruction, and research. *Educational Evaluation & Policy Analysis 25*(2), 119–142.	23	**1.65**	**2.17**
13. Donovan, S. M., & Bransford, J. D. (2005). *How students learn: history, mathematics, and science in the classroom*. Washington DC: The National Academies Press.	23	**3.25**	**4.00**
14. Fullan, M., Hill, P., & Crévola, C. (2006). *Breakthrough*. Thousand Oaks, California. Corwin Press.	23	**1.22**	**1.61**
15. Garmston, R. J. & Wellman, B. M. (2009). *The adaptive school: A sourcebook for developing collaborative groups, 2nd Edition*. Norwood, MA: Christopher-Gordon.	23	3.52	3.87
16. Loucks-Horsley, S., Love, N., Stiles, K. E., Mundry, S., & Hewson, P. W. (2010). *Designing professional development for teachers of science and mathematics, Third edition*. Thousand Oaks, CA: Corwin.	23	**3.00**	**4.09**
17. Michaels, S., Shouse, A., & Schweingruber, H. (2008). *Ready, Set, Science: Putting research to work in K–8 science classrooms*. Washington D.C: National Academies Press.	23	3.70	4.09
18. National Research Council. Bransford, J.D., Brown, A.L., & Cocking, R.R. (Eds.). (2003). *How People Learn: Brain, Mind, Experience, and School*. Washington, DC: National Academy Press.	23	3.87	4.13
19. Thompson, C. L., & Zeuli, J.S. (1999). *The frame and the tapestry: Standards-based reform and professional development*. In L. Darling-Hammond & G. Sykes (Eds.),	23	**2.83**	**4.26**

NOTE: Bold faced numbers indicate a statistically significant (at the .05 level) change from the pre- to postsurvey.
Analysis includes only those who completed both the pre- and the postsurvey
Scale: 1 = Not at all, 2 = I have heard about it, 3 = I have skimmed it, 4 = I have read it, 5 = I have studied it and am very familiar with it

Understanding the Washington State Science Logic Model

How able do you feel you are to recognize when a lesson has effectively accomplished each of the following elements? Do you know specifically what you would look for among students? Use the Scale below to rate your ability level with each element.

Elements of Effective Science Learning Experiences for Students	*n*	Mean Pre	Mean Post
20. Draw upon a deep foundation of usable knowledge within the context of a conceptual framework to build scientific understanding	23	3.52	3.87
21. Are intellectually engaged and motivated	23	**4.17**	**3.65**
22. Reveal preconceptions and their initial reasoning	23	4.09	4.22
23. Use evidence to generate explanations	23	4.14	4.27
24. Communicate and critique their scientific ideas and the ideas of others	23	**3.78**	**4.22**
25. Engage in activities and sense-making discussions to develop scientific understandings	23	—	4.17
26. Reflect on how personal understanding has changed over time and recognize cognitive processes that lead to changes	23	3.70	3.82

NOTE: Bold faced numbers indicate a statistically significant (at the .05 level) change from the pre- to postsurvey.
Analysis includes only those who completed both the pre- and the postsurvey

SCALE:

1. **Not at all able**—You are not sure exactly what this statement means.
2. **Not very able**—You feel you would need to see more examples of this element in practice to understand what it really means.
3. **Somewhat able**—You believe that you understand but would need more experience observing effective classrooms practice to be certain.
4. **Able**—You feel that you have some understanding what this would look line in practice.
5. **Very able**—You believe that you have a clear understanding of what this element would look like in classroom instruction if done effectively.

Professional Development

<u>Foundational PD</u>—Think about the foundational (initial module use) professional development conducted *SINCE JANUARY 1, 2010* for teachers in your region. How well do you feel that the foundational professional development helps teachers in each of the following areas? Use the scale below to rate your comfort level with each element.

Knowledge and Skill	*n*	Mean Pre	Mean Post
27. Prepares teachers to engage students in effective learning experiences (see items 24 to 30 above)	18	2.89	3.06
28. Develops a deep science content knowledge in area of assignment	15	2.60	2.87
29. Provides teachers with a solid understanding of what the cognitive sciences tells us about how students learn science	16	2.44	2.81
30. Helps teachers understand the Science standards and how they influence curriculum and how they relate specifically to the module	17	2.59	2.94
31. Prepares teachers to effectively use the curriculum materials to provide effective science learning experiences (curricular reasoning)	17	3.41	3.47
32. Helps teachers develop content specific pedagogical skills	17	2.76	3.00
33. Helps teacher implement formative assessment practices that effectively informs instruction	17	**2.35**	**2.94**
34. Helps teachers implement summative assessment and use summative assessment data to improve instruction	12	2.33	2.75

NOTE: Bold faced numbers indicate a statistically significant (at the .05 level) change from the pre- to postsurvey.
Analysis includes only those who completed both the pre- and the postsurvey

SCALE:

1. **Not at all**—It is the intent or purpose but it has not been made explicit that this knowledge or skill must be addressed in the foundational professional development and it is seldom addressed.
2. **Not very wel**l—It has not been made explicit that this knowledge or skill must be addressed but many of the instructors address it. However, how it is addressed is not very consistent.
3. **Fairly well**—It has been made explicit that this knowledge or skill be addressed but it is up to the instructor how it is accomplished.
4. **Well**—It has been made explicit that this knowledge or skill be addressed and there is some effort to standardize the approach among instructors so that all who attend receive the same message.
5. **Very well**—It has been made explicit that this knowledge or skill be addressed in the foundational PD and the approach has been standardized among instructors. We feel reasonably confident that teachers who attend are receiving the same message regardless of the instructor.

<u>Developing Expertise PD</u>—Think about the developing expertise (training beyond initial use) professional development conducted *SINCE JANUARY 1, 2010* in your region. How well do you feel that this professional development currently helps teachers in each of the following areas? Use the scale below to rate your comfort level with each element.

Knowledge and Skill	*n*	Mean Pre	Mean Post
35. Prepares teachers to engage students in effective learning experiences (see items 24 to 30 above)	21	**2.76**	**3.29**
36. Develops a deep science content knowledge in area of assignment	20	**2.65**	**3.30**
37. Provides teachers with a solid understanding of what the cognitive sciences tells us about how students learn science	21	**2.52**	**3.43**
38. Helps teachers understand the Science standards and how they influence curriculum and how they relate specifically to the module	21	**2.71**	**3.33**
39. Prepares teachers to effectively use the curriculum materials to provide effective science learning experiences (curricular reasoning)	19	**2.68**	**3.21**
40. Helps teachers develop content specific pedagogical skills	20	**2.85**	**3.40**
41. Helps teacher implement formative assessment practices that effectively informs instruction	20	**2.70**	**3.50**
42. Helps teachers implement summative assessment and use summative assessment data to improve instruction	15	2.60	3.07

NOTE: Bold faced numbers indicate a statistically significant (at the .05 level) change from the pre- to postsurvey.
Analysis includes only those who completed both the pre- and the postsurvey

SCALE:

1. **Not at all**—It is the intent or purpose but it has not been made explicit that this knowledge or skill must be addressed in the developing expertise professional development and it is seldom addressed.
2. **Not very wel**l—It has not been made explicit that this knowledge or skill must be addressed but many of the instructors address it. However, how it is addressed is not very consistent.
3. **Fairly well**—It has been made explicit that this knowledge or skill be addressed but it is up to the instructor how it is accomplished.
4. **Well**—It has been made explicit that this knowledge or skill be addressed and there is some effort to standardize the approach among instructors so that all who attend receive the same message.
5. **Very well**—It has been made explicit that this knowledge or skill be addressed and the approach has been standardized among instructors. We feel reasonably confident that those who attend are receiving the same message regardless of the instructor.

43. Which of the following best describe the target audience for the developing expertise professional development that was conducted ***SINCE JANUARY 1,2010*** in your region? (*n* = 31) Check all that apply.
The courses/workshops . . .

58.1%	Are open to anyone interested
64.5%	Target teacher leaders
12.9%	Target science coaches
12.9%	Target science curriculum coordinators
25.8%	Target Administrators
19.4%	Target potential professional development providers of foundational PD
6.5%	Others

Capacity to Support Professional Development

Think about your regional team near the end of the final Science Partnership Academy. Indicate the degree to which you agree with each of the following statements about the regional team that you represent.

	n	Mean Pre	Mean Post
44. Our regional team has a shared vision of effective science teaching and learning practices.	22	**3.00**	**3.41**
45. Our regional team has a shared vision of effective professional development for science teachers.	20	**2.70**	**3.30**
46. Our regional team has a shared vision of the kind of policies and practices schools and districts should have in place in order to support inquiry-based science instruction.	17	2.65	3.00
47. Our regional team has proactively worked with school and district administration to help them implement policies and practices that support inquiry-based science instruction.	21	2.62	2.57
48. Our regional team has a shared vision of a process for implementing effective school-based professional development that will help teachers use research-based instructional practices, materials, and assessments to engage students in the Effective Science Learning Experiences (see items 24 to 30).	19	**2.21**	**2.68**
49. Our regional team has encouraged schools and districts to develop and implement policies and practices that support school-based professional development (some form of professional learning community) for science.	21	2.48	2.62
50. Our regional team has a mechanism to help district build the capacity necessary to support school-base professional development for science.	21	2.38	2.29
51. Our regional team has establish clear criteria for identifying instructional leadership that is based on the persons demonstrated ability to implement Effective Science Learning Experiences with students and ability to positively influence the instructional practices of science teacher.	18	2.28	2.39
52. Our regional team has helped school and district administration identify instructional leadership based on this criteria (see item 55).	17	2.12	2.18
53. Our regional team has a mechanism to develop and nurture those who have the potential to become instructional leaders but do not yet meet the established criteria.	20	2.60	2.55
54. Our regional team has a mechanism for developing a cadre of trainers capable of providing foundational professional development on the modules.	21	**2.57**	**2.90**
55. Our regional team has a mechanism for developing a cadre of trainers capable of providing developing expertise professional development on the modules.	18	**2.22**	**2.83**
56. Our team has a means of assessing and analyzing the unique context and issues within our region.	21	2.29	2.48
57. The plan developed by our team adequately addresses components 3 and 4 of the logic model	31	—	2.97
58. Our plan is very likely to significantly increase the frequency at which students in our region are engaged in the effective science learning experiences as described in component 3 of the logic model	30	—	3.13

NOTE: Bold faced numbers indicate a statistically significant (at the .05 level) change from the pre- to postsurvey.
Analysis includes only those who completed both the pre- and the postsurvey
Scale: 1 = Strongly disagree, 2 = Disagree, 3 = Agree, 4 = Strongly agree

59. Please provide any other comments regarding your experience during the Science Partnership Academy or anything else you would like the organizers to know.

- I wish we could have such thinking and reflecting time in our school environment. Time to think at this level is so meaningful.
- The lower scores for plan potential reflect the lack of structured planning time provided.
- Lots of theory, constructs, and coming to common understandings . . . Unfortunately at the expense of adequate time to apply and strive for this kind of understanding for our region. Therefore, our plan needs lots of work to become a living document, and we need additional time to work as a team and to network with the incredible group of people gathered here.
- Comment in the knowledge and skill section: This is problematic—I do a variety of P.D. with a number of audiences. Is this "as a whole" so on average or is this per class? About whole region? Just those that attended?
- Great PD experience for me!
- When we get books as resources, would it be possible to get an electronic version instead of a physical version as an option?
- Since we are an organization who provides high quality PD for educators and at times administrators, many of the questions did not fit with what we do. However, the PD we have received through SPA will critically impact our planning, preparation, and delivery of PD in the future and we are grateful to be at the table.
- I have learned a lot. All preservice faculty in higher ed should have this PD.

Appendix C
Science Partnership Academy Pre- and Postsurveys

Science Partnership Academy

Baseline Survey

December 1, 2009

Your responses to the following items will be used to create a unique identifier which will enable RMC Research to match your responses on this survey with your responses on the follow-up survey that will be administered in May 2010.

A. What are the last 4 digits of your home phone number? _____

B. On what day of the month were you born (Between 1 and 31)? _____

C. How many letters are in your last name? _____

Background

1. Which of the following best describes the position that you currently hold with respect to the regional team that you represent at this Science Partnership Academy? Check all that apply.

   ① Regional Alliance Director
   ② Other Regional Alliance staff
   ③ ESD Science Coordinator
   ④ District Administrator or Superintendent
   ⑤ School Principal or Administrator
   ⑥ Science Coach or TOSA
   ⑦ Professional Development Provider
   ⑧ Teacher
   ⑨ College or University Faculty
   ⑩ Other, Your title: _____

2. Which of the following best describes the region of the state that your team serves? Check all that apply.

   ① Western Washington
   ② Seattle-Tacoma Metropolitan Area
   ③ Central Washington
   ④ Eastern Washington
   ⑤ N/A

3. What is the highest degree that you hold?

   ① Does not apply
   ② BA or BA
   ③ MA or MS
   ④ Multiple MA or MS
   ⑤ PhD or EdD

4. Do you have a degree (major) in a science discipline?

   ① Yes
   ② No — *If No, skip to item number 6.*

5. In what science discipline?

   ① Biology or other Life Science
   ② Physics
   ③ Chemistry
   ④ Earth science
   ⑤ Astronomy or other space science
   ⑥ Other, Specify _____

6. Have you ever been a science content teacher at any level?

   ① Yes
   ② No — *If No, skip to item number 10.*

7. At what level did you teach or are you teaching Science? Check all that apply.

   ① Elementary
   ② Middle School
   ③ High School
   ④ Community College
   ⑤ 4-year College or University
   ⑥ Graduate level

8. How many years did you teach science content at any level?

   ① 2 or less years
   ② 3 to 5 years
   ③ 6 to 10 years
   ④ 11 to 15 years
   ⑤ 16 to 20 years
   ⑥ 21 to more years

9. When was the last time you taught science?
   - ① I am teaching science this year (2009–2010 school year)
   - ② I taught Science last year (2008–2009 school year)
   - ③ I taught Science 2 to 5 years ago
   - ④ I taught Science 6 to 10 years ago
   - ⑤ I taught Science 11 to 15 years ago
   - ⑥ I taught Science 16 to 20 years ago
   - ⑦ I taught Science more that 20 years ago

10. Have you ever taught science education for either preservice or inservice science teachers?
    - ① Yes
    - ② No — *If No, skip to item number 12.*

11. How many years have you taught science education?
    - ① 2 or less years
    - ② 3 to 5 years
    - ③ 6 to 10 years
    - ④ 11 to 15 years
    - ⑤ 16 to 20 years
    - ⑥ 21 to more years

The Research Behind the Washington State Science Logic Model

How familiar are you with each of the references listed below?	**Not at all**	**I have heard about it**	**I have skimmed it**	**I have read it**	**I have studied it and am very familiar with it**
12. American Association for the Advancement of Science (1991). *Science for all Americans.* Washington D.C.: AAAS.	①	②	③	④	⑤
13. Banilower, E., Cohen, K., Pasley, J., & Weiss, I. (2008). *Effective science instruction: What does research tell us?* Portsmouth, NH: RMC Research Corporation, Center on Instruction.	①	②	③	④	⑤
14. Cohen, D. K., Raudenbush, S. W., & Ball, D. L. (2003). Resources, instruction, and research. *Educational Evaluation & Policy Analysis 25*(2), 119-142.	①	②	③	④	⑤
15. Donovan, S. M., & Bransford, J. D. (2005). *How students learn: history, mathematics, and science in the classroom*. Washington DC: The National Academies Press.	①	②	③	④	⑤
16. Fullan, M., Hill, P., & Crévola, C. (2006). *Breakthrough*. Thousand Oaks, California. Corwin Press.	①	②	③	④	⑤
17. Garmston, R. J. & Wellman, B. M. (2009). *The adaptive school: A sourcebook for developing collaborative groups, 2nd Edition*. Norwood, MA: Christopher-Gordon.	①	②	③	④	⑤
18. Loucks-Horsley, S., Love, N., Stiles, K. E., Mundry, S., & Hewson, P. W. (2010). *Designing professional development for teachers of science and mathematics, Third edition*. Thousand Oaks, CA: Corwin.	①	②	③	④	⑤
19. Michaels, S., Shouse, A., & Schweingruber, H. (2008). *Ready, Set, Science: Putting research to work in K-8 science classrooms*. Washington D.C: National Academies Press.	①	②	③	④	⑤

How familiar are you with each of the references listed below?	Not at all	I have heard about it	I have skimmed it	I have read it	I have studied it and am very familiar with it
20. National Research Council. Bransford, J.D., Brown, A.L., & Cocking, R.R. (Eds.). (2003). *How People Learn: Brain, Mind, Experience, and School*. Washington, DC: National Academy Press.	①	②	③	④	⑤
21. Thompson, C. L., & Zeuli, J.S. (1999). *The frame and the tapestry: Standards-based reform and professional development*. In L. Darling-Hammond & G. Sykes (Eds.),	①	②	③	④	⑤

Understanding the Washington State Science Logic Model

22. Have you had a chance to carefully examine the Washington State Logic Model for Science Professional Development?

    ① Yes ② No

How able do you feel you are to recognize when a lesson has effectively accomplished each of the following elements? Do you know specifically what you would look for among students? Use the Scale below to rate your ability level with each element.

1. **Not at all able**—You are not sure exactly what this statement means.
2. **Not very able**—You feel you would need to see more examples of this element in practice to understand what it really means.
3. **Somewhat able**—You believe that you understand but would need more experience observing effective classrooms practice to be certain.
4. **Able**—You feel that you have some understanding what this would look line in practice.
5. **Very able**—You believe that you have a clear understanding of what this element would look like in classroom instruction if done effectively.

Elements of Effective Science Learning Experiences for Students	Not at all able	Not very able	Somewhat able	Able.	Very able
23. Draw upon a deep foundation of usable knowledge within the context of a conceptual framework	①	②	③	④	⑤
24. Are intellectually engaged and motivated	①	②	③	④	⑤
25. Reveal preconceptions and reasoning	①	②	③	④	⑤
26. Use evidence to generate explanations	①	②	③	④	⑤
27. Communicate and critique their scientific ideas and the ideas of others	①	②	③	④	⑤
28. Reflect on how personal understanding has changed over time	①	②	③	④	⑤

29. How could the organizers of the Science Partnership Academy help you improve your understanding of the Elements of Effective Science Learning Experiences for Students (23 to 28 above) and what it would look like if done effectively in practice?

Professional Development

<u>Foundational PD</u>—Think about the sequence of foundational (initial module use) professional development needed for teachers in your region to use one of the modules. How well do you feel that the foundational professional development currently available in your region helps teachers in each of the following areas? Use the scale below to rate your comfort level with each element.

0 **Not the intent**—It is not the intent or the purpose of professional development at this level to address this knowledge or skill.

1. **Not at all**—It is the intent or purpose but it has not been made explicit that this knowledge or skill must be addressed in the foundational professional development and it is seldom addressed.
2. **Not very well**—It has not been made explicit that this knowledge or skill must be addressed but many of the instructors address it. However, how it is addressed is not very consistent.
3. **Fairly well**—It has been made explicit that this knowledge or skill be addressed but it is up to the instructor how it is accomplished.
4. **Well**—It has been made explicit that this knowledge or skill be addressed and there is some effort to standardize the approach among instructors so that all who attend receive the same message.
5. **Very well**—It has been made explicit that this knowledge or skill be addressed in the foundational PD and the approach has been standardized among instructors. We feel reasonably confident that teachers who attend are receiving the same message regardless of the instructor.

Knowledge and Skill	Not the intent	Not at all	Not very well	Fairly well	Well.	Very Well
30. Prepares teachers to engage students in effective learning experiences (see items 23 to 28 above)	⓪	①	②	③	④	⑤
31. Develops a deep science content knowledge relevant to the module	⓪	①	②	③	④	⑤
32. Provides teachers with a solid understanding of what the cognitive sciences tells us about how students learn science	⓪	①	②	③	④	⑤
33. Helps teachers understand the Science standards and how they influence curriculum and relate specifically to the module	⓪	①	②	③	④	⑤
34. Prepares teachers to effectively use the curriculum materials to provide effective science learning experiences (curricular reasoning)	⓪	①	②	③	④	⑤
35. Helps teachers develop content specific pedagogical skills	⓪	①	②	③	④	⑤
36. Helps teacher implement formative assessment practices that effectively informs instruction	⓪	①	②	③	④	⑤
37. Helps teachers implement summative assessment and use summative assessment data to improve instruction	⓪	①	②	③	④	⑤

38. How could the organizers of the Science Partnership Academy help you adjust the foundational professional development to better address the knowledge and skills listed above?

<u>Developing Expertise PD</u>—Think about the developing expertise (training beyond initial use) professional development that is currently available in your region. How well do you feel that this professional development currently helps teachers in each of the following areas? Use the scale below to rate your comfort level with each element.

0 **Not the intent**—It is not the intent or the purpose of professional development at this level to address this knowledge or skill.

1. **Not at all**—It is the intent or purpose but it has not been made explicit that this knowledge or skill must be addressed in the developing expertise professional development and it is seldom addressed.
2. **Not very wel**l—It has not been made explicit that this knowledge or skill must be addressed but many of the instructors address it. However, how it is addressed is not very consistent.
3. **Fairly well**—It has been made explicit that this knowledge or skill be addressed but it is up to the instructor how it is accomplished.
4. **Well**—It has been made explicit that this knowledge or skill be addressed and there is some effort to standardize the approach among instructors so that all who attend receive the same message.
5. **Very well**—It has been made explicit that this knowledge or skill be addressed and the approach has been standardized among instructors. We feel reasonably confident that those who attend are receiving the same message regardless of the instructor.

Knowledge and Skill	Not the intent	Not at all	Not very well	Fairly well	Well.	Very Well
39. Prepares teachers to engaged students in effective learning experiences (see items 23 to 28 above).	⓪	①	②	③	④	⑤
40. Develops a deep science content knowledge relevant to the module	⓪	①	②	③	④	⑤
41. Provides teachers with a solid understanding of what the cognitive sciences tells us about how students learn science	⓪	①	②	③	④	⑤
42. Helps teachers understand the Science standards and how they influence curriculum and relate specifically to the module	⓪	①	②	③	④	⑤
43. Prepares teachers to effectively use the curriculum materials to provide effective science learning experiences (curricular reasoning)	⓪	①	②	③	④	⑤
44. Helps teachers develop content specific pedagogical skills	⓪	①	②	③	④	⑤
45. Helps teacher implement formative assessment practices that effectively informs instruction	⓪	①	②	③	④	⑤
46. Helps teachers implement summative assessment and use summative assessment data to improve instruction	⓪	①	②	③	④	⑤

47. Which of the following best describe the target audience for the developing expertise professional development that is currently available in your region? Check all that apply.
The courses/workshops . . .

① Are open to anyone interested
② Target teacher leaders
③ Target science coaches
④ Target science curriculum coordinators
⑤ Target Administrators
⑥ Target potential professional development providers of foundational PD
⑦ Others: _____

48. How could the organizers of the Science Partnership Academy help you improve adjust the developing expertise professional development to better address the knowledge and skills listed above?

Capacity to Support Professional Development

Indicate the degree to which you agree with each of the following statements about the regional team that you represent.

	Don't Know	Strongly Disagree	Disagree	Agree	Strongly Agree
49. Our regional team has a shared vision of effective science teaching and learning practices.	⓪	①	②	③	④
50. Our regional team has a shared vision of effective professional development for science teachers.	⓪	①	②	③	④
51. Our regional team has a shared vision of the kind of policies and practices schools and districts should have in place in order to support inquiry-based science instruction.	⓪	①	②	③	④
52. Our regional team has proactively worked with school and district administration to help them implement policies and practices that support inquiry-based science instruction.	⓪	①	②	③	④
53. Our regional team has a shared vision of a process for implementing effective school-based professional development that will help teachers use research-based instructional practices, materials, and assessments to engage students in the Effective Science Learning Experiences (see items 23 to 28).	⓪	①	②	③	④
54. Our regional team has encouraged schools and districts to develop and implement policies and practices that support school-based professional development (some form of PLC) for science.	⓪	①	②	③	④
55. Our regional team has a mechanism to help district build the capacity necessary to support school-base professional development for science.	⓪	①	②	③	④
56. Our regional team has establish clear criteria for identifying instructional leadership that is based on the persons demonstrated ability to implement Effective Science Learning Experiences with students and ability to positively influence the instructional practices of science teacher.	⓪	①	②	③	④
57. Our regional team has helped school and district administration identify instructional leadership based on this criteria (see item 56).	⓪	①	②	③	④

	Don't Know	Strongly Disagree	Disagree	Agree	Strongly Agree
58. Our regional team has a mechanism to develop and nurture those who have the potential to become instructional leaders but do not yet meet the established criteria.	⓪	①	②	③	④
59. Our regional team has a mechanism for developing a cadre of trainers capable of providing foundational professional development on the modules.	⓪	①	②	③	④
60. Our regional team has a mechanism for developing a cadre of trainers capable of providing developing expertise professional development on the modules.	⓪	①	②	③	④
61. Our team has a means of assessing and analyzing the unique context and issues within our region.	⓪	①	②	③	④

62. Please provide any other comments regarding your expectation for the Science Partnership Academy or anything else you would like the organizers to know.

Science Partnership Academy

Final Survey

May 2010

Your responses to the following questionswill be used to create your unique identifier which will enable RMC Research to match your responses on this survey with your responses on the survey that was administered aat the first (December 2009) Academy.

A. What are the last 4 digits of your home phone number? _____

B. On what day of the month were you born (Between 1 and 31)? _____

C. How many letters are in your last name? _____

Background

1. Did you attend the first Science Partnership Academy in the fall 2009?

   ① Yes — *If Yes, skip to item number 13.*
   ② No

2. Which of the following best describes the position that you currently hold with respect to the regional team that you represent at this Science Partnership Academy? Check all that apply.

   ① Regional Alliance Director
   ② Other Regional Alliance staff
   ③ ESD Science Coordinator
   ④ District Administrator or Superintendent
   ⑤ School Principal or Administrator
   ⑥ Science Coach or TOSA
   ⑦ Professional Development Provider
   ⑧ Teacher
   ⑨ College or University Faculty
   ⑩ Other, Your title: _____

3. Which of the following best describes the region of the state that your team serves? Check all that apply.

   ① Western Washington
   ② Seattle-Tacoma Metropolitan Area
   ③ Central Washington
   ④ Eastern Washington
   ⑤ N/A

4. What is the highest degree that you hold?

   ① Does not apply
   ② BA or BA
   ③ MA or MS
   ④ Multiple MA or MS
   ⑤ PhD or EdD

5. Do you have a degree (major) in a science discipline?

   ① Yes
   ② No — *If No, skip to item number 7.*

6. In what science discipline?

   ① Biology or other Life Science
   ② Physics
   ③ Chemistry
   ④ Earth science
   ⑤ Astronomy or other space science
   ⑥ Other, Specify _____

7. Have you ever been a science content teacher at any level?

   ① Yes
   ② No — *If No, skip to item number 11.*

8. At what level did you teach or are you teaching Science? Check all that apply.

   ① Elementary
   ② Middle School
   ③ High School
   ④ Community College
   ⑤ 4-year College or University
   ⑥ Graduate level

9. How many years did you teach science content at any level?

   ① 2 or less years
   ② 3 to 5 years
   ③ 6 to 10 years
   ④ 11 to 15 years
   ⑤ 16 to 20 years
   ⑥ 21 to more years

10. When was the last time you taught science?
    - ① I am teaching science this year (2009–2010 school year)
    - ② I taught Science last year (2008–2009 school year)
    - ③ I taught Science 2 to 5 years ago
    - ④ I taught Science 6 to 10 years ago
    - ⑤ I taught Science 11 to 15 years ago
    - ⑥ I taught Science 16 to 20 years ago
    - ⑦ I taught Science more that 20 years ago

11. Have you ever taught science education for either preservice or inservice science teachers?
    - ① Yes
    - ② No — *If No, skip to item number 13.*

12. How many years have you taught science education?
    - ① 2 or less years
    - ② 3 to 5 years
    - ③ 6 to 10 years
    - ④ 11 to 15 years
    - ⑤ 16 to 20 years
    - ⑥ 21 to more years

The Research Behind the Washington State Science Logic Model

How familiar are you with each of the references listed below?	**Not at all**	**I have heard about it**	**I have skimmed it**	**I have read it**	**I have studied it and am very familiar with it**
13. American Association for the Advancement of Science (1991). *Science for all Americans.* Washington D.C.: AAAS.	①	②	③	④	⑤
14. Banilower, E., Cohen, K., Pasley, J., & Weiss, I. (2008). *Effective science instruction: What does research tell us?* Portsmouth, NH: RMC Research Corporation, Center on Instruction.	①	②	③	④	⑤
15. Cohen, D. K., Raudenbush, S. W., & Ball, D. L. (2003). Resources, instruction, and research. *Educational Evaluation & Policy Analysis 25*(2), 119-142.	①	②	③	④	⑤
16. Donovan, S. M., & Bransford, J. D. (2005). *How students learn: history, mathematics, and science in the classroom*. Washington DC: The National Academies Press.	①	②	③	④	⑤
17. Fullan, M., Hill, P., & Crévola, C. (2006). *Breakthrough*. Thousand Oaks, California. Corwin Press.	①	②	③	④	⑤
18. Garmston, R. J. & Wellman, B. M. (2009). *The adaptive school: A sourcebook for developing collaborative groups, 2nd Edition*. Norwood, MA: Christopher-Gordon.	①	②	③	④	⑤
19. Loucks-Horsley, S., Love, N., Stiles, K. E., Mundry, S., & Hewson, P. W. (2010). *Designing professional development for teachers of science and mathematics, Third edition*. Thousand Oaks, CA: Corwin.	①	②	③	④	⑤
20. Michaels, S., Shouse, A., & Schweingruber, H. (2008). *Ready, Set, Science: Putting research to work in K-8 science classrooms*. Washington D.C: National Academies Press.	①	②	③	④	⑤

How familiar are you with each of the references listed below?	Not at all	I have heard about it	I have skimmed it	I have read it	I have studied it and am very familiar with it
21. National Research Council. Bransford, J.D., Brown, A.L., & Cocking, R.R. (Eds.). (2003). *How People Learn: Brain, Mind, Experience, and School*. Washington, DC: National Academy Press.	①	②	③	④	⑤
22. Thompson, C. L., & Zeuli, J.S. (1999). *The frame and the tapestry: Standards-based reform and professional development*. In L. Darling-Hammond & G. Sykes (Eds.),	①	②	③	④	⑤

Understanding the Washington State Science Logic Model

23. Have you had a chance to carefully examine the Washington State Logic Model for Science Professional Development?

    ① Yes ② No

How able do you feel you are to recognize when a lesson has effectively accomplished each of the following elements? Do you know specifically what you would look for among students? Use the Scale below to rate your ability level with each element.

1. **Not at all able**—You are not sure exactly what this statement means.
2. **Not very able**—You feel you would need to see more examples of this element in practice to understand what it really means.
3. **Somewhat able**—You believe that you understand but would need more experience observing effective classrooms practice to be certain.
4. **Able**—You feel that you have some understanding what this would look line in practice.
5. **Very able**—You believe that you have a clear understanding of what this element would look like in classroom instruction if done effectively.

Elements of Effective Science Learning Experiences for Students	Not at all able	Not very able	Somewhat able	Able.	Very able
24. Draw upon a deep foundation of usable knowledge within the context of a conceptual framework to build scientific understanding	①	②	③	④	⑤
25. Are intellectually engaged and motivated	①	②	③	④	⑤
26. Reveal preconceptions and their initial reasoning	①	②	③	④	⑤
27. Use evidence to generate explanations	①	②	③	④	⑤
28. Communicate and critique their scientific ideas and the ideas of others	①	②	③	④	⑤
29. Engage in activities and sense-making discussions to develop scientific understandings	①	②	③	④	⑤
30. Reflect on how personal understanding has changed over time and recognize cognitive processes that lead to changes	①	②	③	④	⑤

Professional Development

<u>Foundational PD</u>—Think about the foundational (initial module use) professional development conducted *SINCE JANUARY 1, 2010* for teachers in your region. How well do you feel that the foundational professional development helps teachers in each of the following areas? Use the scale below to rate your comfort level with each element.

0 **Not the intent**—It is not the intent or the purpose of professional development at this level to address this knowledge or skill.

1. **Not at all**—It is the intent or purpose but it has not been made explicit that this knowledge or skill must be addressed in the foundational professional development and it is seldom addressed.
2. **Not very wel**l—It has not been made explicit that this knowledge or skill must be addressed but many of the instructors address it. However, how it is addressed is not very consistent.
3. **Fairly well**—It has been made explicit that this knowledge or skill be addressed but it is up to the instructor how it is accomplished.
4. **Well**—It has been made explicit that this knowledge or skill be addressed and there is some effort to standardize the approach among instructors so that all who attend receive the same message.
5. **Very well**—It has been made explicit that this knowledge or skill be addressed in the foundational PD and the approach has been standardized among instructors. We feel reasonably confident that teachers who attend are receiving the same message regardless of the instructor.

Knowledge and Skill	Not the intent	Not at all	Not very well	Fairly well	Well.	Very Well
31. Prepares teachers to engage students in effective learning experiences (see items 24 to 30 above)	⓪	①	②	③	④	⑤
32. Develops a deep science content knowledge in area of assignment	⓪	①	②	③	④	⑤
33. Provides teachers with a solid understanding of what the cognitive sciences tells us about how students learn science	⓪	①	②	③	④	⑤
34. Helps teachers understand the Science standards and how they influence curriculum and how they relate specifically to the module	⓪	①	②	③	④	⑤
35. Prepares teachers to effectively use the curriculum materials to provide effective science learning experiences (curricular reasoning)	⓪	①	②	③	④	⑤
36. Helps teachers develop content specific pedagogical skills	⓪	①	②	③	④	⑤
37. Helps teacher implement formative assessment practices that effectively informs instruction	⓪	①	②	③	④	⑤
38. Helps teachers implement summative assessment and use summative assessment data to improve instruction	⓪	①	②	③	④	⑤

<u>Developing Expertise PD</u>—Think about the developing expertise (training beyond initial use) professional development conducted *SINCE JANUARY 1, 2010* in your region. How well do you feel that this professional development currently helps teachers in each of the following areas? Use the scale below to rate your comfort level with each element.

0 **Not the intent**—It is not the intent or the purpose of professional development at this level to address this knowledge or skill.

1. **Not at all**—It is the intent or purpose but it has not been made explicit that this knowledge or skill must be addressed in the developing expertise professional development and it is seldom addressed.
2. **Not very wel**l—It has not been made explicit that this knowledge or skill must be addressed but many of the instructors address it. However, how it is addressed is not very consistent.
3. **Fairly well**—It has been made explicit that this knowledge or skill be addressed but it is up to the instructor how it is accomplished.
4. **Well**—It has been made explicit that this knowledge or skill be addressed and there is some effort to standardize the approach among instructors so that all who attend receive the same message.
5. **Very well**—It has been made explicit that this knowledge or skill be addressed and the approach has been standardized among instructors. We feel reasonably confident that those who attend are receiving the same message regardless of the instructor.

Knowledge and Skill	Not the intent	Not at all	Not very well	Fairly well	Well.	Very Well
39. Prepares teachers to engage students in effective learning experiences (see items 24 to 30 above)	⓪	①	②	③	④	⑤
40. Develops a deep science content knowledge in area of assignment	⓪	①	②	③	④	⑤
41. Provides teachers with a solid understanding of what the cognitive sciences tells us about how students learn science	⓪	①	②	③	④	⑤
42. Helps teachers understand the Science standards and how they influence curriculum and how they relate specifically to the module	⓪	①	②	③	④	⑤
43. Prepares teachers to effectively use the curriculum materials to provide effective science learning experiences (curricular reasoning)	⓪	①	②	③	④	⑤
44. Helps teachers develop content specific pedagogical skills	⓪	①	②	③	④	⑤
45. Helps teacher implement formative assessment practices that effectively informs instruction	⓪	①	②	③	④	⑤
46. Helps teachers implement summative assessment and use summative assessment data to improve instruction	⓪	①	②	③	④	⑤

47. Which of the following best describe the target audience for the developing expertise professional development that was conducted ***SINCE JANUARY 1,2010*** in your region? Check all that apply.
The courses/workshops . . .

① Are open to anyone interested
② Target teacher leaders
③ Target science coaches
④ Target science curriculum coordinators
⑤ Target Administrators
⑥ Target potential professional development providers of foundational PD
⑦ Others: _____

Capacity to Support Professional Development

Think about your regional team near the end of the final Science Partnership Academy. Indicate the degree to which you agree with each of the following statements about the regional team that you represent.

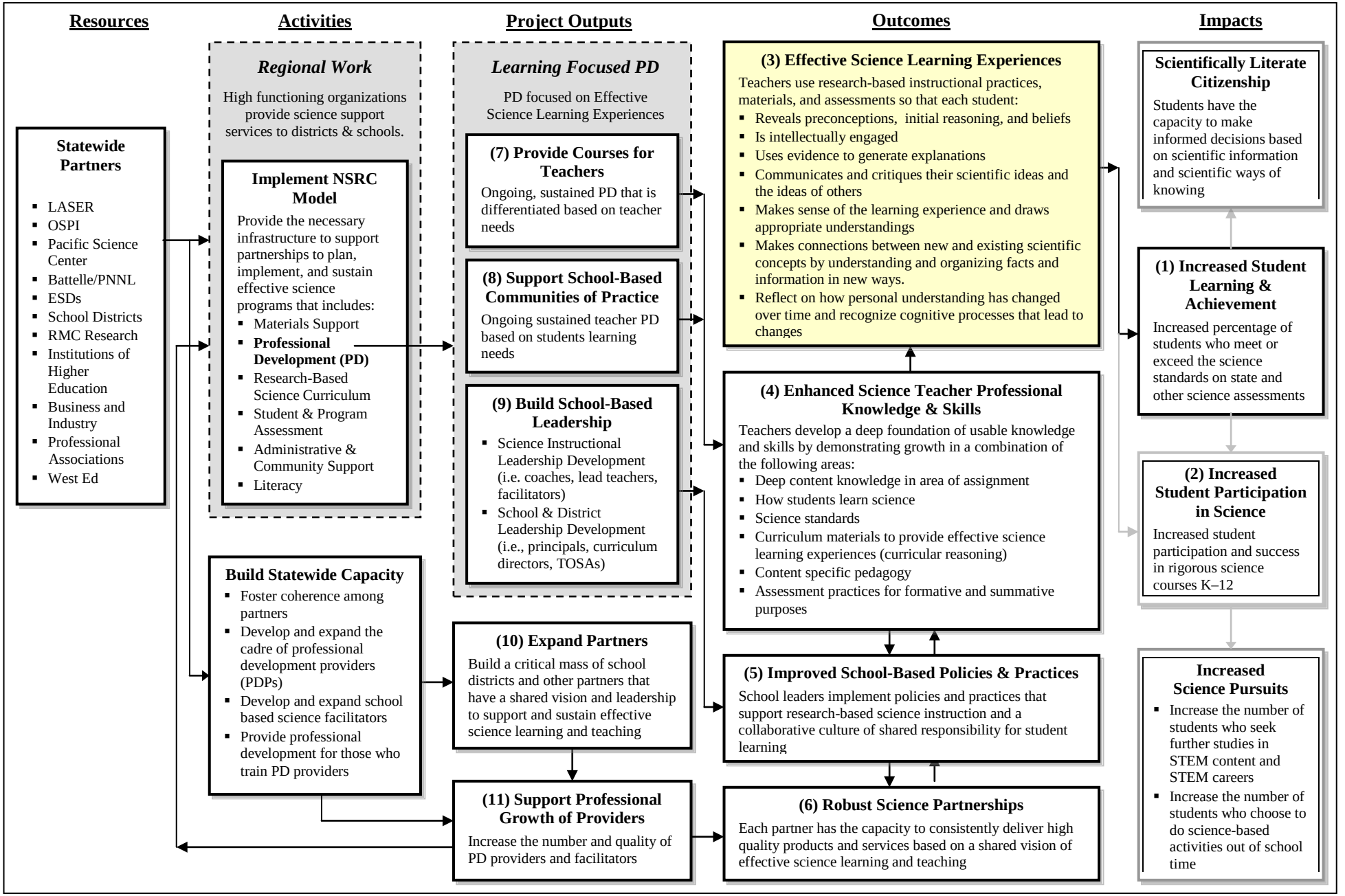
	Don't Know	Strongly Disagree	Disagree	Agree	Strongly Agree
48. Our regional team has a shared vision of effective science teaching and learning practices.	⓪	①	②	③	④
49. Our regional team has a shared vision of effective professional development for science teachers.	⓪	①	②	③	④
50. Our regional team has a shared vision of the kind of policies and practices schools and districts should have in place in order to support inquiry-based science instruction.	⓪	①	②	③	④
51. Our regional team has proactively worked with school and district administration to help them implement policies and practices that support inquiry-based science instruction.	⓪	①	②	③	④
52. Our regional team has a shared vision of a process for implementing effective school-based professional development that will help teachers use research-based instructional practices, materials, and assessments to engage students in the Effective Science Learning Experiences (see items 24 to 30).	⓪	①	②	③	④
53. Our regional team has encouraged schools and districts to develop and implement policies and practices that support school-based professional development (some form of PLC) for science.	⓪	①	②	③	④
54. Our regional team has a mechanism to help district build the capacity necessary to support school-base professional development for science.	⓪	①	②	③	④
55. Our regional team has establish clear criteria for identifying instructional leadership that is based on the persons demonstrated ability to implement Effective Science Learning Experiences with students and ability to positively influence the instructional practices of science teacher.	⓪	①	②	③	④
56. Our regional team has helped school and district administration identify instructional leadership based on this criteria (see item 55).	⓪	①	②	③	④
57. Our regional team has a mechanism to develop and nurture those who have the potential to become instructional leaders but do not yet meet the established criteria.	⓪	①	②	③	④
58. Our regional team has a mechanism for developing a cadre of trainers capable of providing foundational professional development on the modules.	⓪	①	②	③	④
59. Our regional team has a mechanism for developing a cadre of trainers capable of providing developing expertise professional development on the modules.	⓪	①	②	③	④

	Don't Know	Strongly Disagree	Disagree	Agree	Strongly Agree
60. Our team has a means of assessing and analyzing the unique context and issues within our region.	⓪	①	②	③	④
61. The plan developed by our team adequately addresses components 3 and 4 of the logic model	⓪	①	②	③	④
62. Our plan is very likely to significantly increase the frequency at which students in our region are engaged in the effective science learning experiences as described in component 3 of the logic model	⓪	①	②	③	④

63. Please provide any other comments regarding your experience during the Science Partnership Academy or anything else you would like the organizers to know.

Appendix D
Washington State Logic Model for Science Professional Development

Washington State Logic Model for Science Professional Development



Adapted by ESD Science Coordinators and LASER Alliance Directors from original work of Kennedy and Weaver

Washington State Science Professional Development

Theory of Action

If all science professional development is focused on helping teachers use research-based instructional practices, materials, and assessments so that each student:

- Reveals preconceptions, initial reasoning, and beliefs
- Is intellectually engaged
- Uses evidence to generate explanations
- Communicates and critiques their scientific ideas and the ideas of others
- Makes sense of the learning experience and draws appropriate understandings
- Makes connections between new and existing scientific concepts by understanding and organizing facts and information in new ways.
- Reflect on how personal understanding has changed over time and recognize cognitive processes that lead to changes

Then:

- Student science learning & achievement would increase;
- More students would enroll and successfully complete challenging and advanced science courses at the high school level;
- More students would seek further studies beyond high school in STEM content and would seek STEM careers;
- More students will seek to be engaged in STEM-related activities in out-of-school time, and;
- More students would have the capacity to make informed decisions based on scientific information and scientific ways of knowing.

Logic Model Column Definitions

Resources—The personnel and financial resources that support the work

Activities—What regional partners do

Outputs—Evidence that the activities were carried out

Outcomes—The targets of the activities and outputs

Impact—The results of carrying out the logic model

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