

Mathematics and Science Instructional Coach Program

Final Report to the Legislature



Randy I. Dorn
State Superintendent of
Public Instruction

December 2009

Mathematics and Science Instructional Coach Program

Final Report to the Legislature

Prepared by:
Julie Wagner, Elementary Mathematics Specialist
Greta Bornemann, Mathematics Director

Teaching and Learning
Office of Superintendent of Public Instruction
Jessica Vavrus, Director

Randy I. Dorn
Superintendent of Public Instruction

Ken Kanikeberg
Chief of Staff

Alan Burke, Ed.D.
Deputy Superintendent, K-12 Education

December 2009

TABLE OF CONTENTS

| | |
|--|----|
| Executive Summary..... | iv |
| I. Introduction | 1 |
| II. Process and Findings for Evaluation of Mathematics Coaches..... | 2 |
| III. Process and Findings for Evaluation of Science Coaches..... | 16 |
| IV. Characteristics of Instructional Coaches..... | 20 |
| V. Conclusion and Recommendations..... | 21 |
| VI. Bibliography..... | 24 |
| VII. Appendices..... | 24 |
| Appendix A: Survey of Math Coaches..... | 25 |
| Appendix B: Survey of Math Teachers..... | 29 |
| Appendix C: Survey of Administrators participating in Math Coaching Grant..... | 31 |

LIST OF FIGURES

| | |
|--|----|
| Figure 1: Math Coach Overall Evaluation of Professional Development for 2007-08 and 2008-09 | 3 |
| Figure 2: Math Coach Evaluation of Facilitators for 2007-08 and 2008-09..... | 4 |
| Figure 3: Math Coach Evaluation of Professional Development Content for 2007-08 and 2008-09 | 4 |
| Figure 4: Math Coach Evaluation of August Professional Development Institute for 2007-08 and 2008-09 | 5 |
| Figure 5: Math Coach Evaluation of Professional Development Information for 2007-08 and 2008-09 | 6 |
| Figure 6: Math Coach Evaluation of Professional Development Meeting Expectations for 2007-08 and 2008-09 | 6 |
| Figure 7: Math Coach Evaluation of Professional Development – Teacher Content during 2007-08 and 2008-09 | 7 |
| Figure 8: Math Coaches Self Evaluation of Percent of Time on Coaching Activities during 2008-09 | 8 |
| Figure 9: Administrator Evaluation on Improved Student Learning during 2007-08 and 2008-09 | 10 |
| Figure 10: Administrator Evaluation on Improved Teaching of Curriculum during 2008-09 | 10 |
| Figure 11: Administrator Evaluation on Improved Effectiveness of Professional Learning Communities 2008-09 | 11 |
| Figure 12: Teacher Evaluation of Coach Contact Time during 2008-09..... | 12 |
| Figure 13: Teacher Evaluation of the Value of Coaching during 2008-09 | 13 |
| Figure 14: Teacher Evaluation of Overall Math Coaching Effectiveness during 2007-08 and 2008-09 | 15 |
| Figure 15: Administrator Evaluation of Overall Math Coaching Effectiveness during 2007-08 and 2008-09 | 15 |
| Figure 16: Evaluation of Professional Development by Science Coaches | 17 |

Executive Summary

In 2007, the Washington State Legislature provided funding to support 25 secondary mathematics instructional coaches for the 2007-08 and 2008-09 school years. Twenty-five secondary science instructional coaches were added to this program in 2008-09. The mathematics and science instructional coach program is described in Second Substitute House Bill 1906 (improving mathematics and science education). This report represents the culminating final report for the math and science coaching program for the 2008-09 academic year.

The legislature specifically asked that data be collected through various performance efforts, and that the findings would include:

- a) An evaluation of the coach development institute, coaching support seminars, and other coach support activities;
- b) Recommendations with regard to the characteristics required of the coaches;
- c) Identification of changes in teacher instruction related to coaching activities; and
- d) Identification of the satisfaction level with coaching activities as experienced by classroom teachers and administrators.

The Office of Superintendent for Public Instruction (OSPI) contracted with math consultants Kris Lindeblad, an independent contractor, David Foster from the Noyce Foundation, and Cathy Carroll from WestEd, to provide professional development for the state-funded mathematics coaches for the 2008-09 academic year. Washington State University was granted an external evaluation contract to examine the impact of the coaching program on teachers and students.

Because of funding cuts during 2008-09, limited data was collected on the mathematics coaching program. The instructional coaching program received no data from Social and Economic Sciences Research Center (SESCR) for the 25 science coaches. However, the science professional development program for the coaches was evaluated by Dr. Dan Hanley, who was contracted with Western Washington University. Part II of this report specifically addresses the math coaching program while Part III examines the science coaching program.

The math coaching evaluation indicates that the coaching program was viewed as successful by coaches, teachers and administrators. This satisfaction rate increased during the course of the program. In year two, 95 percent of the administrators with an OSPI-funded math coach believed coaching improved students' mathematics learning.

Professional learning communities was another area where administrators noticed a positive coaching impact. Seventy-seven percent of the administrators surveyed indicated coaches greatly improved the effectiveness of professional learning communities in the school.

Seventy-one percent of the teachers involved with the math coaches indicated a positive rating for the overall evaluation of the program. Teachers cited coaches as having helped them make positive changes in the classroom. All of their comments communicated a deeper understanding of the pedagogy of teaching and the use of data to inform instruction.

In order to evaluate the professional development that coaches received, the math coaches were asked to assess the August 2008 Institute, the ten days of professional development during the school year, the facilitators, the content covered, and the materials used. The overall professional development received excellent reviews in 2007-08 with ninety-five percent positive ratings (excellent or good). The second year showed an increase in positive ratings of 100 percent for overall professional development. For the science program, over 90 percent of the respondents gave positive ratings (good or excellent) to their “overall experience” of the professional development offered during the year. Even higher positive ratings (96 percent) were expressed for the science Summer Academy in August 2008.

Although legislation required evaluation to determine characteristics of good instructional coaching, the job of the coach varied greatly from school to school. Consequently, it would have been difficult to delve into the specific requirements needed for each position. Instead research was examined to determine necessary characteristics for coaching.

Instructional coaching is a method of embedding professional development within a school or district. They build the relationships and trust necessary to support and sustain change. Effective interpersonal communication skills are also paramount to building rapport, as well as collaborative working groups, reflective practices, and conflict resolution. Successful coaches must develop a safe environment, listen compassionately, and hold positive, open and honest conversations with stakeholders. Coaches must also work through resistance to change, manage conflict effectively, and respect confidentiality while maintaining a non-evaluative role.

The 2007-09 Mathematics and Science coaching program was created to investigate coaching models around mathematics and science, similar to the program currently existing in reading. Two years is a very limited time to show an impact on student

learning of mathematics (one year in the case of science). Despite the short timeframe of implementation, there were indications that coaches were making an impact on teacher-practices, as well as changing the culture of mathematics and science work within professional learning communities and in the classroom.

Administrators and teachers concluded that the state-funded coaching program was very beneficial. They also believed it would be difficult to continue the coaching program if required to use existing district and/or building funds. The 2009 legislative session did continue the coaching program an additional two years, but on a greatly reduced scale. Only nine mathematics and nine science coaches will be working with their districts during the 2009-10 and 2010-11 school years.

Given the resources that have been invested at the state level to develop this much needed leadership coaching capacity within the mathematics and science communities, it is critical for OSPI and other statewide partners to consider ways to sustain the high level professional development and state support of science and mathematics coaching in Washington State. It is important those leaders continue to receive support and feel connected to a state-wide system moving towards continued improvement of high quality teaching and learning in mathematics and science. OSPI is currently exploring ways to collaborate with others in the field of building mathematics and science leaders to integrate and join efforts as the state faces increased budget deficits.

I. Introduction

In 2007, the Washington State Legislature provided funding to support 25 secondary mathematics instructional coaches for the 2007-08 and 2008-09 school years. Twenty-five secondary science instructional coaches were added to this program in 2008-09. The mathematics and science instructional coach program is described in Second Substitute House Bill 1906 (improving mathematics and science education). The legislature also directed the Social and Economic Sciences Research Center (SESRC) of Washington State University (WSU), to conduct the evaluation of this program. The twenty-five coaches' were required by legislation to work in two schools at the secondary level that the district assigned. The districts that received coaching grants in the areas of math and/or science were: Aberdeen, Auburn, Battle Ground, Bethel, Blaine, Brewster, Bridgeport, Burlington-Edison, Central Kitsap, Cheney, Cle-Elum/Roslyn, Evergreen (Clark), Ferndale, Grandview, Granite Falls, Kent, Longview, Mead, Medical Lake, Moses Lake, Mount Vernon, Nine Mile Falls, North Thurston, Oak Harbor, Prosser, Selah, Spokane, Tukwila, Walla Walla, and White River.

An interim report completed in September 2008 was written by SESCR after the mathematics instructional coach program had completed one year. SESCR began the evaluation of the mathematics and science coaching program for 2008-09, but because of funding cuts, limited data was collected on the mathematics coaching program for the second year. The instructional coaching program received no data from SESCR for the 25 science coaches. However, the science professional development program for the coaches was evaluated by Dr. Dan Hanley, who was contracted with Western Washington University (WWU) to provide the professional development for the science coaches during 2008-09. It is from this report that the science section of this final report is drawn. This report represents the culminating final report for the math and science coaching program for the 2008-09 academic year.

The legislature specifically asked that data be collected through various performance efforts, and that the findings would include:

- a) An evaluation of the coach development institute, coaching support seminars, and other coach support activities
- b) Recommendations with regard to the characteristics required of the coaches
- c) Identification of changes in teacher instruction related to coaching activities
- d) Identification of the satisfaction level with coaching activities as experienced by classroom teachers and administrators

Part II of this report will address evaluation of professional development received, changes in teaching instruction, and satisfaction levels with coaching activities for the mathematics instructional coaches. The science instructional coach program will address evaluation of and changes in teacher instruction in Part III. Data for satisfaction levels with coaching activities in the science instructional coach program was not collected due to the loss of funding for a full evaluation.

Instructional coaching is a method of embedding professional development within a school or district. They build the relationships and trust necessary to support and sustain change. Effective interpersonal communication skills are also paramount to building rapport, as well as collaborative working groups, reflective practices, and conflict resolution. Successful coaches must develop a safe environment, listen compassionately, and hold positive, open and honest conversations with stakeholders. Coaches must also work through resistance to change, manage conflict effectively, and respect confidentiality while maintaining a non-evaluative role. Part IV will address recommendations regarding required characteristics for both science and math coaches.

II. Process and Findings for Evaluation of Mathematics Coaches

A. Evaluation of Professional Development for Math Coaches in 2008-09

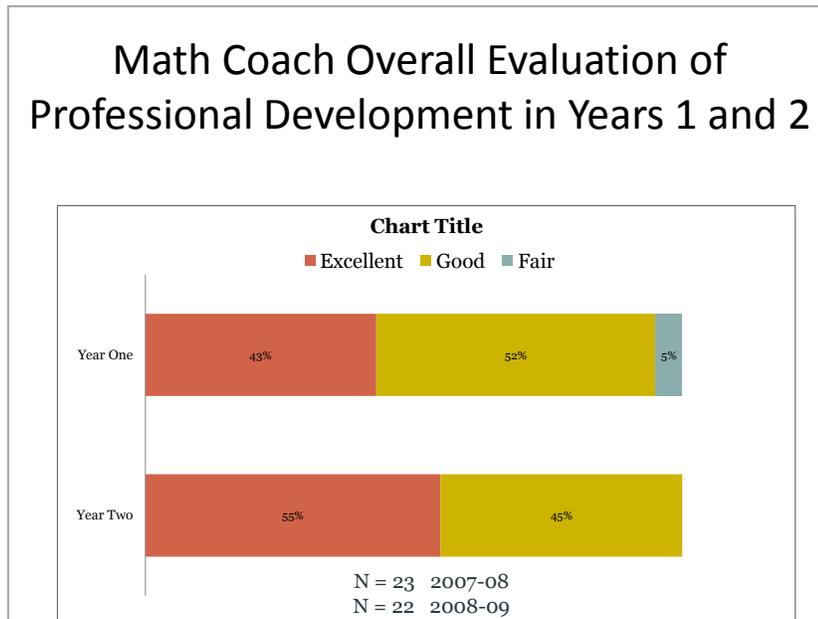
The Office of Superintendent for Public Instruction (OSPI) contracted with math consultants Kris Lindeblad, an independent contractor, David Foster from the Noyce Foundation, and Cathy Carroll from WestEd, to provide professional development for the state-funded mathematics coaches for the 2008-09 school year. Washington State University was granted an external evaluation contract to examine the impact of the coaching program on teachers and students. This section is largely reporting from that WSU evaluation.

Professional development activities for the mathematics coaches included a five-day Summer Academy in August 2008 developed and conducted by Kris Lindeblad in coordination with OSPI, as well as four two-day seminars during the school-year developed and conducted by Kris Lindeblad, David Foster, Cathy Carroll, and Greta Bornemann, OSPI Mathematics Director. Activities during the school year included brief evaluations at the end of each seminar and surveys at the end of the school year, completed by involved coaches, teachers and principals.

In order to evaluate the professional development that coaches received, the coaches were asked to assess the August 2008 Institute, the eight days of professional development during the school year, the facilitators, the content covered, and the materials used.

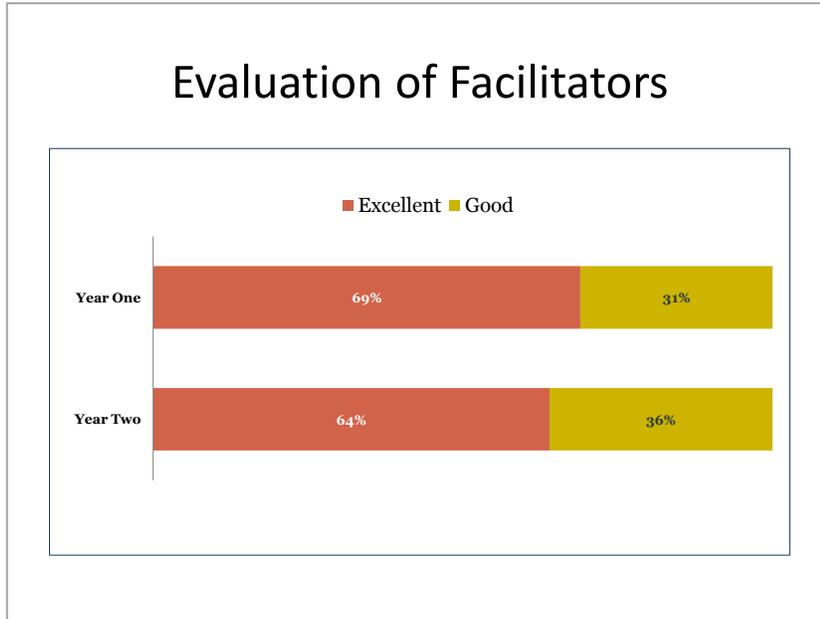
The overall professional development received excellent reviews in year one (2007-08) with 95 percent positive ratings (excellent or good). The second year showed an increase in positive ratings of 100 percent for overall professional development.

Figure 1: Math Coach Overall Evaluation of Professional Development for 2007-08 and 2008-09



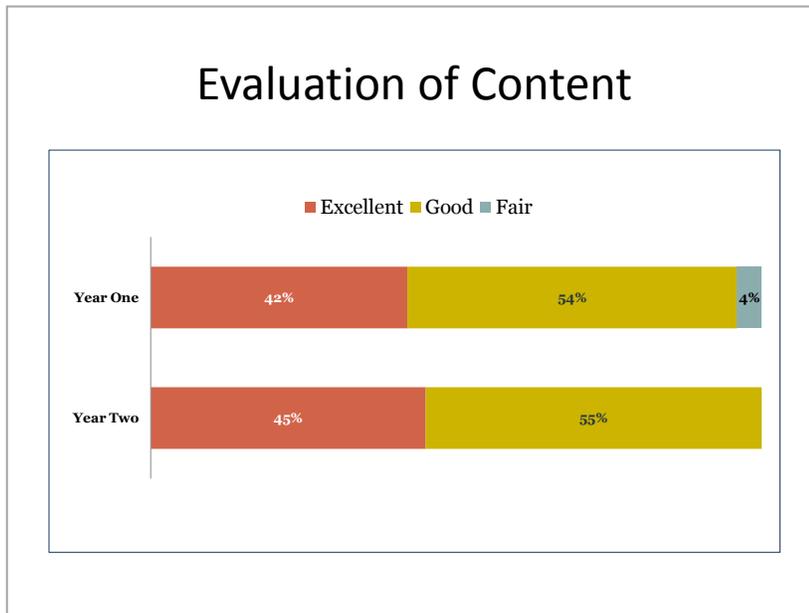
The professional development facilitators who provided the training received 100 percent positive ratings (excellent or good) in both year one and year two. In the second year, the excellent ratings decreased from 69 percent to 64 percent, but no neutral or negative ratings were indicated in either year.

Figure 2: Math Coach Evaluation of Facilitators for 2007-08 and 2008-09



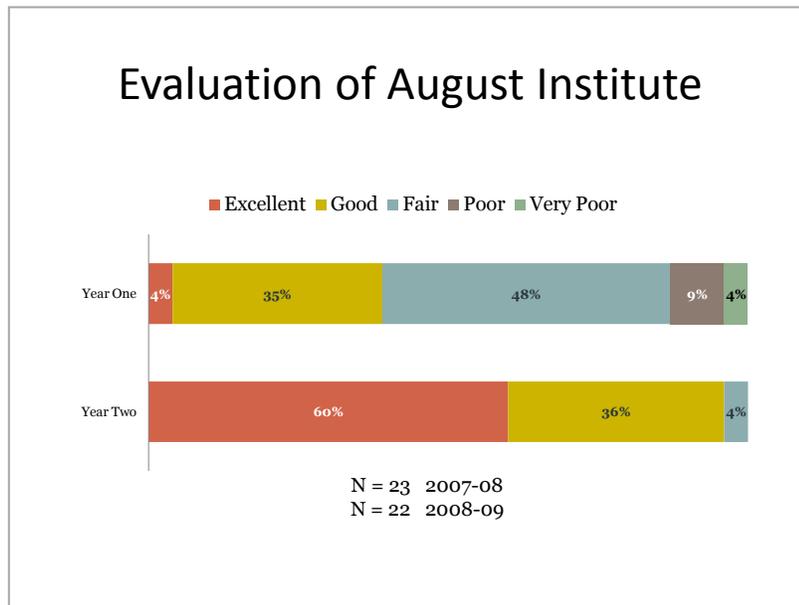
The content covered increased from 96 percent positive ratings in year one to 100 percent positive ratings in year two. The materials used mirrored similar ratings, going from 92 percent positive ratings in year one to 100 percent in year two.

Figure 3: Math Coach Evaluation of Professional Development Content for 2007-08 and 2008-09



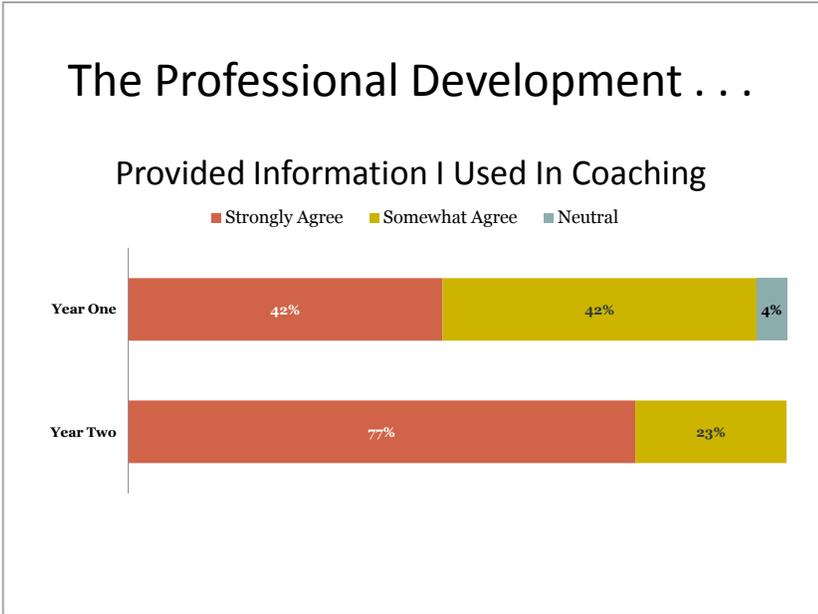
The lowest rating from the 2007-08 professional development was the August Institute, which received a positive rating of 39 percent. In 2008-09, that improved to a positive rating of 96 percent.

Figure 4: Math Coach Evaluation of August Professional Development Institute for 2007-08 and 2008-09



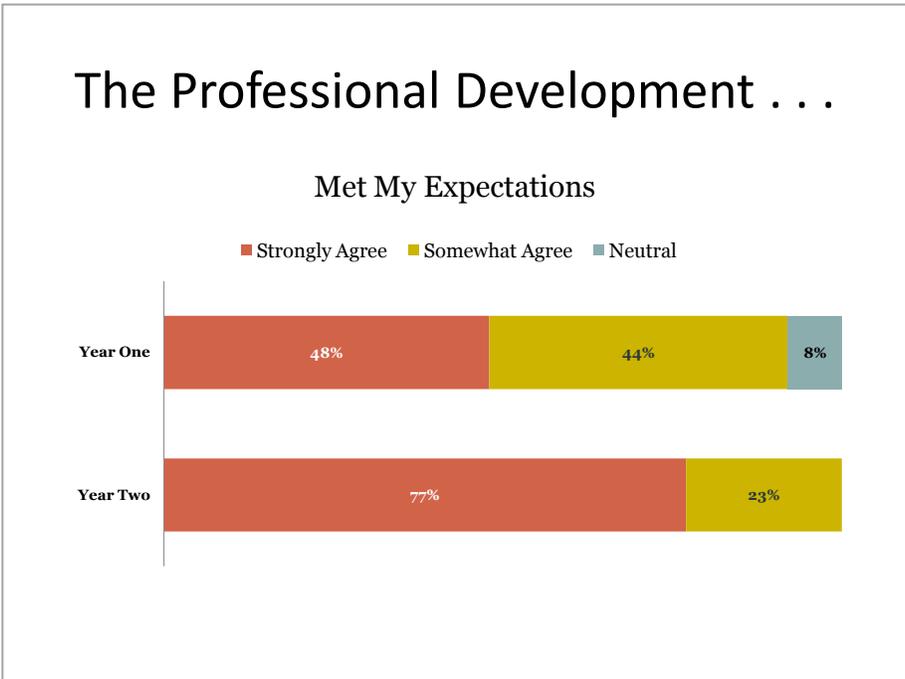
The coaches were asked to rate how the professional development had contributed to their work and improvement in their schools. When asked whether the professional development met their expectations, the positive rating (strongly agree or somewhat agree) rose from 92 percent to 100 percent. The strongly agree response increased by 29 percent over the two years.

Figure 5: Math Coach Evaluation of Professional Development Information for 2007-08 and 2008-09



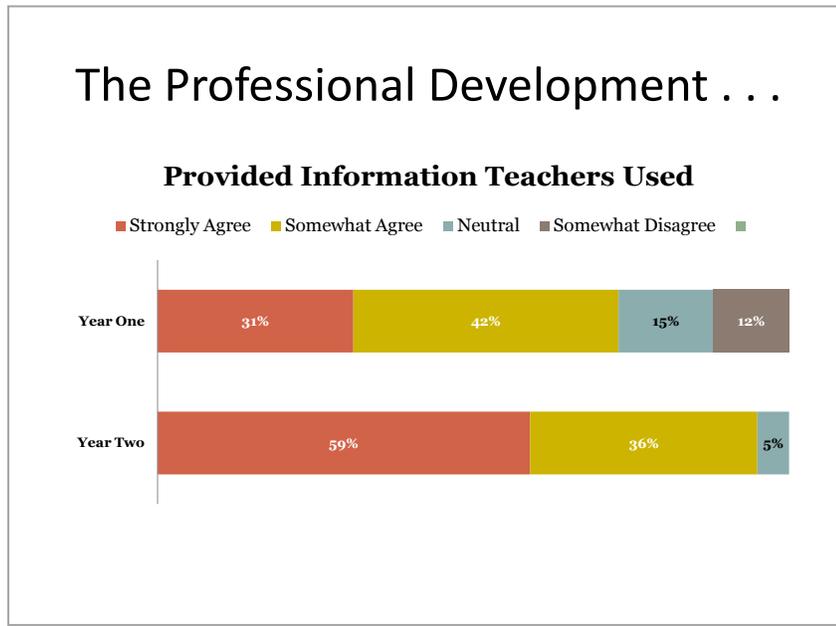
When asked whether the professional development provided information that was used in their coaching positions, the positive ratings increased from 84 percent in year one to 100 percent in year two. The strongly agree response increased by 35 percent over the two years.

Figure 6: Math Coach Evaluation of Professional Development Meeting Expectations for 2007-08 and 2008-9



Coaches were asked if the professional development provided information teachers used. The positive rating increased from 73 percent to 91 percent over the two years. The strongly agree response increased by 28 percent points in that time frame.

Figure 7: Math Coach Evaluation of Professional Development–Teacher Content during 2007-08 and 2008-09



The most valuable part of the professional development for 2008-09 in year two, as cited by the coaches, included:

- The coaching network established
- The specific mathematics content samples and the discussion around them
- The facilitators
- Problem solving with colleagues
- Honing skills from the first year of the coaching program
- Reviewing student work
- New ways of thinking about mathematics
- Learning best practices

The least valuable pieces of the professional development in year two included:

- Repetitious sessions
- Large group discussions
- Lack of differentiation according to the level of experience of the coaches
- Sessions that were longer than two days at a time
- Traveling

In the second year of the program, state coaching professional development became available to district and school mathematics leaders and coaches. This nearly tripled the number of teachers and coaches reached. In several places this seemed to be a concern among state funded coaches who were in year one regarding the “lack of differentiation” for new and more experienced coaches.

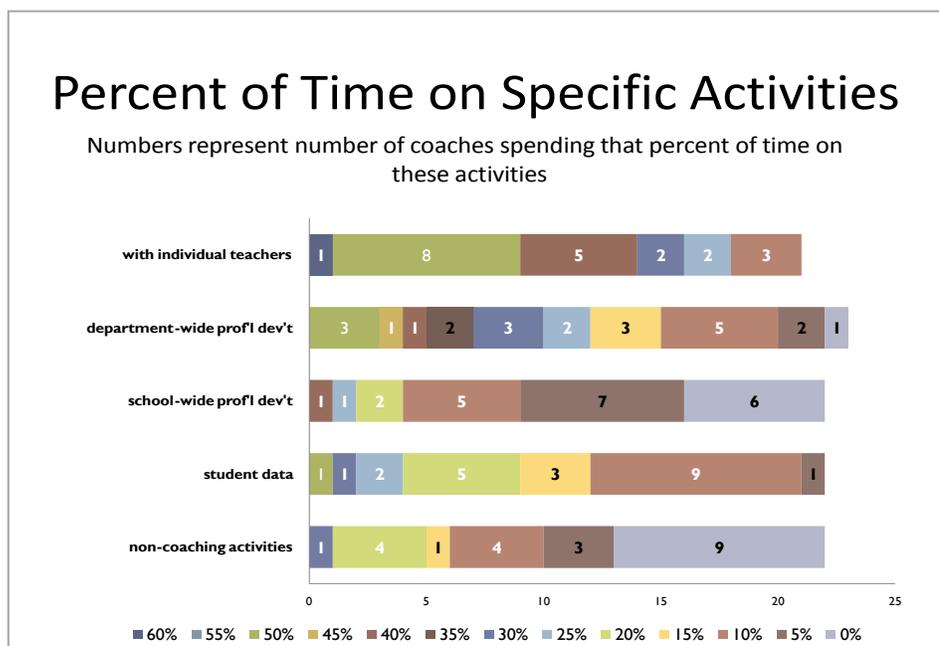
Suggestions on how to improve professional development were also requested. The suggestions received included the following:

- There should be more on coaching, less on content
- More time for group sharing of real examples
- Too many new people/non-coaches the second year
- Summer sessions were too long
- Try video conferencing
- More organization around specific assignments

B. Identification of Changes in Teacher Instruction Related to Mathematics Coaching Activities

In order to receive a broad-based response to this question, information was collected through surveys of coaches, administrators, and teachers. These survey results will be discussed by the data collected from each group. The coaches spent various amounts of time on specific activities. These activities included working with instructional teachers, department-wide work, school-wide work, student data, and non-coaching activities. During 2008-09, half of the coaches reported working individually with teachers.

Figure 8: Math Coaches Self Evaluation of Percent of Time on Coaching Activities during 2008-09



Year two coaching successes included:

- Creating student-centered classrooms
- Implementing new standards, curricula, and formative assessments
- Overcoming teacher resistance, getting schools to cooperate with each other
- Intense work with individual teachers, either new to math or on probation
- Building bridges between math and Career and Technical Education (CTE)
- Being a catalyst for common learning communities
- Having real acceptance as a math resource
- Working with special education teachers

Year two coaching challenges included:

- Not having the role of coaches defined by OSPI prior to the start of the 2007-08 school year
- Splitting time among multiple schools
- Working with teachers nervous about new practices
- Getting into classrooms to observe
- Resistance to coaching from secondary teachers
- Slow rate of change inherent in the system
- Working with incredibly busy teachers
- Teaching administrators about coaching
- Deep misconceptions about what matters in math

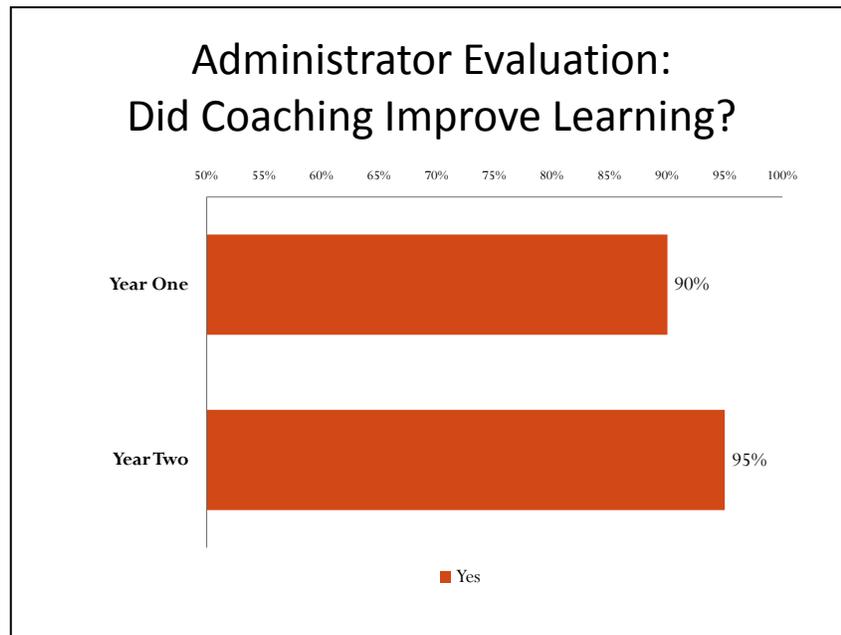
Administrator Evaluation

At the end of year two, administrators were selected to complete a survey reflecting their perspective on the coaching program. The administrators who completed the survey were those whom coaches acknowledged as either their supervisors or those who were most knowledgeable of the program. This number varied for each school. Forty-three administrators or 75 percent responded, representing 20 districts. All questions asked had positive and negative ratings. Any graph reflects only options where a response was given by at least one administrator.

Administrators were asked a series of questions related to the effect coaching had on teaching, improving curriculum, student learning, and professional learning communities, in order to assess their perspectives of the coaching program. Additional questions were asked regarding observed changes in student learning and evidence of impact they had to verify this. These questions will be taken one by one, with ratings given for each.

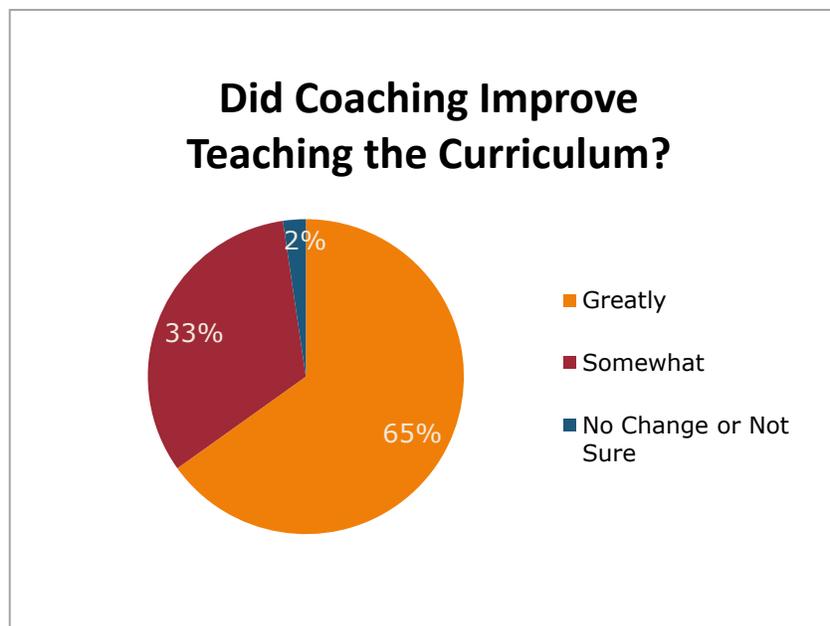
Ninety-five percent of the administrators reported in the second year that coaching improved learning compared with 90 percent in year one of the program.

Figure 9: Administrator Evaluation on Improved Student Learning during 2007-08 and 2008-09



When asked how the administrator observed changes in student learning, the following responses were given: observed through conversations with teachers, classroom observations, conversations with coaches, and improved student grades. Most felt it was “too early to tell” whether the coaches’ work improved WASL scores.

Figure 10: Administrator Evaluation on Improved Teaching of Curriculum during 2008-09



Sixty-five percent of the administrators in 2008-09 responded that coaching greatly improved the teaching of the curriculum, while another 33 percent indicated it somewhat improved the teaching of the curriculum.

Another area where administrators noticed coaching impact was on professional learning communities. Seventy-seven percent of the administrators surveyed, indicated coaches greatly improved the effectiveness of professional learning communities in the school. Another 21 percent indicated that these were somewhat improved. Two percent saw no change or were not sure of an improvement.

Figure 11: Administrator Evaluation on Improved Effectiveness of Professional Learning Communities during 2008-09



Administrators wrote of a number of positive changes they observed in their schools and among their teachers. Some of these changes included:

- Teachers are now more intentional about standards, assessments, and alignment of instructional materials to the standards.
- There is improved curricula alignment with state standards and improved alignment between grades and schools.
- The level of collaboration in the district improved.
- There is an increased focus on pedagogy with more hands-on instruction and more integration with other disciplines.
- Administrators were helped to understand what math teachers are trying to accomplish.

When asked for other evidence of impact coaches had on student learning, more comments were elicited. Other cited evidence of coaching impact included:

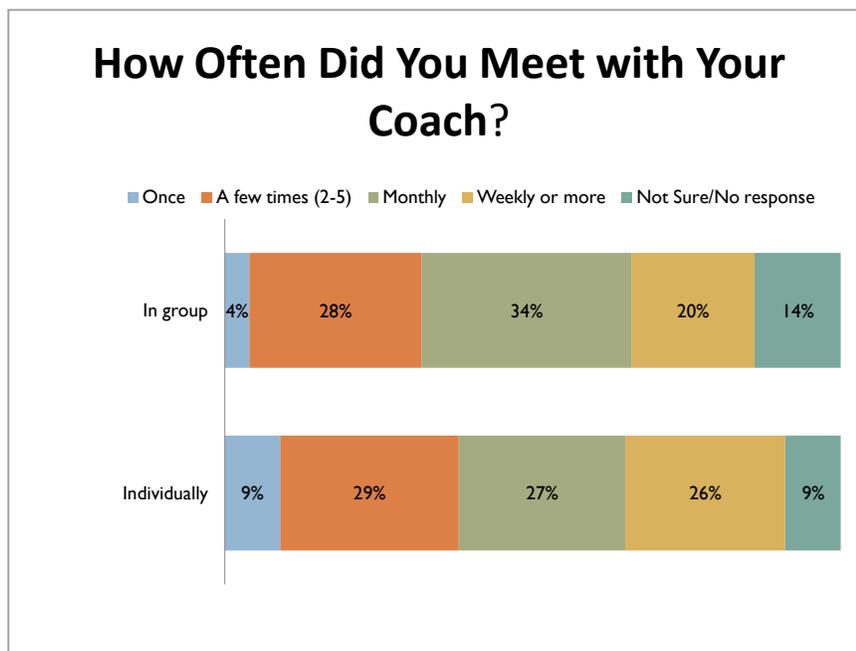
- The coach led curriculum review in some schools revealed that schools were not covering the essential learning of core standards.
- More emphasis was placed on finding evidence of student learning.
- Teacher-to-teacher conversations about math instruction were more frequent and focused.

Teacher Evaluation of Program

Teachers were likewise given an opportunity to evaluate the coaching program. The questions asked of teachers were similar to those asked of administrators to assess the coaching program. Teachers were asked about the amount of time they met with the coach, teaching adjustments made, evidence of classroom change from the coaching, and other benefits derived from this model of professional development. One hundred forty-two teachers, representing all of the OSPI-funded math coaches, responded to the survey.

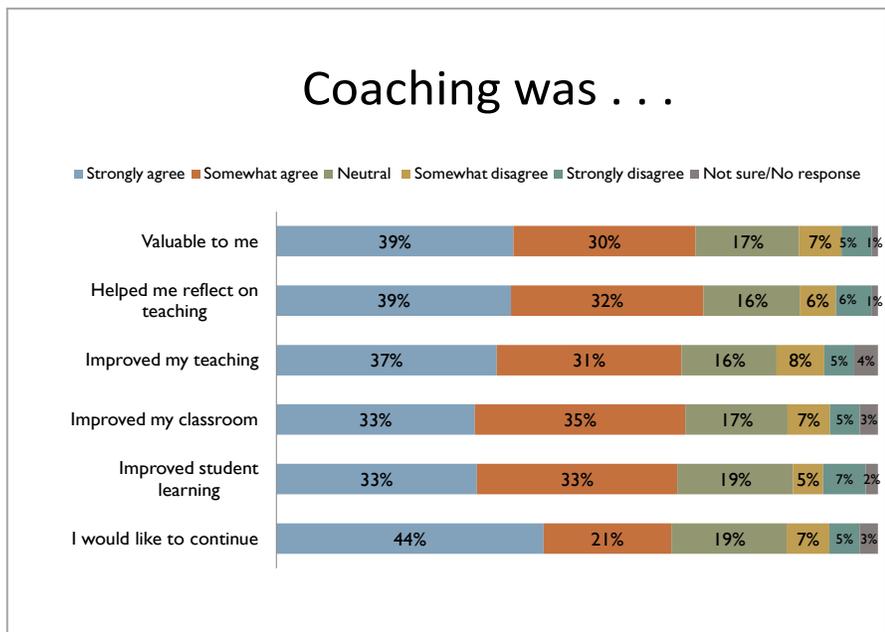
The graph below illustrates how often teachers met with coaches. Over half of the teachers reported meeting monthly, weekly or more, both individually and in groups with their math coach.

Figure 12: Teacher Evaluation of Coach Contact Time during 2008-09



Teachers were asked to what extent they agreed/disagreed with statements about coaching and its relationship to their practice. Positive ratings (strongly agree and somewhat agree) of over 60 percent were found on all statements.

Figure 13: Teacher Evaluation of the Value of Coaching during 2008-09



Both positive and critical responses were noted about teacher-coach interactions. The positive comments most frequently reported were that the coaches:

- Provided grade appropriate materials
- Helped create assessments
- Helped with student management ideas
- Helped with lesson ideas/curriculum planning
- Provided research and resources
- Provided curriculum alignment
- Provided data analysis

For those who wrote critical responses, the comments indicated that the coaches were largely not connected to individual classrooms. These were individual comments and spoke to the desire of the teacher to have the coach more involved in the classroom.

Teachers cited coaches as having helped them make positive changes in the classroom. All of their comments communicate a deeper understanding of the pedagogy of teaching and the use of data to inform instruction. Specific comments included:

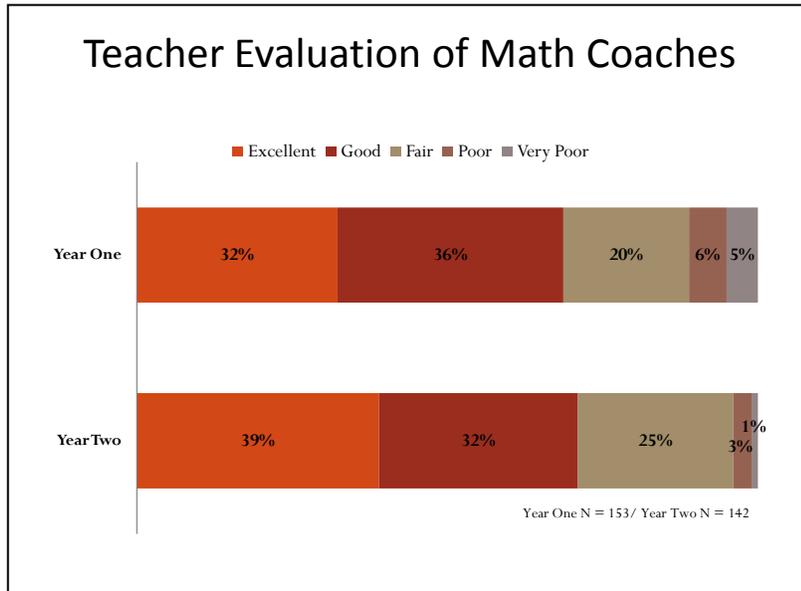
- “Now I can break down a lesson to meet different learning needs.”
- “I better address all learners.”
- “I’m more aware of concept development.”
- “I have better interaction with students.”
- “I’m using data to drive instruction more.”
- “I’m using higher level questions.”

An improved classroom environment was also referenced as something impacted by the coaching. Teachers noted that their classrooms were much better places for students; more students were on task and engaged; they were better organized; used better questioning techniques; and they had more time to work with students individually. Many revealed that there was better alignment between course content, assessment, and standards. Forty-five teachers cited better test responses as evidence of change in student learning. Better homework performance was mentioned by 23 teachers. The most compelling evidence of change mentioned by 81 teachers was that students offered better classroom responses. Other responses communicated that students had a better attitude toward the subject, giving it greater effort and more thought.

C. Satisfaction Level with Mathematics Coaching Activities as Experienced by Classroom Teachers and Administrators

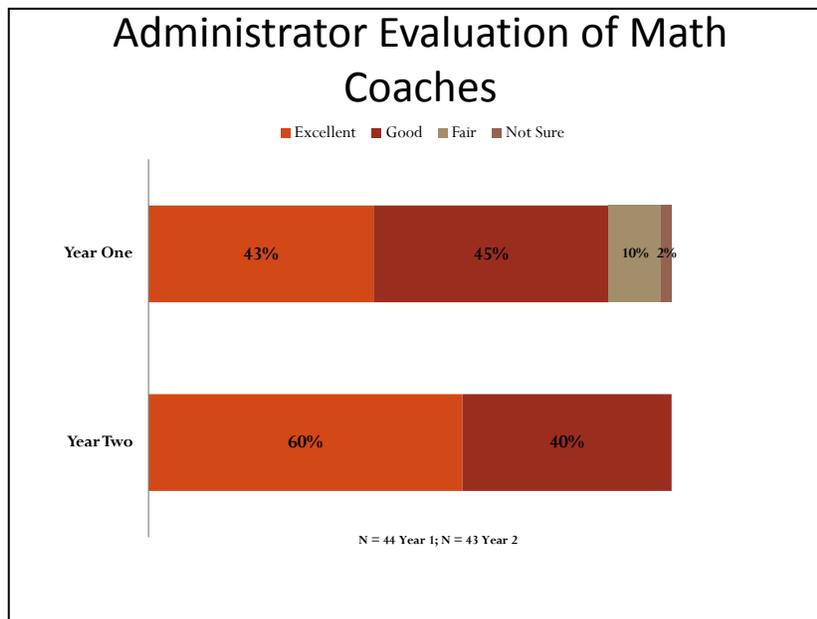
The legislature requested information on how satisfied classroom teachers and administrators were with the coaching program. The positive rating (excellent or good) given by teachers in year one of the coaching program was 68 percent, while in year two, the positive ratings increased to 71 percent. Conversely, the negative rating (poor or very poor) decreased from 11 percent in year one to 4 percent in year two. There were 153 teachers who responded to the survey in year one compared with 142 teachers who responded in year two.

Figure 14: Teacher Evaluation of Overall Math Coaching Effectiveness during 2007-08 and 2008-09



The positive administrator rating increased from 88 percent in the first year to 100 percent in the second year. Previous comments relate the reasons for these high approval ratings. The survey feedback confirms evidence of positive impact the mathematics coaching program had on schools and districts.

Figure 15: Administrator Evaluation of Overall Math Coaching Effectiveness during 2007-08 and 2008-09



III. Process and Findings for Evaluation of Science Coaches

The science instructional coaching program began with the 2008-09 school year as directed by legislation. This part of the report differs from the mathematics summary because of several factors. One factor included making drastic cuts to legislated programs in order to balance the budget which was under tremendous strain from the economic crisis that affected the nation and the state at the end of the 2008-09 school year. Due to these cuts, no formal overall evaluation of the program was performed.

Fortunately, as part of the state-provided professional development for the science coaches, OSPI was able to contract with the North Cascades and Olympic Science Partnership (NCOSP) based out of Western Washington University (WWU). WWU utilized the services of Dr. Dan Hanley to write an evaluation report on the professional development component of the science coaching program as part of their professional development process. Evaluation tools included surveys at the end of each seminar, interviews of all science coaches at the beginning and end of the school year, and quarterly reviews of coaches' weekly activity logs. Because of this perspective, information on the satisfaction level with coaching activities as experienced by classroom teachers and administrators will not be addressed in this report. The remaining findings on professional development and subsequent input on teacher instruction as perceived by the coaches will be addressed.

Evaluation of Professional Development of Science Coaches

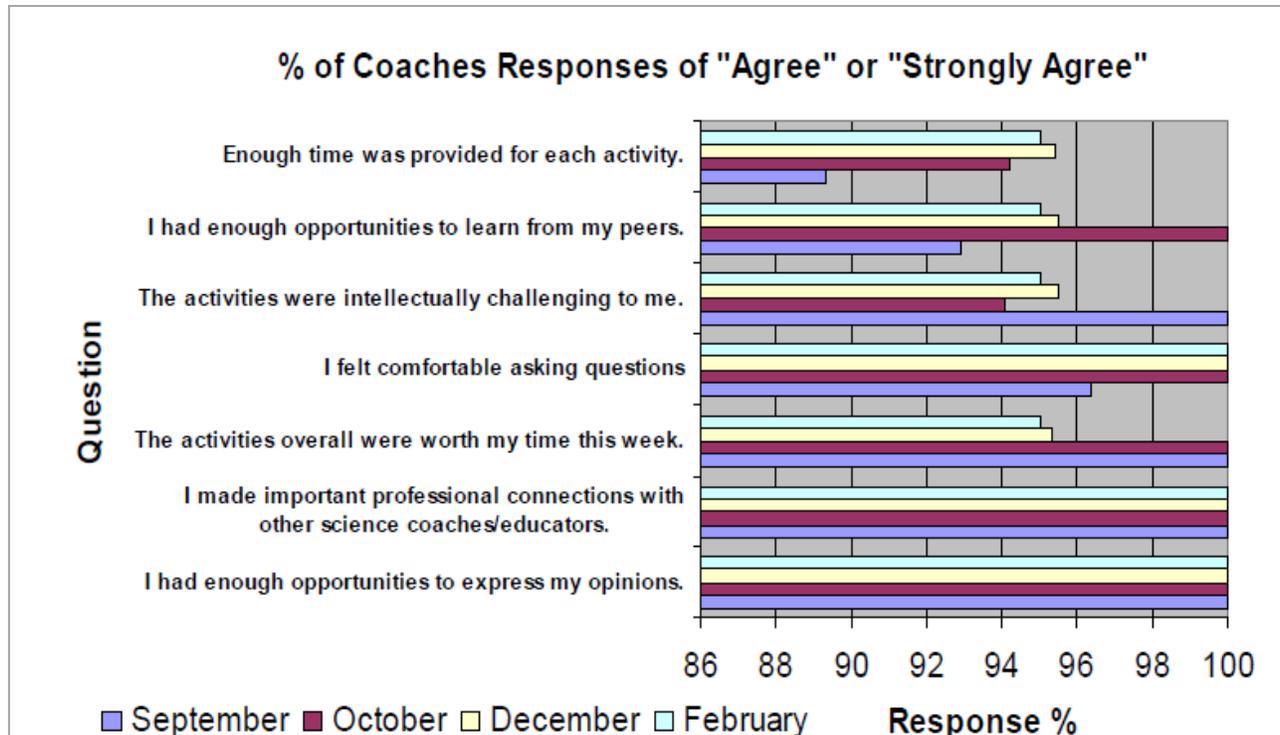
This section reports findings from the NCOSP evaluation throughout the 2008-09 school year of the science coaches' professional development. Professional development activities for the science coaches included a six-day Summer Academy in August 2008, developed and conducted by NCOSP, and four two-day seminars during the school year developed and conducted by Shannon Warren of NCOSP, and Tara Richerson, science specialist from OSPI. Evaluation activities during the school year included surveys at the end of each seminar, interviews of all science coaches at the beginning and end of the school year (conducted by Dan Hanley), and quarterly reviews of coaches' weekly activity logs.

Professional Survey Results

Surveys were administered to science coaches at the end of each seminar. The surveys included indicators to measure the quality of the professional development. The figure below illustrates the coaches' perceptions of professional development quality for each seminar, which was consistently high.

Lower ratings in September on some indicators received higher ratings in subsequent seminars. Over 90 percent of the respondents gave positive ratings (good or excellent) to their “overall experience” of the two-day seminars when surveyed at the end of each semester. Even higher positive ratings (96 percent) were expressed for the Summer Academy in August 2008.

Figure 16: Evaluation of Professional Development by Science Coaches



At individual interviews at the end of the year, science coaches discussed the things covered in professional development that had the greatest impact on their efforts to help teachers improve their science instruction. Topics that multiple coaches (n=6 or more) mentioned were:

- Everything covered was helpful. The modules were research based, modeled well, and introduced at appropriate times.
- Assessment and use of data through formative assessment, formative assessment probes, and Looking at Student Work Protocols.
- NCOSP tools, such as the Student Classroom observation Guide (SCOG), the Supporting Student Success Guide (SSSG), and the Professional Learning Communities Observation Protocol (PLCOP) were guides that helped them and their administrators and understand important elements of effective science instruction and collaboration.
- Readings about the various coaching roles helped them think about their roles and the work they should be doing.
- Professional development on standards-based grading
- Main elements of professional learning communities.

The professional development on the use of technology had mixed responses. Of the eight who commented on this section of the professional development, half of them reported that it was something new to share with teachers to keep them engaged and excited. The other half felt that the amount of time spent on technology was not adequate enough to learn how to fully apply the technologies in the classroom.

Identification of Changes in Teacher Instruction Related to Coaching Activities

Thirty-minute interviews with 28 out of the 29 state-funded science coaches were conducted between May 19 and April 6, 2009. These interviews focused on their work as a science coach during the 2008-09 school year and their perceived impact on teachers. As part of the analyses of the coaches' interview data, they were placed into high, medium, and low impact groups. Their placement was determined by their descriptions of their work during the school year with the acknowledgment that the emphasis of their training was on coaching through professional learning communities, their comments about the impact they had on the teachers they supported, and the breadth of their impact given the large number of teachers many coaches supported. Based on the effectiveness of their work through professional learning communities, six coaches were sorted into the high impact group, 18 fell into the medium impact group, and four coaches were in the low impact group.

The six science coaches sorted into the high impact group targeted their improvement efforts in three primary areas:

- Developing professional learning communities of teachers collaborating within and sometimes across, school buildings;
- Working with teachers to examine aligning curricula in light of the standards, eliminating topics that do not correspond to the standards, and finding gaps in curricula that do not address the standards; and,
- Working with teachers to develop or incorporate common assessments connected to the main learning targets and standards and to use formative assessment data from their classrooms to inform instruction.

The high impact coaches used interpersonal skills to help understand teachers' thinking about science teaching and learning in order for them to be more receptive to working with a coach to improve their classroom practice. They had highly effective professional relationships with teachers and focused their work on student learning and made it clear that their role was not administrative or evaluative. The use of tools helped focus professional learning communities work on student learning. Coaches were highly effective when: 1) their work was clearly focused on improving student learning, 2) they used student data as a vehicle for talking about changes to teachers' instructional practices, and 3) their improvement efforts targeted groups of teachers in professional learning communities.

In contrast, the low impact coaches: 1) spent a majority of their time working with individual teachers by sharing instructional materials and resources and focusing on changing instructional practices rather than improving student learning; 2) had difficulty overcoming teachers' resistance to their help because they worked individually with teachers rather than in professional learning communities, and 3) did not have clearly defined roles or goals for themselves or the teachers they intended to support.

Medium impact coaches had similar work priorities as high impact coaches. However, they spent more time with individual teachers and it took longer to establish working relationship with the larger group. Their impact was not as broad across all the science teachers in the school they supported. It took these coaches a longer time to define their role as neither administrative nor evaluative. Additionally, when coaches worked individually with teachers, pre-existing interpersonal factors played a larger role in determining the nature of the working relationship than when coaches worked with teachers in professional learning communities, which have less of an individual focus and often include norms to guide interactions.

Year-end data from the evaluation of professional development components for state science coaches revealed that coaches established effective professional relationships with teachers through several means, including:

- Helping teachers clearly understand the role of a science coach and the benefits they could expect from their work with a coach.
- Working with teachers in professional learning communities that used student data as the primary vehicle for talking about changes to teachers' instructional practices.
- Focusing their work with teachers explicitly on improving student learning.

IV. Characteristics of Instructional Coaches

A fourth area in which the legislature requested information included the characteristics required of coaches. In the Interim Report, produced by the Social and Economic Sciences Research Center, a full description of coaching was outlined. Included in that document are descriptions of the tasks of coaches, why coaching provides effective professional development, qualities of a good coach, and what makes a coaching program successful.

The job of the coach varied greatly from school to school. Consequently, it would have been difficult to delve into the specific requirements needed for each position. The sample size of state-funded math and science coaches was too small to have findings of any significance. Hence, in an attempt to respond to this particular request, OSPI turned to broader research on instructional coaching, in general. Specifically, OSPI used materials from the Center for Strengthening the Teaching Profession (CSTP), which was part of the professional development modules that mathematics coaches were exposed to during their first summer institute.

Instructional coaching is a method of embedding professional development within a school or district. Coaches provide support for instructional improvement by working closely with all members of the school community. They build the relationships and trust necessary to support and sustain change. Activities that are often required of coaches are the facilitation of professional development of teacher content knowledge; pedagogical content knowledge; instructional alignment; development of leadership skills in others; and the use of assessment data within Professional Learning Communities or with individual teachers to focus and improve instruction. The means by which these tasks are accomplished can vary from school to school.

With the responsibility of increasing student achievement through coaching activities, effective coaches must possess characteristics that prepare them for their role. The two factors that must be recognized in selecting and recruiting highly effective coaches are teaching experience and wide-spread recognition of leadership skills.

To serve in this role, instructional coaches must have a set of professional qualities that reflect their role. They need to have a belief that all staff seek to make a positive difference in their students' education and have a capacity and desire for growth. They must be lifelong learners who are reflective about their practice and hold high positive expectations for themselves and others.

Effective interpersonal communication skills are also paramount to building rapport, as well as collaborative working groups, reflective practices, and conflict resolution. Successful coaches must develop a safe environment, listen compassionately, and hold positive, open and honest conversations with stakeholders. Coaches must also work through resistance to change, manage conflict effectively, and respect confidentiality while maintaining a non-evaluative role. These interpersonal communications are most effective in changing student learning when focused on developing professional relations with teachers. These relationships are built within a collaborative framework that focuses on the use of data collected from student work.

Coaches have technical expertise as well. They understand standards-based education, can apply research/theory into practice, have knowledge of the state assessment system, develop differentiated learning experiences based on diverse student needs, and model student-centered and highly engaged instruction. An effective coach possesses knowledge and skills in research-based instructional strategies, professional development, and in coaching.

V. Conclusion and Recommendations

The 2007-2009 Mathematics and Science Coaching Program was created to investigate coaching models around mathematics and science, similar to the program currently existing in reading. Two years is a very limited time to show an impact on student learning of mathematics (one year in the case of science). Despite the short timeframe of implementation, there were indications that coaches were making an impact on teacher practices, as well as changing the culture of mathematics and science work within professional learning communities and in the classroom.

The mathematics coaching evaluations reflect program growth in effectiveness and satisfaction based on survey results received from year one and year two. The mathematics coaches communicated the quality of the professional development they

received (as part of the state-supported coaching program) improved from year one to year two, with the greatest progress shown in the August Institute. Increases were also noted in professional development. Coaches also gained content knowledge which could be used for coaching and for teaching in the classroom.

The positive rating (excellent or good) of teachers for year one of the coaching program was 68 percent. In year two, the positive ratings increased to 71 percent. Conversely, the negative rating (poor or very poor) decreased from 11 percent in year one to 4 percent in year two. Teachers cited coaches as having helped them make positive changes in the classroom. All of their comments communicate a deeper understanding of the pedagogy and the use of data to inform instruction. Teachers believed working with a mathematics coach improved their teaching, improved student learning, and was something that must be continued.

The administrators' positive ratings increased from 88 percent in the first year to 100 percent in the second year. Administrators gave very high approval ratings in the mathematics coaches' abilities to improve student learning, teaching of curriculum, and effectiveness of the professional learning communities.

The science coaching professional development evaluation data shows that there are clear differences in the strategies used by coaches that are considered to be highly effective, based on changes in teacher instructional practices that focus on improving student learning. The highly effective coaches accomplished this by following a clear focus on improving student learning using student data as a vehicle for talking about changes to teachers' instructional practices; and improvement efforts targeted to groups of teachers in professional learning communities. Professional development programs should help instructional coaches develop their knowledge and skills in these areas that foster strong professional relationships with teachers.

Administrators concluded that the state-funded coaching program was very beneficial. They also believed it would be difficult to continue the coaching program if required to use existing district and/or building funds. The 2009 legislative session did continue the coaching program an additional two years, but on a greatly reduced scale. Only nine mathematics and nine science coaches will be working with their districts during the 2009-11 school years.

Given the resources that have been invested at the state level to develop this much needed leadership coaching capacity within the mathematics and science communities, it is critical for OSPI and other statewide partners to consider ways to sustain the high level professional development and state support of science and mathematics coaching in Washington State.

It is important those leaders continue to receive support and feel connected to a statewide system moving towards continued improvement of high quality teaching and learning in mathematics and science. OSPI is currently exploring ways to collaborate with others in the field of building mathematics and science leaders, as a way to integrate and join efforts as the state faces increased budget deficits.

VI. Bibliography

Dan Hanley, Ph.D., Program Evaluator, North Cascades and Olympic Science Partnership, Western Washington University, *Evaluation Report on the Professional Development Component of the Washington State Science Coaching Program from August 2008 - June 2009.*

Center for Strengthening the Teaching Profession; *Improving Instruction through Coaching.* June, 2007.

Social and Economic Sciences Research Center – Kyra Kester and Candiya Mann, *2008 Mathematics Instructional Coaching: Interim Report to the Legislature.*

VII. Appendices

Appendix A: Survey of Math Coaches

Appendix B: Survey of Math Teachers

Appendix C: Survey of Administrators participating in Math Coaching Grant

2009 Math Coaching Program Coach Web Survey

1. Had you received training on math coaching prior to the 2008-2009 OSPI math coach trainings?
2. What organization or school provided your previous math coach training?
3. Have you ever received training to be an academic coach of a subject other than math?
4. What organization or school provided the academic coach training?
5. Had you served as a math coach prior to your involvement in OSPI's math coach program?
6. How long were you a math coach prior to OSPI's math coach program?
7. Have you served as a coach in any other academic subject?
8. In which academic subjects (other than math) have you served as a coach?
9. How long did you serve as a coach in academic subjects other than math?
10. Please answer the following:
 - a. Have you had a coach assist you in your teaching previously?
 - b. Do you have an endorsement in secondary mathematics?
 - c. Do you have an elementary certification?
 - d. Do you have an elementary certification with a minor in mathematics?
 - e. Do you have a bachelor's degree in mathematics?
 - f. Do you have an advanced degree in mathematics?
 - g. Do you have an advanced degree in math pedagogy?
 - h. Do you have National Board certification in math? (AYA)
 - i. Do you have National Board certification in math? (EA)
11. How many years' experience do you have teaching math in a K-12 school?
12. What levels of K-12 math have you taught?
13. What levels of college math have you taught?

Professional Development

14. How would you rate the following areas? Describe your experience:
 - a. Professional development
 - b. The August Institute (summer professional development)
 - c. Ten day training follow-up after the Institute
 - d. Training content
 - e. Facilitators
 - f. Materials provided
15. If one or more facilitators seemed particularly effective, please identify them and describe what was effective. If not, please leave this question blank.
16. If one or more lessons or topics proved particularly effective, please identify it and describe what was effective. If not, please leave this question blank.
17. To what extent do you agree with the following statements? The professional development:
 - a. Met my expectations
 - b. Provided information I used in coaching in 2008-09
 - c. Provided information my teachers used in their classrooms in 2008-09
18. In your opinion, what was the most valuable part of the professional development in 2008-09?
19. What did you consider the least valuable part of the professional development in 2008-09?
20. How do you think the professional development could be improved?
21. If you are a second-year coach, how did the professional development of 2008-09 compare to the professional development offered in 2007-08?
22. Do you have any additional comments about the professional development?

Your Coaching

23. In your role as a coach in 2008-09, what percentage of your time was spent in each of the following activities:
- a. Working with individual teachers:
 - b. Department-wide professional development:
 - c. School-wide professional development:
 - d. Student data interpretation:
 - e. Non-coaching activities (i.e. substitute teaching/student advising)
24. For how many buildings are you providing coaching?
- a. Elementary
 - b. Middle
 - c. High
25. How many teachers did you coach individually in 2008-09?
- a. Elementary
 - b. Middle
 - c. High
26. Below, please provide the number of teachers you coached who fit each category. Among the teachers you coached individually, how many do you think were....
- a. Early career (fewer than 5 years experience)
 - b. Mid career (5-10 years experience)
 - c. Experienced teachers (11-15 years experience)
 - d. Senior teachers (16 or more years experience)

Coaching Program

27. Please rate your experience in OSPI's 2008-09 Math Coach Program. How would you rate the following?
- a. Your overall experience as a coach in OSPI's 2008-09 math program.
 - b. OSPI's support of the math coach program.
 - c. Communication from OSPI: How clear was the purpose of coaching?
 - d. Communication from OSPI: How clear was your role as a coach?
 - e. Overall, your district's understanding of the purpose of coaching.
 - f. Your supervisor's understanding of the purpose of coaching.
 - g. Your coaches' (the teachers you coached) understanding of the purpose of coaching.

28. Describe your greatest coaching success in 2008-09:
29. Describe your greatest coaching challenge in 2008-09:
30. Does that challenge remain?
31. Were you a coach last year (in OSPI's math coach program)?
32. Last year, were you a coach in the same district?
33. Last year, were you a coach in the same school(s)?
34. Last year, did you coach teachers with the same grade level(s)?
35. Compared to your first year of coaching, do you think your coaching improved?
36. How do you think your coaching improved?
37. As a result of your coaching, did you observe any of the following?
 - a. Teachers using coaching information
 - b. Curriculum improvements
 - c. Improved classroom pedagogy
 - d. Assessment improvements
 - e. Improved student engagement
 - f. Increased engagement in professional learning communities
38. Will your school or district continue the math coaching program in 2009-10?
39. In the next school year, do you plan to make any changes in the way you coach?
40. How do you expect your coaching to change?
41. If a statewide math coaching program is offered in the future, do you have any suggestions for changes and/or improvements?
42. Do you have any other comments you would like to share about your experience with OSPI's math coach program?

2009 Math Coach Program Teacher Web Survey

1. What is your overall opinion of the 2008-09 math coach program in your district?
2. How many years have you been teaching?
3. How many years have you been teaching math?
4. Do you have a secondary math endorsement?
5. For how much of the school year did you receive coaching?
6. How many times did you meet with your coach in 2008-09? (Estimates are fine.)
 - a. Individually?
 - b. In a group setting (such a coaching workshop?)
7. Who explained the purpose of coaching to you? (Please mark all that apply.)
 - a. No one
 - b. OSPI
 - c. Your district/building administration
 - d. Your local ESD
 - e. Your math coach
 - f. Not sure
 - g. Other (please specify)
 - h. If you selected other, please specify
8. Are you aware of the difference between mentoring and coaching for teachers?
9. How would you characterize the kinds of interactions you had with your coach? (Please mark all that apply.)
 - a. Coaching
 - b. Content development
 - c. Mentoring
 - d. Other (please specify)
 - e. If you selected other, please specify

10. To what extent do you agree/disagree with the following statements?
 - a. Receiving coaching was valuable to me.
 - b. My coach helped me to reflect upon my teaching.
 - c. Receiving coaching has improved my teaching.
 - d. My involvement in the coaching process has resulted in changes in my classroom.
 - e. Coaching-based changes have improved student learning in my class(es).
 - f. I would like to continue working with a math coach next school year.
11. You indicated that your involvement in the coaching process has contributed to changes in your classroom. How would you characterize these changes?
12. You reported that being coached has improved student learning in your class(es).
Which indicators of improved student learning have you observed?
(Please mark all that apply)
 - a. Better test responses
 - b. Better homework performance
 - c. Better classroom responses
 - d. Better WASL performance
 - e. Other
13. Will your school continue coaching next year?
14. How much time do you expect to spend with your coach next year?
15. Compared to the coaching you received in the 2008-09 year, do you expect the coaching activities to change in the next school year?
16. What would you most like to change in the coaching you receive next year?
17. If a statewide math coaching program is offered in the future, do you have any suggestions for changes and/or improvements?
18. Do you have any other comments you would like to share about your experience receiving math coaching in 2008-09?

2009 Math Coach Program Administrator Web Survey

1. What is your overall opinion of OSPI's 2008-09 math coach program?
2. In your opinion, did the math coach program create positive changes, negative changes, or no change in your district?
3. How did the math coach program affect the following elements of your district?
 - a. Teaching
 - b. Curriculum
 - c. Student Learning
 - d. Professional learning community
 - e. Other changes due to coach program
 - f. Please specify the other changes
4. You indicated that the math coach program has led to changes in your district. How have you observed these changes? (Please mark all that apply)
 - a. Improved student grades
 - b. Improved WASL scores
 - c. Changes apparent in classroom observations
 - d. Changes apparent in conversations with teachers
 - e. Changes apparent in conversations with coach(es)
 - f. Other (please specify)
5. Do you have any other comments about changes in your district caused by the math coaching program?
6. In the 2008-09 math coaching program at your district, were the following elements a major challenge, minor challenge, or not challenging at all? (Please note: This question focuses on challenges in the 2008-09 school year. You will have the chance to comment on challenges to next year's program later in the survey.)
 - a. Funding and sustainability
 - b. Finding the right person to be the coach
 - c. Developing teacher interest
 - d. Sustaining teacher involvement
 - e. Finding time for coaches and teachers to meet
 - f. Demonstrating measurable results
 - g. Continual changes in math standards
 - h. Other challenge
 - i. Please specify the other challenge:
7. Will you retain a math coaching program next year?

8. How are you planning to support next year's math coaching program financially?
(Please mark all that apply)
 - a. State funding
 - b. Federal funding
 - c. Grant funding
 - d. Levy or local funding
 - e. Not sure
 - f. Other (please specify)
9. Will you change the math coaching program in any substantial way?
10. What changes are you planning for next year's math coaching program?
 - a. Non-coaching responsibilities for the coach
 - b. Amount of time for coach and teacher to meet
 - c. Number of teachers involved
 - d. Number of coaches
 - e. Other
 - f. Please specify the other change:
11. Why will your district not be continuing a math coaching program next year?
(Please review the list below and indicate the order of importance as they apply.
For those that do not apply, please leave them blank.)
 - a. Lack of funding
 - b. Lack of appropriate staff to be a coach
 - c. Lack of teacher involvement
 - d. Lack of results
 - e. Other
 - f. If "other" please specify:
12. Why would your district not be continuing a math coaching program next year?
(Please review the list below and indicate the order of importance as they apply.
For those that do not apply, please leave them blank.)
 - a. Lack of funding
 - b. Lack of appropriate staff to be a coach
 - c. Lack of teacher involvement
 - d. Lack of results
 - e. Other
 - f. If "other" please specify
13. Were you provided with any information on how to evaluate the performance of a math coach?

14. Who provided you with information on how to evaluate a coach? (Please mark all that apply.)
 - a. OSPI
 - b. Your local ESD
 - c. Math coach
 - d. Other
 - e. Not sure

15. If a statewide math coaching program is offered in the future, do you have any suggestions for changes and/or improvements?

16. Do you have any other comments you would like to share about your experience with OSPI's math coach program?

Office of Superintendent of Public Instruction
Old Capitol Building
P.O. Box 47200
Olympia, WA 98504-7200

For more information about the contents
of this document, please contact:
Greta Bornemann, OSPI
E-mail: greta.bornemann@k12.wa.us
Phone: (360) 725-0437

To order more copies of this document,
please call 1-888-59-LEARN (1-888-595-3276)
or visit our Web site at <http://www.k12.wa.us/publications>

Please refer to the document number below for quicker service:
09-0039

This document is available online at:
<http://www.k12.wa.us/>

This material is available in alternative format upon request.
Contact the Resource Center at (888) 595-3276, TTY (360) 664-3631.



Office of Superintendent of Public Instruction
Old Capitol Building
P.O. Box 47200
Olympia, WA 98504-7200
2009