Mathematics and Science Partnership

A Program Evaluation
Year 2 Progress Report

Prepared for the
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Members of *The* **BERC** *Group* have K–20, experiences as teachers, counselors, psychologists, building administrators, district administrators, and college professors. The team is currently working on research and evaluation projects at the national, state, regional, district, school, classroom, and student levels in over 400 schools in Washington State and nationally.

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Executive Summary

The purpose of this report is to provide summative feedback to personnel at the Office of Superintendent of Public Instruction about the professional development provided to the teachers in Cohort 1 and 2 of the Mathematics and Science Partnership (MSP) during Year 2 of the project. The intent of the MSP competitive grant program in Washington State is to encourage institutions of higher education, educational service districts, local school districts, and individual schools to collaborate around professional development activities that increase the subject matter knowledge and instructional skills of science, mathematics, and technical education teachers. The development of teachers' content knowledge and instructional skills is intended to impact student academic achievement in science, mathematics, content area reading, and technical writing. Professional development activities are designed to be sustainable, intensive, classroom focused, and aligned with state and local standards in mathematics and science. These activities are designed for demonstrable and measurable improvement in student academic performance in mathematics and science, particularly for underrepresented student populations. Although this evaluation aims to report on the development of knowledge and skills of teachers in Washington State, the primary focus is to document and monitor the development of *in-depth content knowledge for teaching*. Therefore, the primary intent of the state-level evaluation is to determine the impact of MSP efforts on actual teaching practices.

The evaluation utilized a multiple measures, mixed methodology approach. The evaluation design focused on five areas of inquiry:

1. To what extent does teacher subject area knowledge change over time?
2. To what extent do teacher skills and practices change over time?
3. To what degree can changes be attributed to the professional development provided in each region?
4. Are there regional practices that emerge as highly effective (promising practices)?
5. What is the role of the college and university staff members, and how do they benefit from the partnership?

In order to answer these questions, researchers gathered a variety of qualitative and quantitative data, including teacher interviews, student achievement data, OSPI documents/materials, and internal regional evaluation reports. In addition, the *STAR Classroom Observation Protocol* was utilized to quantify classroom practices. Overall, 132 people participated in evaluation activities. Classroom observations were conducted in 105 math and science classrooms.

The Washington State MSP project provided funds to five different regional programs throughout the state. Each region developed its own model for delivery of professional development and program activities. Each regional MSP structured professional development activities to meet the unique needs of its members, and each region experienced various levels of success during Year 2 activities. Promising practices identified in Year 2 included utilizing effective professional development models, developing partnerships at multiple levels, and fostering sustainability.

Each region monitors changes in subject area knowledge through various qualitative and quantitative methods, including surveys, reflection activities, workshop evaluations, and interviews. For this evaluation, teachers rated the MSP program for its effectiveness for increasing content knowledge and instructional skill (1 to 10 scale, 1 being the worst ever and 10 being the best ever experienced). Regional responses for increasing content knowledge during Year 2 ranged from 5.05 (PRiSSM) to 7.72 (WWU), and the project average was 6.86. Regional responses for increasing instructional skill during Year 2 ranged from 6.67 (ESD101) to 8.7 (PRiSSM), and the project average was 7.45. Self-reported content knowledge and instructional skill ratings increased from Year 1 to Year 2 in each region that participated for 2 years.

Researchers utilized the *STAR Classroom Observation Protocol* to quantify practices in 105 classrooms across the state. The purpose of the observations was to determine the extent to which the Essential Components of Powerful Teaching and Learning were present. The type of teaching identified as *Powerful Teaching and Learning*, and correlated with student achievement in the state of Washington, was observed in 24% of the 70 classrooms during Year 1 and in 33% of the 105 classrooms during Year 2. All regions improved their overall STAR performance from Year 1 to Year 2, and all the MSP regions outperformed the state average in Year 2.

The Year 2 MSP promising practices vary from region to region, but all share several common features. These features include utilizing effective professional development models, developing partnerships at multiple levels, and fostering sustainability. Several regions in the MSP share similar professional development approaches, but each one varies to meet local needs. Despite regional differences, all MSP regions recognize the need to create sustainable programs that partner effectively with higher education and community organizations. Many participants described the role of MSP's higher education partners as one of organizer, facilitator, or researcher. However, some teachers recognized the higher education partners as fellow participants, resource providers, and networking liaisons. The community college and university faculty that participate in the MSP as partners benefit from their participation by staying connected to the K-12 environment and by building a collaborative K-16 network. The role of higher education partners as fellow participants was not an expectation of the MSP program, but appeared to develop in a cooperative environment where the professional development topics could benefit teachers at all levels.

At the end of Year 2, Washington State's MSP programs are making progress toward their unique partnership and professional development goals. Each region follows a cycle of continuous improvement to address shortcomings and to capitalize on discoveries. Each region has continued to define and redefine the role of their partners and has worked to build capacity for K-16 sustainability. Areas of future focus involve collecting outcome measures to highlight the long-term value of this initiative for the various stakeholders. There are several important implications from this evaluation that apply to the MSP and to statewide professional development models in general. First, greater ownership of the program results in increased involvement among participants and non-participants alike. Secondly, the MSP may serve as an avenue to provide institutions of higher education the opportunity to become familiar with the present status of the K-12 classroom and state educational reform. Finally, involvement in the MSP provides opportunities for leadership development, especially when the program allows teachers to share their own content knowledge and instructional skill across a K-16 network.

Washington State Mathematics and Science Partnership

Year 2 Program Evaluation

"(W)e need to ***encourage children to take more math and science, and to make sure those courses are rigorous enough to compete with other nations.*** *We've made a good start in the early grades with the No Child Left Behind Act, which is raising standards and lifting test scores across our country.…If we ensure that America's children succeed in life, they will ensure that America succeeds in the world."*

President George W. Bush
2006 State of the Union Address

Introduction

The purpose of this report is to provide summative feedback to personnel at the Office of Superintendent of Public Instruction about the professional development provided to the teachers in Year 2 of the Mathematics and Science Partnership (MSP). The complete summary of the plan and evaluation design are included in the Year 1 report submitted in November 2005. There are five main evaluation questions:

1. To what extent does teacher subject area knowledge change over time?
2. To what extent do teacher skills and practices change over time?
3. To what degree can changes be attributed to the professional development provided in each region?
4. Are there regional practices that emerge as highly effective (promising practices)?
5. What is the role of the college and university staff members, and how do they benefit from the partnership?

The report begins by updating the OSPI support efforts into the national and state reform context. This introductory section is followed by a description of the evaluation design, evaluation findings, summary, and implications for ongoing MSP and statewide efforts.

A National Focus on Mathematics and Science Education

In his 2006 State of the Union address, President Bush requested support for the American Competitiveness Initiative, which seeks to support and improve mathematics and science instruction and learning by training 70,000 high school teachers to lead Advanced Placement courses and to provide early interventions to struggling students. This work complements other initiatives such as Academic Competitiveness Grants and the Mathematics and Science Partnerships.

One challenge to increasing student participation in additional math and science coursework relates to perceived need. In their 2006 report, *Are Parents and Students Ready for More Math and Science?*, Johnson, Arumi, Ott, and Remaley reported that parents are complacent about increasing their students' math and science education. These authors state, "Given the level of leadership anxiety about math and science education in the United States today, the number of parents who worry about whether local schools are teaching enough math and science has declined since the mid-nineties." Although parents support staying internationally competitive, they perceive that the amount of math and science their own children receive is about right.

Dr. William Wulf, President of the National Academy of Engineering, speaking before congress on Science, Technology, and Global Economic Competitiveness in 2005 said, "Unfortunately the problems we are concerned about don't have a Sputnik-like wake-up call." He presented his findings in *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* (2005) to the Science Committee, U.S. House of Representatives, and stressed the importance of improving K-12 mathematics and science education. A variety of statistics gathered from entities such as the Bureau of Labor Statistics and the National Center for Education Statistics indicate that despite an increased need for individuals trained in math and science globally, the United States will not be able to meet this demand.

National MSP Efforts

The Mathematics and Science Partnership program (Title II, Part B, of the *No Child Left Behind* Act) has its historic roots in these national reform efforts. It provides funds to states through a formula that takes into account student population and poverty rates. States are required to hold competitions and make awards to projects that improve the content knowledge of teachers and increase student learning in mathematics and science. In the first year of funding, the Department of Education used these funds to award over 340 grants. By 2006, nearly 600 MSP programs have been funded nationwide and in Guam and Puerto Rico.

The intent of the MSP competitive grant program in Washington State is to encourage institutions of higher education, local school districts, and individual schools to participate in professional development activities that increase the subject matter knowledge and instructional skills of science, mathematics, and technical education teachers. The development of teachers' content knowledge and instructional skill is intended to impact student academic achievement in science, mathematics, content area reading, and technical writing. Professional development activities are designed to be sustainable, intensive, classroom focused, and aligned with state and local standards in mathematics and science. These activities are designed for demonstrable and measurable improvement in student academic performance in mathematics and science, particularly for underrepresented student populations. Although this evaluation aims to report on the development of knowledge and skills of teachers in Washington State, the primary focus is to document and monitor the development of *in-depth content knowledge for teaching*. Therefore, the primary intent of the state-level evaluation is to determine the impact of MSP efforts on actual teaching practices.

The MSP program specifically partners school districts with higher education faculty and Educational Service District (ESD) personnel. These partnerships aim to provide professional development activities for 6th - 12th grade science, mathematics, and career/technical education teachers. Professional development activities focus on strong science and mathematics content knowledge applied in a real world context. Five regional programs make up the Washington State MSP program. These programs are described in the evaluation findings.

Implications for Washington State Graduates

New State Graduation Requirements

Beginning in 2008, Washington state students will need to meet new state graduation requirements. These requirements, spelled out in *Preparing Students for Life and Work: A Guide to the New Graduation Requirements (2006)*, include:

- Earning passing grades in 19 core courses.
- Completion of a culminating project (often referred to as a senior project) that demonstrates application of learning to a specific area of interest.
- Completion of a "high school and beyond plan" that outlines steps needed to prepare for the first year after high school.
- Passing the reading, writing and math portions of the high school Washington Assessment of Student Learning (WASL) assessments. Passing the science portion of WASL will be required beginning with the graduating class of 2010.

The 2006 WASL results are in and the picture is not bright for at least 49 percent of Washington State's class of 2008 students who *did not* meet WASL standards in Reading (18.1%), Writing (20.3%), and Math (49%). For the class of 2010, the Science WASL will be an added requirement. If it were a requirement this year, 65.1% of students would need to retake this section as well.

College and Career Readiness

Today's high school graduates must possess the skills and knowledge to adapt rapidly to the ever-changing landscape of a knowledge-based economy. According to the Education Commission of the States (2005), students now need at least two years of postsecondary education to be successful in a workforce that requires advanced skills. Thus, for today's students, there is little difference in being "workforce ready" versus "college ready." Although the skill set of today's graduates has changed, today's high schools still look much as they did at the beginning of the 20th century when students were being prepared to work in an industrial economy (Baker, Clay, & Gratama, 2005). Simultaneously, governmental and public expectations have raised to ensure that *all* students have access to rigorous and demanding educations. Thus, in the 21st century, college preparation is a necessity for all high school students to be prepared for life in today's "Knowledge Economy."

The disconnect between what students need to know for success beyond high school and what they actually learn in high school is illustrated by the need for remediation during the first year of college. The Social and Economic Sciences Research Center (SESRC) at Washington State University conducted a graduate follow-up study on Washington State's graduating class of 2004. Their 2006 report found that over half (55%) of the class of 2004 attended college the first year after graduation. Thirty-seven percent of the college attendees required some form of remediation prior to entering college level courses. Twice as many students enrolled in remedial math courses (32%) as compared to remedial English courses (16%). Thus, students are leaving high school without the necessary skills and knowledge to succeed in freshman level college coursework.

Despite this need for remediation, there is a disconnect between what high school teachers and college faculty perceive about the skill level of high school graduates who are entering college. Sanoff (2006) conducted a study on this perception gap and found that 32% of college faculty members say students are not well prepared in math, whereas only 9% of high school teachers share this belief. In addition, 25% of college professors feel that high school students are not prepared for college, while only 12% of high school teachers agree with that statement. This perception gap is indicative of larger problems within the realm of the K-16 system such as a lack of curricular alignment, poor communication, and little to no collaboration.

The disconnects between high school preparation and college/career readiness illustrated above reflect a serious need for developing a comprehensive K-16 curriculum that is combined with successful teaching and learning strategies. The State of Washington is trying to address these issues with initiatives such as Washington Learns, the Transition Mathematics Project, and the Mathematics and Science Partnership. These programs aim to create collaborative networks throughout the K-16 educational system to better prepare students for life in today's "Knowledge Economy."

Improving K-16 Teaching and Learning through Collaboration

An obvious starting point for improving teaching and learning throughout the K-16 system would include professional development opportunities. However, teachers often share that typical professional development activities do not provide a structure for sustaining improvement efforts. This perception is supported by research that has found that most professional development programs are transient, disconnected, and subsequently inadequate to meet teachers' needs (Weiss and Pasley, 2006). In order to meet the challenges of better preparing students for life in the "Knowledge Economy," professional development initiatives must take a more thoughtful and comprehensive approach to delivery strategies. In an analysis of professional development in education, Snow-Renner and Lauer (2005) report the qualities of professional development that are most likely to have positive impact on teachers. Effective professional development programs would be characterized as those that are long-term, collaborative, coherent, hands-on, and focused on specific content or instructional activities. Additionally, to enhance K-16 education, formalized structures and partnerships must be established and maintained to address the need for developing a comprehensive K-16 curriculum that is combined with successful teaching and learning strategies.

Evaluation Design

Evaluation Questions

This evaluation continues to address questions that are important to the state of Washington. The essential question guiding the evaluation is: "Does the Mathematics and Science Partnership Program help teachers develop both their knowledge and skills for teaching math, science, and technical education in Washington State?" To answer this question, evaluators must first identify the actual assistance teachers receive and then determine the relationship between the assistance received and changes in student achievement. The evaluation of this program will not only serve OSPI, but it will also add to the research base around effective educational practices and professional development models in the state of Washington.

The evaluation activities were built around the evaluation questions listed below. To answer these questions, researchers gathered a variety of qualitative and quantitative data over the first 24 months of this project and will continue to do so over the remaining 12 months of the three-year grant. The evaluation utilized a multiple measure, mixed methodology approach. The collection of both quantitative and qualitative data adds scope and breadth to the study in addition to providing the ability to triangulate findings (Creswell, 1994).

1. To what extent does teacher subject area knowledge change over time?
2. To what extent do teacher skills and practices change over time? (These include instructional practices and skills in judging evidence of student learning.)
3. To what degree can changes be attributed to the professional development provided in each region?
4. Are there regional practices that emerge as highly effective (promising practices)?
5. What is the role of the college and university staff members, and how do they benefit from the partnership?

General Methods/Procedures

State-level external focused their efforts on answering evaluation questions 2 through 5. Although teachers were asked about gains in their content knowledge, regional internal evaluators provided data for evaluation question 1, and these data were synthesized into the annual program evaluation report. Analysis of data will include mixed method, multi-level procedures. The unit of analysis for classroom instructional practices and gathering evidence of student learning are at the regional/state levels. General methods and activities for gathering and analyzing data are provided in detail as part of the Year 1 report submitted in November 2005.

Evaluators collaborated with regional partnerships and selected approximately half of the schools in each region (67 out of 123; Table 1) for site evaluation activities, which included classroom observations and teacher interviews. An evaluator observed participating teachers in the classroom and used the STAR Classroom Observation Protocol to score the lesson in order to track changes in classroom instructional practices over time. Participants were interviewed to

ascertain changes in teacher language around teaching and learning in addition to providing feedback about partnership activities.

Table 1. Number of Site Visits and Schools by Region.

Regional Partnership	# of Site Visit Schools	Total Schools in Partnership
Eastern Washington Connections and Inquiry *(ESD101)*	8	20
PRiSSM *(WSU-Vancouver)*	11	23
Watershed Investigation Partnership *(NCESD)*	14	25
Whatcom-Skagit Mathematics Partnership *(WWU)*	21	30
Mathematics Case Study Project *(EWU)*	13	25
PROJECT TOTAL	***67***	***123***

Data Sources

To address evaluation questions, researchers gathered data from multiple sources throughout the evaluation, including interviews, classroom observations, student achievement data, OSPI documents/materials, and internal evaluation reports. Teacher observations and interviews took place between February and June of 2006. A total of 132 individuals participated in evaluation activities that included interviews and observations.

Interviews

Researchers conducted interviews with 106 participating teachers, 26 college and university staff members, and ESD representatives from the five MSP regions (see Table 2). The selected teachers met with researchers for a 20-25 minute interview. Interview questions (Appendix) covered general program elements, assessed plans for continued involvement, addressed questions about classroom teaching and learning, and provided an overall assessment of regional activities. Researchers tape-recorded the interviews and the tapes were transcribed for data analysis.

Table 2. Number of Interviews by Region.

Regional Partnership	Number of Teachers Interviewed	Number of Higher Ed & ESD Reps Interviewed
Eastern Washington Connections and Inquiry *(ESD101)*	15	5
PRiSSM *(WSU-Vancouver)*	20	4
Watershed Investigation Partnership *(NCESD)*	24	7
Whatcom-Skagit Mathematics Partnership *(WWU)*	29	5
Mathematics Case Study Project *(EWU)*	18	5
PROJECT TOTAL	***106***	***26***

STAR Classroom Observations

Researchers conducted classroom observations to determine the extent to which powerful teaching and learning was present in the schools. The *STAR Classroom Observation Protocol* (Baker, 2005) is designed as a research instrument to measure the degree to which student-centered teaching and powerful teaching and learning ideals are being employed and/or are present during any given period of observation time in a classroom. This makes the instrument somewhat different from observation tools used for instructional evaluation and improvement for a given teacher. With instructional evaluations, observers are generally interested in being able to place the observation results in the context of a longer instructional unit to get a more complete picture of a single teacher's instructional approach or expertise. In contrast, the intent of the *STAR* observation protocol is to generalize to the school in aggregate rather than to a single teacher. In most cases the school is the unit of study. In the case of the MSP evaluation, the state and regions were the units of study and the entire sample of teachers from around the state were considered "a school."

In the case of the *STAR* observation protocol, sampling a larger number of classes becomes more important than spending more time in fewer classes. For this reason, the observer is not concerned with what preceded the observation period or what may happen after the observer leaves. The observer only records and scores the nature of the classroom activities during the period of time she/he is in the classroom. Although the instrument may be used for longer observation periods, it is generally used for shorter observation periods (30 minutes). For the MSP evaluation, observations took place over an entire class period (50 – 90 minutes).

In most STAR classroom observation studies, two to four observers visit a school for one or two days, depending on the size of the school. However, only one researcher conducted classroom observations for the MSP evaluation. The classroom observer noted information on grade level, subject area, time of day, classroom activities, curricular materials, and student groupings throughout the observation period. At the end of the class, the observer scored all 15 items of the STAR protocol and derived a score for each of the five components of the protocol. Scores were assigned based only on the events that occurred during the observation. Researchers also gave an overall rating to each observed class session. Table 3 shows the number of classroom observations conducted by MSP region. In addition, the number of teachers observed in both Years 1 and 2 is reported.

Table 3. Number of Scored STAR Classroom Observations by Region and Year.

Regional Partnership	Year 1	Year 2	Teachers Observed Both Years
Eastern Washington Connections and Inquiry *(ESD101)*	10	13	7
PRiSSM *(WSU-Vancouver)*	19	19	16
Watershed Investigation Partnership *(NCESD)*	14	24	5
Whatcom-Skagit Mathematics Partnership *(WWU)*	28	30	25
Mathematics Case Study Project *(EWU)*	-	19	-
PROJECT TOTAL	***71***	***105***	***53***

MSP Documents and Materials

Throughout the granting period, evaluators examined project documents and materials. These include application materials, regional program packets, internal evaluation audit reports, performance agreements, workshop agendas, and online resources.

Program Outcomes Data

Each region provided an evaluation report summarizing their evaluation activities, goals and objectives, data collection methodology, and an overview of activities. These reports are available at http://www.k12.wa.us/curriculumInstruct/science/MathSciencePrograms.aspx.

WASL Data

A fundamental goal of the MSP project is to improve teacher content knowledge and instructional skill in order to improve student achievement. WASL scores for math and science in 7^{th}, 8^{th} and 10^{th} grade were utilized to determine changes in student achievement at regional and state levels.

Evaluation Findings

Evaluation findings are organized around the essential elements of Washington State MSPs and the evaluation questions. Because of the nuances of each MSP, the findings are organized by region as well as in aggregate.

General Regional Information

Eastern Washington Connections and Inquiry (ESD 101)

This grant involves a 14-member consortium, known as the Eastern Washington Connections and Inquiry (Table 4). The consortium includes ESD 101 in Spokane, 10 K-12 school districts, Eastern Washington University, Spokane Falls Community College, and Whitworth College. The school district partners are located in several counties in eastern Washington and represent both urban and rural school settings.

Table 4. *Eastern Washington Connections and Inquiry* (ESD 101) Participants

Professional Development Model: Summer Academy with Follow-up
Mathematics and Science Emphasis

ESD 101
Eastern Washington Connections and Inquiry
Barbara Sanders, Evaluator

Higher Education Partners	School District Partners	
Eastern Washington University	Central Valley	Liberty
Spokane Falls Community College	Chewelah	Lind
Whitworth College	Cusick	Mead
	East Valley	Tekoa
	Freeman	West Valley

Year 2 Program Updates

Overall, 41 teachers (3 elementary, 25 middle school, and 13 high school) from partnership districts participated in 88 hours of professional development activities. A majority of the participants (23) were science teachers and the remainder (18) were math teachers. The participants worked in teams made up of teachers from their building, district, or schools in other districts. Out of district teaming occurred primarily for teachers in small rural districts. This program model included a summer academy that focused on developing teachers' content knowledge and technical skill through participation in water quality and hydropower investigations. Additionally, participants designed math and science classroom-based assessments related to the WASL and began a year-long involvement in the Professional Development in Action (PDA) training model. Participants received follow-up instruction

throughout the year and focused on utilizing inquiry-based and interdisciplinary instructional methodologies in addition to reviewing evidence of student work (Table 5).

Table 5. *Eastern Washington Connections and Inquiry* (ESD 101) Year 2 Activities

Date	Activity
6/05 and 8/05	Four-day Summer Academies
9/05-06/06	Four follow-up sessions

The program goals included increasing content knowledge and instructional skill in mathematics, science, and technology education; aligning activities with local, state, and national standards; providing professional development resulting in improvement in student academic performance; enhancing learning opportunities for all students; and enhancing the partnership. The partnership's end of the year report stated that they met their Year 2 goals "as demonstrated by the results of teacher participant surveys, student work samples, classroom observations, and interviews." Additional evaluation instruments included the Beliefs About the Learning Environment (BALE), Expert Science Teaching Educational Evaluation Model (ESTEEM), and the Teaching Practices Assessment Inventory (TPI).

Teacher involvement in this partnership has changed somewhat between Years 1 and 2 even though teachers had the opportunity to reapply and continue. Based upon teacher interviews, many of the teachers who decided not to reapply reported already possessing the content knowledge. One teacher said, "I don't think there was any particular content I didn't know already." Other reasons for not continuing often related to their content area interests. For example, one teacher stated, "They were looking for physical science and trying to connect physical science with math … I do biology classes." Teachers who chose to continue reported enjoying the hands-on approach and the opportunity to collaborate. One teacher asserted, "The MSP has always enabled us to go out and try stuff hands-on." Another teacher said, "I've been able to network with other teachers, so that has been great." One leadership member saw the collaborative nature of the partnership as meaningful for teachers, stating:

> It's been a way for teachers to be with other teachers long enough to gain the trust to be willing to really, seriously look at and critique their teaching. That doesn't happen quickly and that may not happen within a building. Maybe that's easier to do in a neutral setting away from your school and maybe with colleagues from another school who aren't going to be judging you.

Year 3 Plans

- Split the summer workshop into science and math focused groups
- Provide a two-day STAR Observation Protocol training as part of the summer program with a plan for providing opportunities for teachers to visit each other's classrooms during the school year

Partnership for Reform in Secondary Science and Mathematics (PRiSSM; WSU-Vancouver)

This grant involves a nine-member consortium, known as the Partnership in Reform in Secondary Science and Mathematics (PRiSSM; Table 6). The consortium includes six K-12 school districts, Washington State University-Vancouver, ESD112, and ESD114. The school district partners are located in four counties in Washington and represent urban, suburban, and rural school settings.

Table 6. *PRiSSM* (WSU-Vancouver) Participants

Professional Development Model: Summer Academy and Follow-up
Build and Expand Professional Learning Communities (PLC)

WSU-Vancouver
PRiSSM
Anne Kennedy, Evaluator

Higher Education Partners	School District Partners	
WSU-Vancouver	Evergreen	Goldendale
ESD112	Kalama	Klickitat
ESD114	North Thurston	Washougal

Year 2 Program Updates

The PRiSSM program goals include: developing a common vision for High Quality Learning and Teaching, improving student learning, developing professional learning communities, and developing a plan for continuous improvement. Year 2 activities included a summer academy for Lead Teachers, regional spring showcase presentations, topical workshops, monthly Professional Learning Community (PLC) meetings, and peer classroom observations (Table 7). The classroom observations were tied to specific inquiry questions or data collection related to PLC activities. Year 2 also featured a greater emphasis on improving administrative awareness and support for PRiSSM project teachers.

Table 7. *PRiSSM* (WSU-Vancouver) Year 2 Activities

Date	Activity
06/05	Weeklong Summer Academy
Spring 06	Spring Showcase
09/05-06/06	Classroom Observations
09/05/-06/06	Leadership Development (lead teachers only)
09/05-06/06	Ongoing PLC meetings

Overall, 160 teachers (102 middle school and 58 high school) from partnership districts participated in 91 hours of professional development activities. Participants were evenly split

between mathematics (67) and science (69) content areas. There were also 24 teachers who taught both math and science in their schools. In Year 2 PRiSSM added 115 teachers and 32 new PLCs across 22 school buildings. This growth is part of the second stage of the PRiSSM professional development plan where larger schools take first-year lead teachers and put them in charge of their own subject area PLC (mathematics or science). Smaller schools retained blended PLC models due to small staff sizes but were encouraged to increase the number of PLC participants. The average PLC teamed three to six teachers for self-directed group study and inquiry throughout the school year.

Participating teachers acknowledged that the PRiSSM model directly benefited them. One teacher said, “It has been the most effective professional development, and the reason is because teachers are coming together with their common focus. We have a facilitator that's given us information. We’re talking about instructional strategies. We’re not talking about students and their failings; we’re talking about how we can grab those students as a common goal. It stays positive.” Many participants also appreciated the freedom to direct their PLCs’ focus of inquiry. One teacher shared, “It wasn't sitting in a workshop for a week because there was one topic and that's what we were going to do. It was, ‘You guys pick your needs and you do what you need to do.’”

The involvement of lead teachers has remained stable between Years 1 and 2. In addition, a number of second year participants have become PLC leaders. Although many of those interviewed were positive about forming new PLCs within their buildings, others preferred working with teachers from other buildings or wanted to continue the work with their group from Year 1. Despite the positive reports about the PRiSSM model, several teachers pointed out that PLCs are time consuming and can become overwhelming when added to other building and district initiatives. There were differences in the level of administrative support given to participating teachers at different schools. One lead teacher described the importance of having a supportive administrator saying, "The principal is all for it. [He] has seen the success of our math group, and he has asked all of us to attend a professional learning community seminar this summer. … If you don't have administrative support it doesn't fly.”

Year 3 Plans

- Continue PLC expansion to include additional teachers in more buildings
- Enlist Year 1 teachers to lead or co-lead new PLC groups
- Conduct ongoing research
- Develop deeper partnerships with building and district administrators

The Watershed Investigation Partnership (NCESD)

This grant involves a 16-member consortium, known as the Watershed Investigation Partnership (Table 8). The consortium includes the North Central ESD, 14 K-12 school districts, and Central Washington University. The school district partners are located in several counties in central and eastern Washington with nearly 50% of the students representing one large district. The majority of partnership districts are from rural and remote school settings.

Table 8. *The Watershed Investigation Partnership* (NCESD) Participants

Professional Development Model: Summer College Courses and Follow-up Mathematics and Science Emphasis

North Central ESD
Watershed Investigation
Chris Stark, Evaluator

Higher Education Partner	School District Partners	
Central Washington University	Almira	Moses Lake
	Columbia	Quincy
	Curlew	Republic
	Cusick	Soap Lake
	Grand Coulee	St. Michael's
	Inchelium	Wahluke
	Mary Walker	Wellpinit

Year 2 Program Updates

The NCESD Program goals and objectives are to improve teacher capacity and student achievement in math and science as measured by Washington Assessment of Student Learning. The NCESD program aims to meet these goals by implementing a professional development model founded on "linguistic pedagogy, project-based inquiry, service learning, instructional facilitation, and widespread collaboration." Overall, 41 teachers (24 middle school and 16 high school) and one middle school principal from partnership districts participated in 105 to 130 hours of professional development activities during a two-week summer institute and four regional follow-up sessions. The majority of the participants (29) were science teachers and the remaining participants were math teachers.

The NCESD teachers could earn eight credits in science and mathematics study from their participation in the summer institute and regional follow-up workshops throughout the academic year (Table 9). Teachers were also provided with release time during the school year to work with group members on their MSP program projects. The theme of the project was "Stewardship of the Environment and Watershed Investigation" which is especially relevant because all the participating school districts share the same river drainage. NCESD partnership leaders also conducted classroom visitations throughout the school year. The purpose of the site visits was to strengthen relationships between NCESD leaders and the school districts and buildings. The importance of these visits was summed up by on NCESD leader who said, "In education the greatest ideas in the world can die at the door to the classroom if there's not support [from administration]."

A majority of the participating school districts are located in remote or rural settings in central and eastern Washington. Thus, NCESD has placed an emphasis on creating Professional

Learning Communities in these rural educational areas. However, the small schools and remote locations of the participants create barriers to traditional PLC models. One NCESD leader described how NCESD is helping to develop PLCs by stating:

> Geographically we have schools that are probably 250 to 300 miles away, very rural, and a part of their situation is that they don't have other teachers in a learning community situation. One of the things we are doing is building learning communities among districts so that these people can work together, at different grade levels, if not within their own district because they're the only science teacher, then they can work with other districts and pull some of that together.

Thus, relationships developed during the NCESD summer institute are being fostered throughout the school year to help teachers create meaningful PLCs across school districts.

Table 9. *The Watershed Investigation Partnership* (NCESD) Year 2 Activities

Date	Activity
08/06	Two week Residential Summer Institute at CWU
9/05-5/06	Four on-site follow-up workshops (6 hrs each)
9/05-5/06	Classroom visitations

Teachers and project leaders described several structural challenges in the first year. The three week design of the summer activities (two weeks of courses at Central Washington University and a week of field work in Quincy) and the on-going nature of coursework left several teachers dissatisfied. Problems with the program structure have been changed for the second year of the project and have improved participant satisfaction with the program. One of the project leaders noted, "By the time we got the grant [for Year 1], it was too late to organize the program. In a way, this [Year 2] is like starting over. It's like year one." One teacher, whose comment reflected the thoughts of many said:

> The first year was tough. There was no communication, none, you know, nothing came through like it's supposed to. This [second] year has been great. I mean I learned a lot as far as teaching goes this last year and how to change teaching. This first year we took college classes and maybe learned some new science or some new math, but it didn't necessarily affect my teaching or I know it didn't affect my teaching, but this last year I found new approaches on how to teach the subject matter, it's been fabulous. It's been great, compared to others, you know it's just different, everyone's different, but this one is affecting the way I teach. The kid's learn more.

Year 3 Plans

- Reduce the summer institute to one week instead of two
- Include more administrators in the next workshop
- Conduct classroom observations
- Strengthen the Professional Learning Communities model

Whatcom and Skagit Mathematics Partnership (WWU)

This grant involves a 15-member consortium, known as the Whatcom and Skagit Mathematics Partnership: Building Communities of Learners and Leaders in Mathematics (Table 10). The consortium includes 11 school districts, Bellingham Technical College, Skagit Valley College, Western Washington University, and Whatcom Community College. The school district partners are located in two counties in northeastern Washington and represent urban, suburban, and rural school settings.

Table 10. *Whatcom and Skagit Mathematics Partnership* (WWU) Participants

Professional Development Model: Summer Workshop and Monthly Workshops
Mathematic Focus

WWU
Whatcom and Skagit Mathematics
Brian Rick (Evaluator)

Higher Education Partners	School District Partners	
Bellingham Technical College	Bellingham	Meridian
Skagit Valley College	Blaine	Mount Baker
Western Washington University	Burlington-Edison	Mount Vernon
Whatcom Community College	Ferndale	Nooksack Valley
	Lummi Nation	Sedro-Woolley
	Lynden	

Year 2 Program Update

The project goals are to increase the effectiveness of secondary school mathematics teachers, build leadership capacity, and unite the partnership through effective communication. The stated outcome goals aim to increase mathematics achievement and participation of all secondary students' in the partner schools while simultaneously reducing gaps in disaggregated mathematics achievement data. The project steering committee selected workshop topics for the year that included teaching to at-risk students, quality assessments in math classrooms, and teaching informal geometry. Overall, 260 teachers (115 middle school, 117 high school, 12 community college, and 16 pre-service teachers) participated in approximately 70 hours of professional development activities.

Participating teachers could earn two college credits in mathematics from WWU for attending the summer workshop. The follow-up workshops were scheduled on Saturdays, and several teachers commented that they preferred the Saturday schedule because it allowed them to remain in their classrooms during the week (Table 11). The leadership team held the weekend workshops at different schools across the partnership in order to encourage participants to develop strong connections with others across the network. In addition, the partnership

established a website that provides weekly resources to participating teachers. One university professor observed that the participating teachers are corresponding with one another via email and that they contact him with their questions. Thus, the participants are developing as a network as demonstrated by their communication with one another.

Table 11. *Whatcom and Skagit Mathematics Partnership* (WWU) Year 2 Activities

Date	Activity
07/05	Summer workshop
09/05-05/06	Monthly follow-up workshops
09/05-05/06	Study Groups
04/06	Community event on Art and Mathematics

The project steering committee selected workshop topics based upon suggestions from the participants. One committee member explained, "It's great because it's designed by teachers, and it's for teachers. There's just a mentality of presenting what teachers need and what they want." The teachers choose the workshops they attend because their needs vary according to grade level or specific mathematic content areas. One teacher appreciated the selection saying, "I've been to a lot of workshops now. … You normally would expect a lot more chaff to weed out than what I've gotten so the methodology they're using to choose what they're doing, the people, and how they're choosing those people to come in, it's dead-on." The demand for attending partnership activities is high. One teacher stated, "I'd like to keep doing it [the summer workshop]. They only let two or three people from each school go, so everyone has a chance. Since I've already been twice, I'm not sure that I'll be able to go this summer." Similarly, the Saturday workshops fill quickly and waitlists are established for teachers who want to attend.

Year 3 Plans

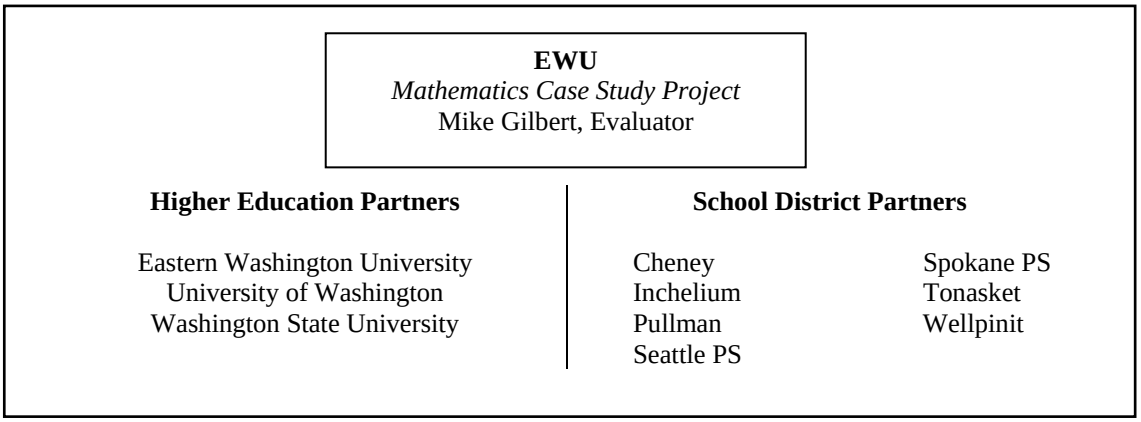
- Build leadership for partnership sustainability
- Host three public community mathematics events
- STAR Classroom Observation Protocol training

Mathematics Case Study Project (EWU)

This grant involves a 10-member consortium, known as the Mathematics Case Study Project (MCSP; Table 12). The consortium includes seven K-12 school districts, Eastern Washington University, Washington State University, and the University of Washington. The school district partners are located in six counties in both eastern and western Washington and represent urban, suburban, and rural school settings.

Table 12. *Mathematics Case Study Project* (EWU) Participants

Professional Development Model: Summer Workshop and Follow-up
Mathematics Focus



Year 1 Program (Cohort 2 MSP)

Overall, 43 middle school teachers from partnership districts participated in 88 hours of professional development activities during a weeklong summer institute and five regional follow-up sessions. Teachers utilized a case study format to increase their mathematical and pedagogical content knowledge. The case studies were specifically aligned with math standards taught at the middle school level. Participating teachers help design professional development modules that align with state, local, and national mathematics standards. Partnership leaders visited participating teachers at their schools at least two times throughout the school year. One program leader said, "It's more than just a drive-by. We're trying to get in and do some observations and actually have some nice conversations with teachers in their schools." The program also aimed to increase collaboration between school districts, pre-service teacher educators, and university mathematics departments. The partnership's Year 1 report stated that they had met or exceeded these goals. In addition, program leaders administered a rational numbers pre-test to the participating teachers at the beginning of the summer institute and the post-test was administered at the end of the Year 1 activities. Analysis of pre- and post-test results indicates that participants demonstrated a gain in math content knowledge necessary for teaching middle school mathematics. A summary of Year 1 activities is presented in Table 13.

Table 13. *Mathematics Case Study Project* (EWU) Year 1 Activities

Date	Activity
08/05	Summer Institute
09/05-05/06	Professional Learning Experience Visits (two visits per school)
09/05-05/06	On-going regional sessions (five Saturdays per region)

A majority of the teachers participating in the first year of the MSCP described a focused professional development model that has continued to develop their content knowledge and instructional skill. Teachers liked the emphasis on content knowledge and skill development. One participant said, "It's one of the best [professional development opportunities], and I think it's because it is looking at building content knowledge and practice, but it focuses on content, and that's what I've been wanting since I ended up in this position." Other teachers appreciated that the material covered in the workshops had direct application to the classroom setting. A teacher stated, "It's been very beneficial because I can see it in the classroom, I can take it to the classroom, it's working with me, and it's making me a better teacher." A program leader reported that another aspect of this partnership is that materials developed by MCSP participants will be available to math teachers across the state. He stated, "Our charge is to create professional development materials for middle school math teachers that can be disseminated after our project is done."

Year Two Plans

- Enlist Year 1 participants to return as program leaders and bring in new teachers
- Present the proportional reasoning module
- Develop and pilot a new geometry module
- Consider incorporating the STAR Classroom Observation Protocol training into the program

MSP Project-Wide Results

Evaluation Question #1: To what extent does teacher subject area knowledge change over time?

Each region monitors changes in subject area knowledge through various qualitative and quantitative methods including surveys, reflection activities, workshop evaluations, and interviews. Many of the instruments are developed regionally. During interviews, teachers provided a wide variety of responses concerning the effectiveness of their regions' MSP in the area of improving *content knowledge*. It is important to note that each region established unique goals for their partnerships. In some instances, building content knowledge was not an area of focus. When assessed locally, pre/post surveys indicated gains in content knowledge.

Teachers rated the following question during their recorded interview: "On a 1 to 10 scale, 1 being the worst ever and 10 being the best you've experienced, how would you rate the effectiveness of this program in increasing your *Content Knowledge*?" Regional responses for Year 2 ranged from 5.05 (PRiSSM) to 7.72 (WWU), and the project average was 6.86 (Figure 1). Self-reported content knowledge ratings increased from Year 1 to Year 2 in each region that has participated for 2 years. NCESD posted the greatest change in self-reported Content Knowledge ratings (increasing from 5.50 in Year 1 to 7.25 in Year 2). This change may be due to NCESD's restructuring of their MSP program delivery. The survey results were similar to interview findings. The increase in Content Knowledge is presented by teacher's grade level in Figure 2. Teacher responses for Year 2 ranged from 6.07 (high school teachers) to 7.42 (middle school teachers). Self-reported content knowledge ratings increased from Year 1 to Year 2 for each

grade level category. Elementary school teachers exhibited the greatest change in self-reported Content Knowledge ratings (+1.2) as compared to middle school (+.69) and high school (+.60) teachers.

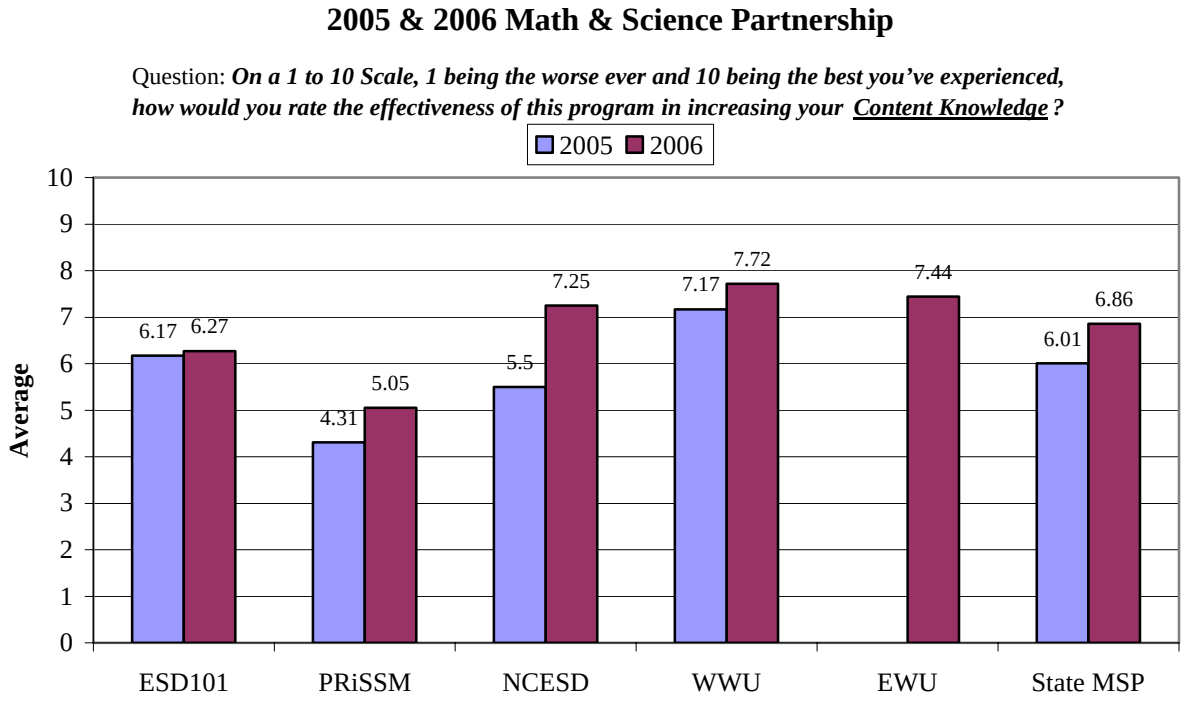


Figure 1. **Teachers rating of MSP for increasing Content Knowledge**

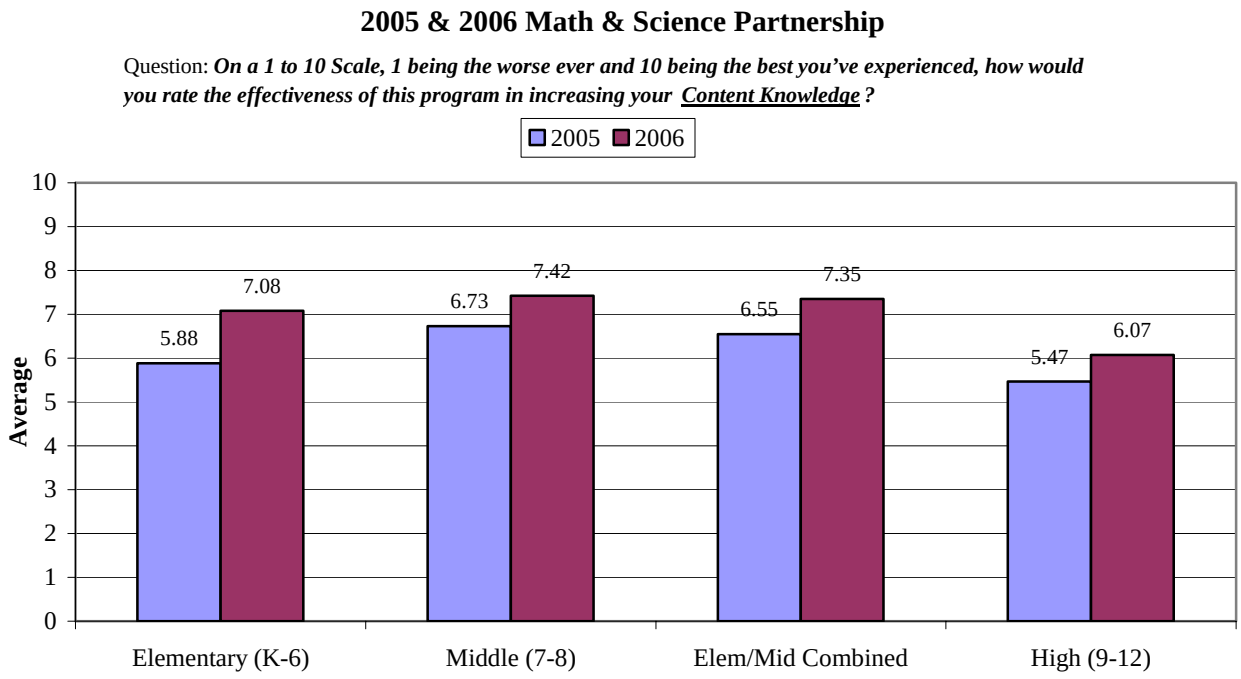


Figure 2. **Teachers rating of MSP for increasing Content Knowledge by grade level**

Evaluation Question #2: To what extent do teacher skills and practices change over time (these include instructional practices and skills in judging evidence of student learning)?

Teachers rated the following question during their recorded interview: "On a 1 to 10 scale, 1 being the worst ever and 10 being the best you've experienced, how would you rate the effectiveness of this program in increasing your *instructional skill*?" Regional responses for Year 2 ranged from 6.67 (ESD101) to 8.7 (PRiSSM), and the project average was 7.45 (Figure 3). Self-reported instructional ratings increased from Year 1 to Year 2 in each region that has participated for 2 years. NCESD posted the greatest change in self-reported Instructional Skill ratings (increasing from 4.61 in Year 1 to 7.38 in Year 2). This change may be due to NCESD's restructuring of their MSP program delivery. The survey results were similar to interview findings. The increase in Instructional Skill is presented by teacher's grade level in Figure 4. Teacher responses for Year 2 ranged from 7.50 (middle school teachers) to 8.42 (elementary school teachers). Self-reported instructional skill ratings increased from Year 1 to Year 2 for each grade level category. High school teachers exhibited the greatest change in self-reported Instructional Skill ratings (+1.19) as compared to elementary school (+1.17) and middle school (+.33) teachers.

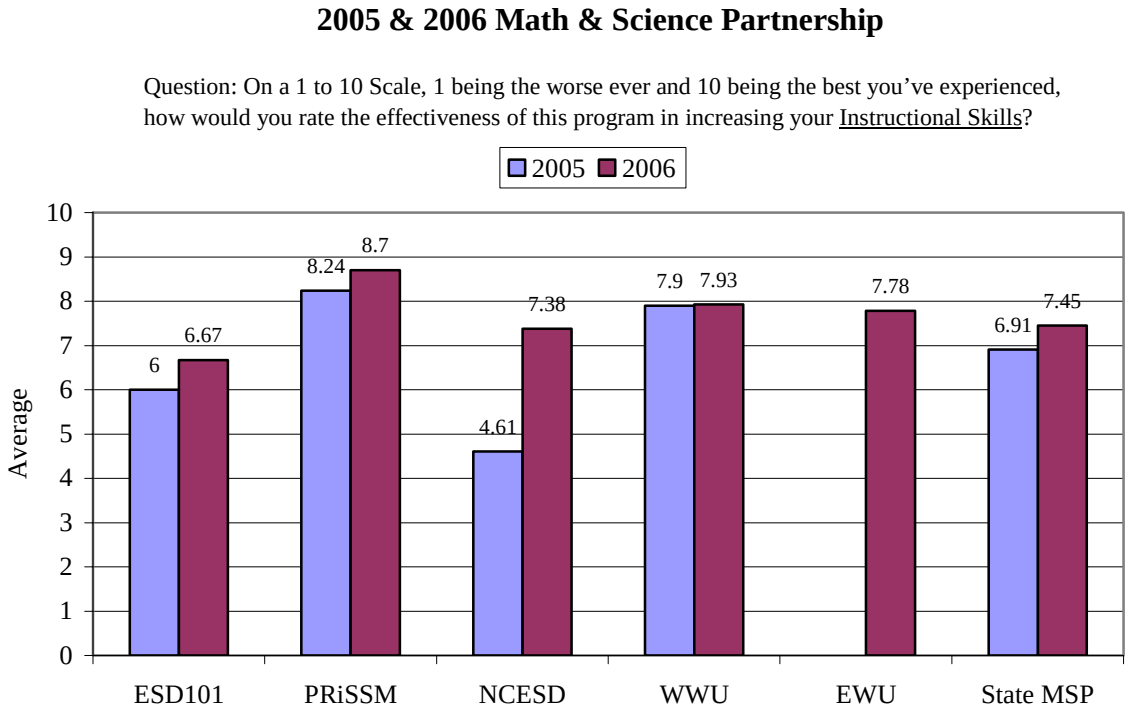


Figure 3. **Teachers rating of MSP for increasing Instructional Skill**

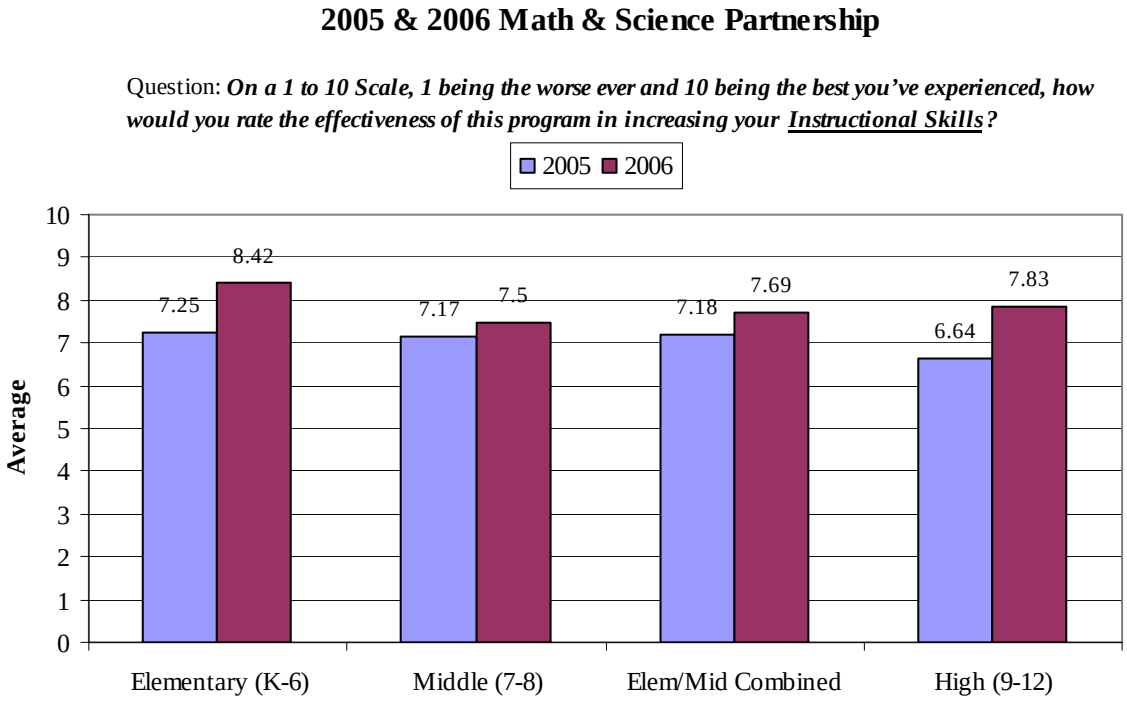


Figure 4. **Teachers rating of MSP for increasing Instructional Skill by grade level**

The type of teaching identified as *Powerful Teaching and Learning* and correlated with student achievement in the state of Washington was observed in approximately 18% of the lessons (n = 1180) observed in the BERC Group STAR classroom observation studies in a two year period from fall 2004 to spring 2006. Figures 5 - 10 provide component scores for the MSP classroom observation study for 70 classrooms during Year 1 (2004 – 2005) and 105 classrooms during Year 2 (2005 – 2006). The MSP results outpaced that of the state average in both Year 1 and Year 2.

Overall, constructivist teaching was observed in 24% of the 70 classrooms during Year 1 and in 33% of the 105 classrooms during Year 2 (Figure 10). The MSP participants also demonstrated gains from Year 1 to Year 2 in *Skills* (Goal 1, Figure 5) and *Thinking* (Goal 3, Figure 7). In addition, MSP participants outperformed the state average in *Application* (Goal 4, Figure 8) in both Years 1 and 2. Researchers observed lessons that demonstrated outstanding application 19% of the time in Washington State, whereas MSP participants demonstrated outstanding application 31% and 29% of the time in Years 1 and 2, respectively (Figure 8). However, both the state average and the MSP results showed an extreme dichotomy in the demonstration of application, with the majority of teachers showing either no evidence of application (score = 0) or very descriptive evidence of application (score = 4).

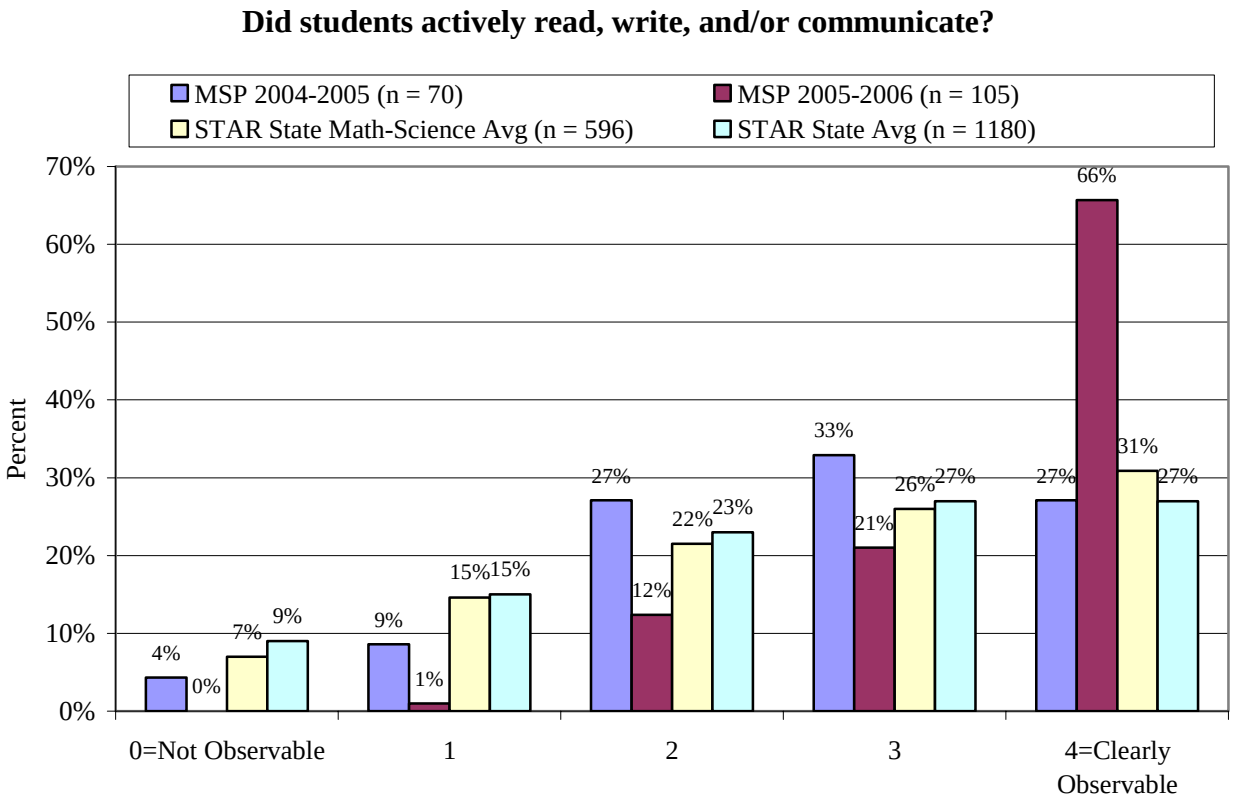


Figure 5. **Frequencies of Scores for Washington State Reform Goal #1 (Skills)**

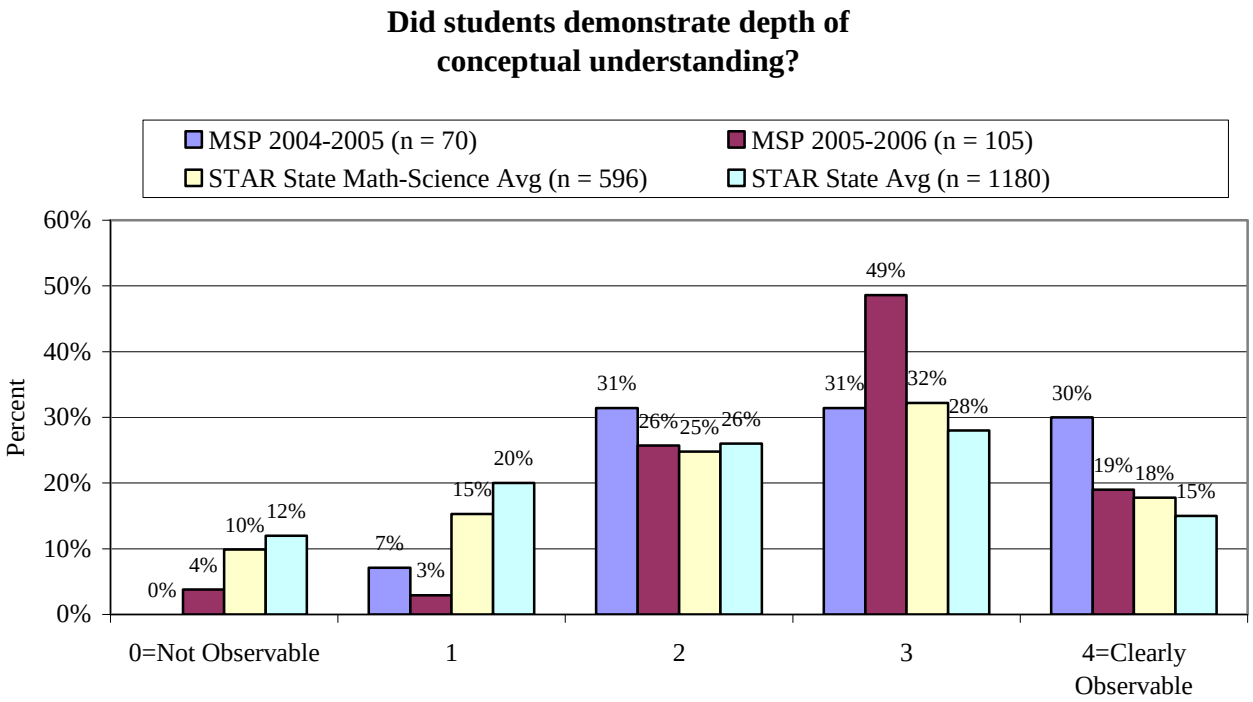


Figure 6. **Frequencies of Scores Washington for State Reform Goal #2 (Knowledge)**

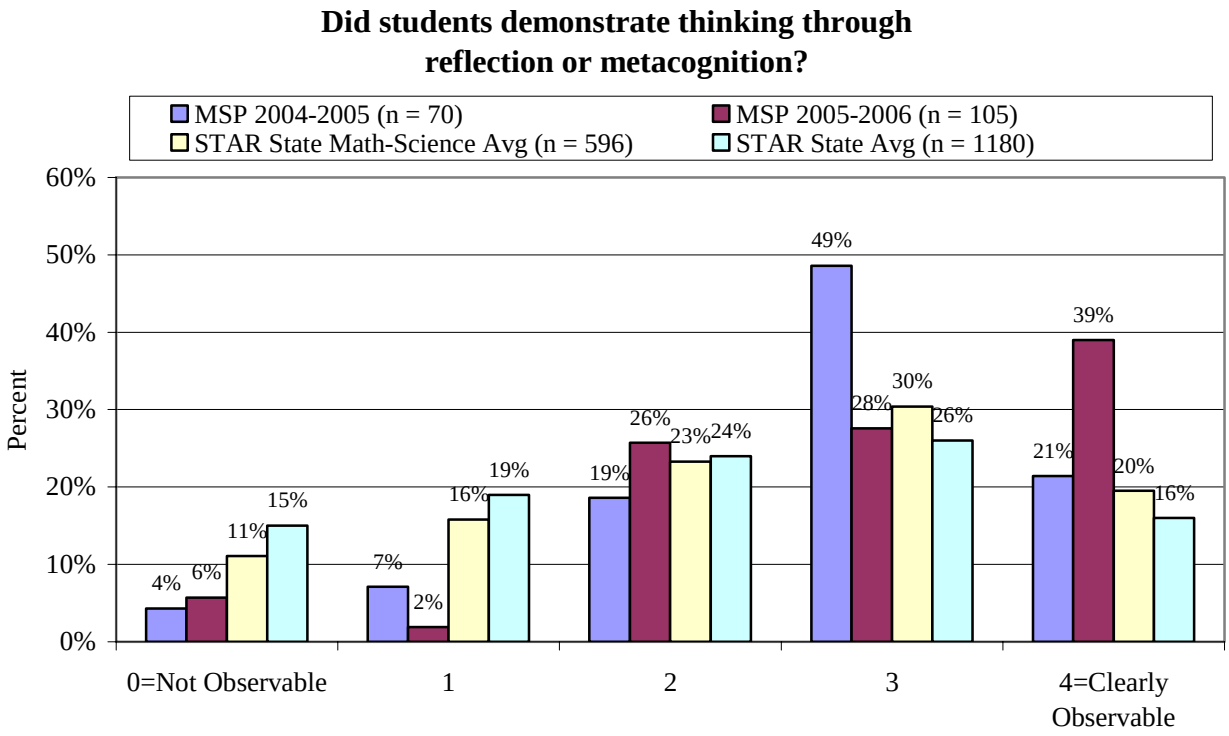


Figure 7. **Frequencies of Scores for Washington State Reform Goal #3 (Thinking)**

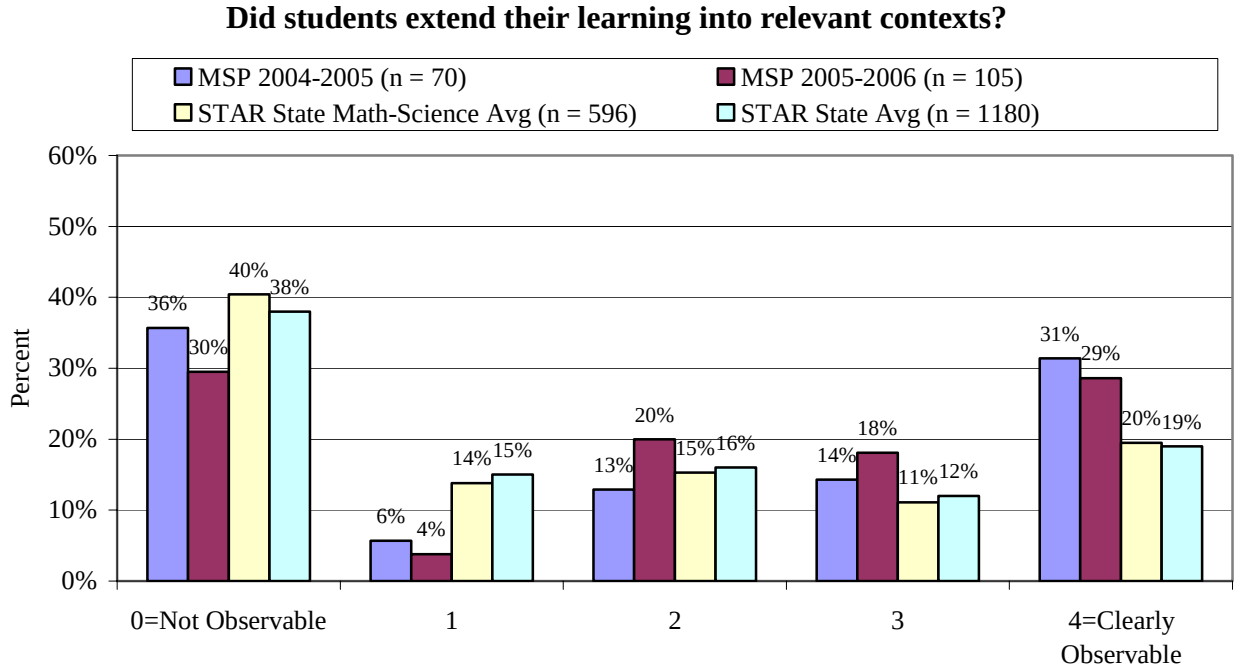


Figure 8. **Frequencies of Scores for Washington State Reform Goal #4 (Application)**

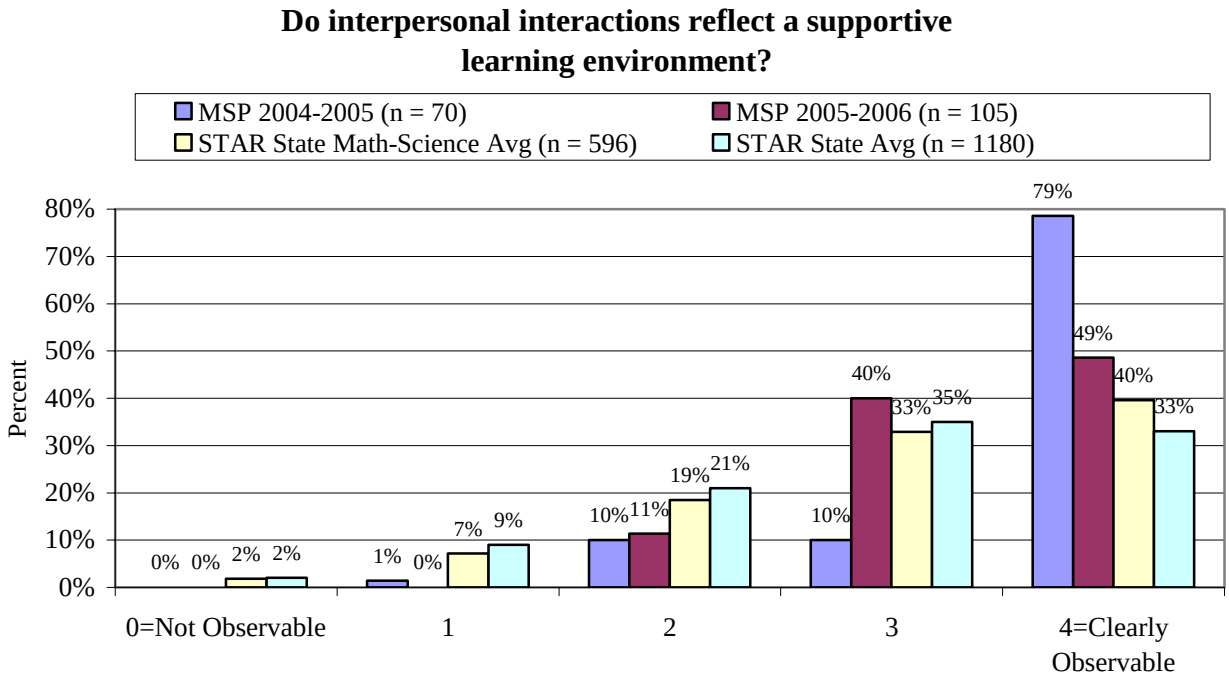


Figure 9. **Frequencies of Scores for Conditions for Learning (Relationships)**

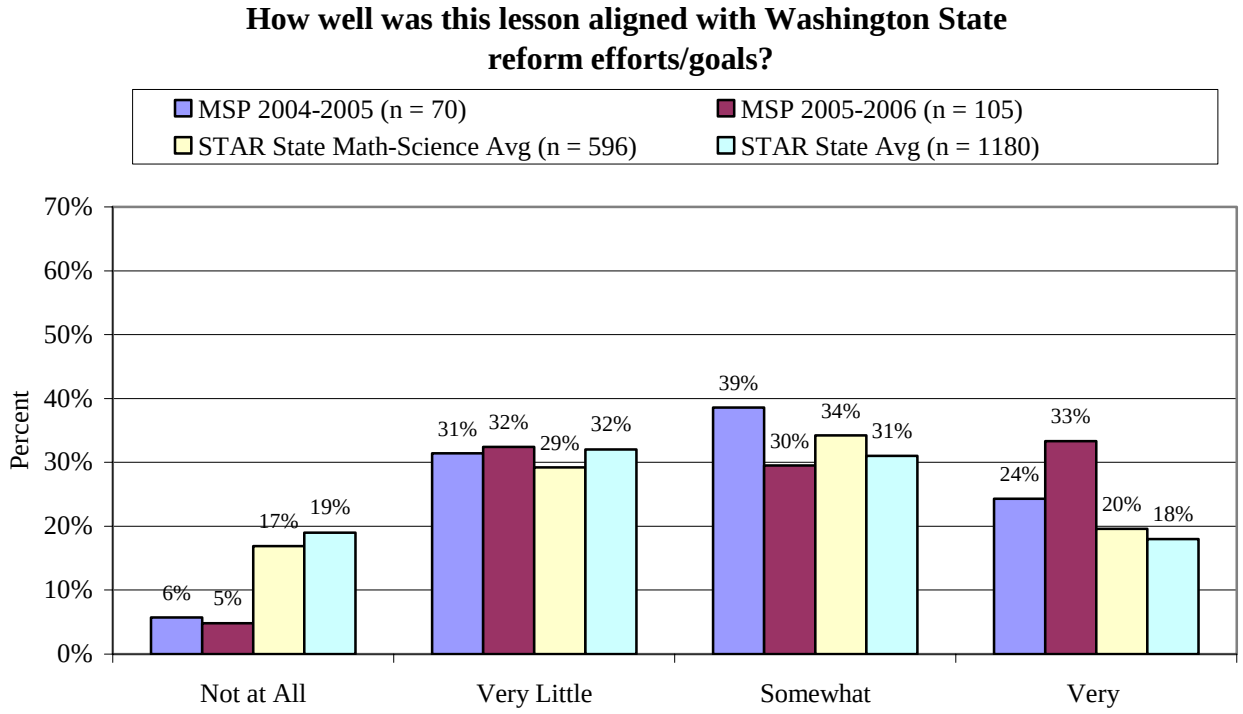


Figure 10. **Frequencies of Scores for the Overall Conclusion**

The type of teaching identified as *Powerful Teaching and Learning* and correlated with student achievement in the state of Washington is presented for each region in Figures 11 and 12. All regions improved their overall STAR performance from Year 1 to Year 2. NCESD and PRISSM exhibited the largest gains from Year 1 to Year 2 (19% and 16%, respectively). All the MSP regions outperformed the state average in Year 2 (Figure 12). A one-way analysis of variance showed no significant differences between regions in either Year 1 ($F(3, 66) = 1.34$, $p = .270$) or Year 2 ($F(4,100) = .726$, $p = .576$).

A paired samples *t* test was used to determine if there was a difference in the score for "Overall Conclusion" between Year 1 and Year 2 for teachers who were observed both years. Teachers who scored consistently at a high level both years (3-3 or 4-4 for Years 1-2) were omitted from the analysis. The paired samples *t* test indicated that teachers from PRiSSM scored significantly higher on the Overall Conclusion of the STAR Classroom Observation Protocol in Year 2 as compared to Year 1 $t(10) = 2.35$, $p = .010$, $d = .96$. According to Cohen (1988), the effect size (d) is large. The PRiSSM model focuses on supporting Professional Learning Communities in order to develop a common vision for high quality teaching and learning. The results of the paired samples *t* tests must be approached with caution, however, since the number of teachers in each region with classroom observation scores both years was relatively small (ranging from 3 -15 teachers per region).

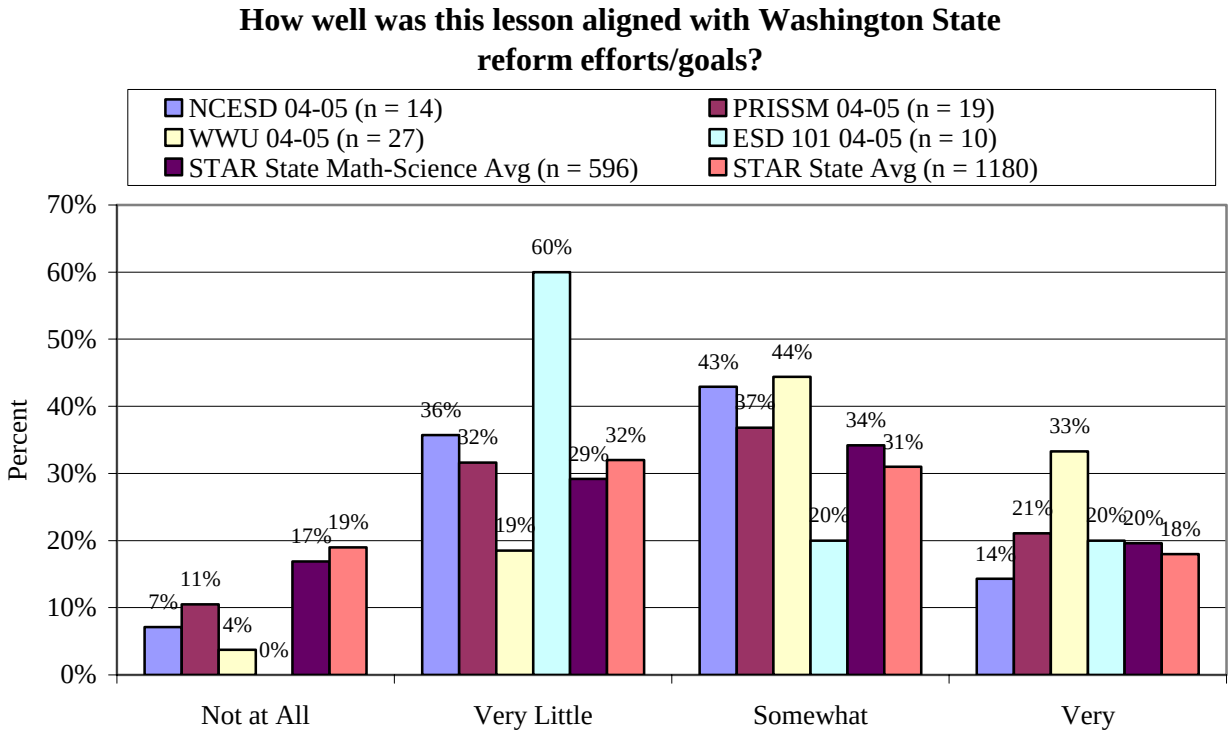


Figure 11. **Frequencies of Scores for the Overall Conclusion for Year 1 by MSP Region**

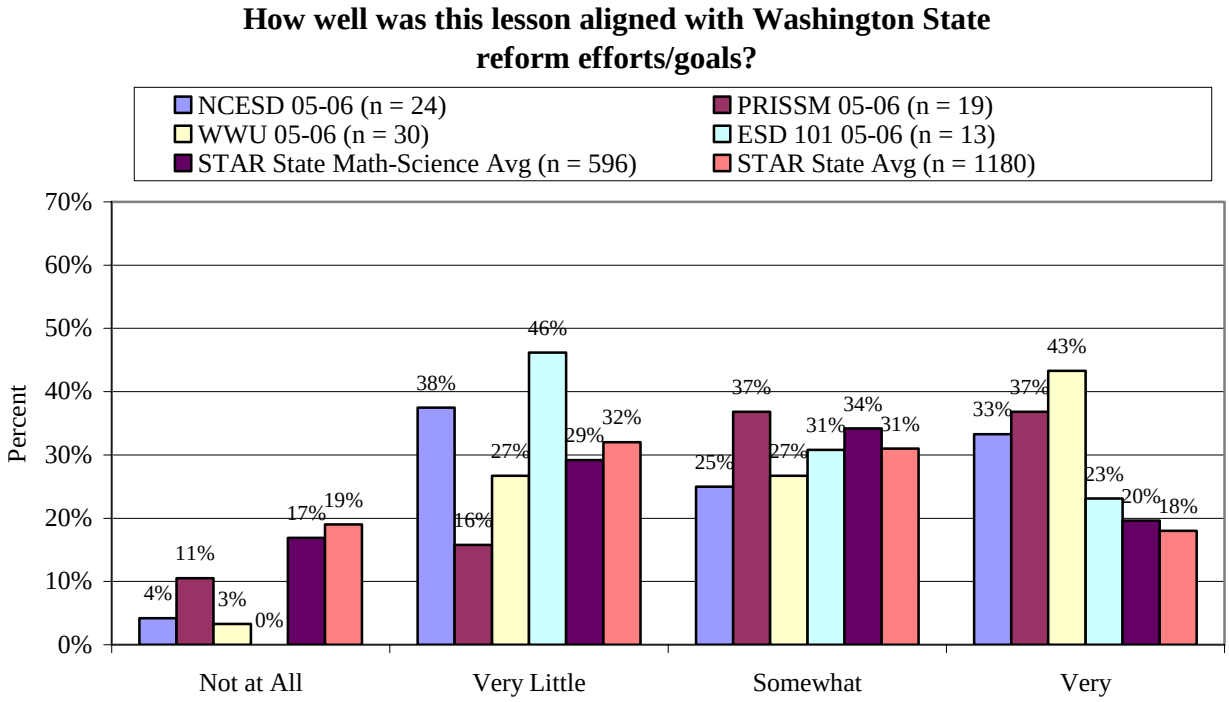


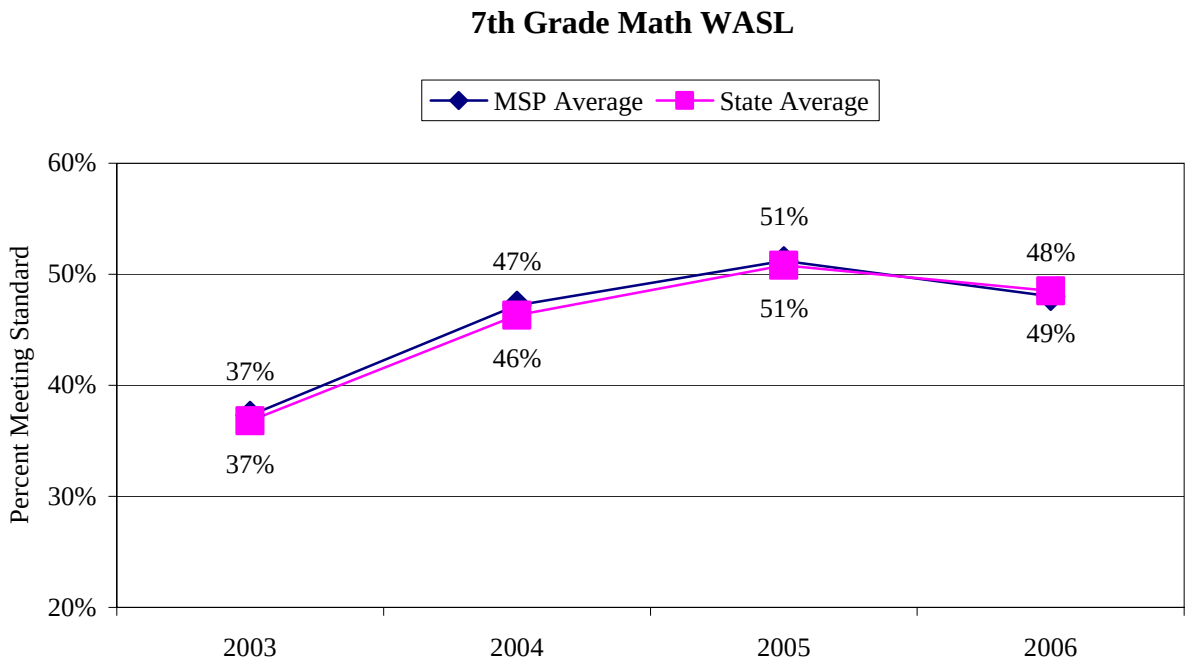
Figure 12. **Frequencies of Scores for the Overall Conclusion for Year 2 by MSP Region**

Evaluation Question #3: To what degree can changes be attributed to the professional development provided in each region?

Regional and State WASL Scores

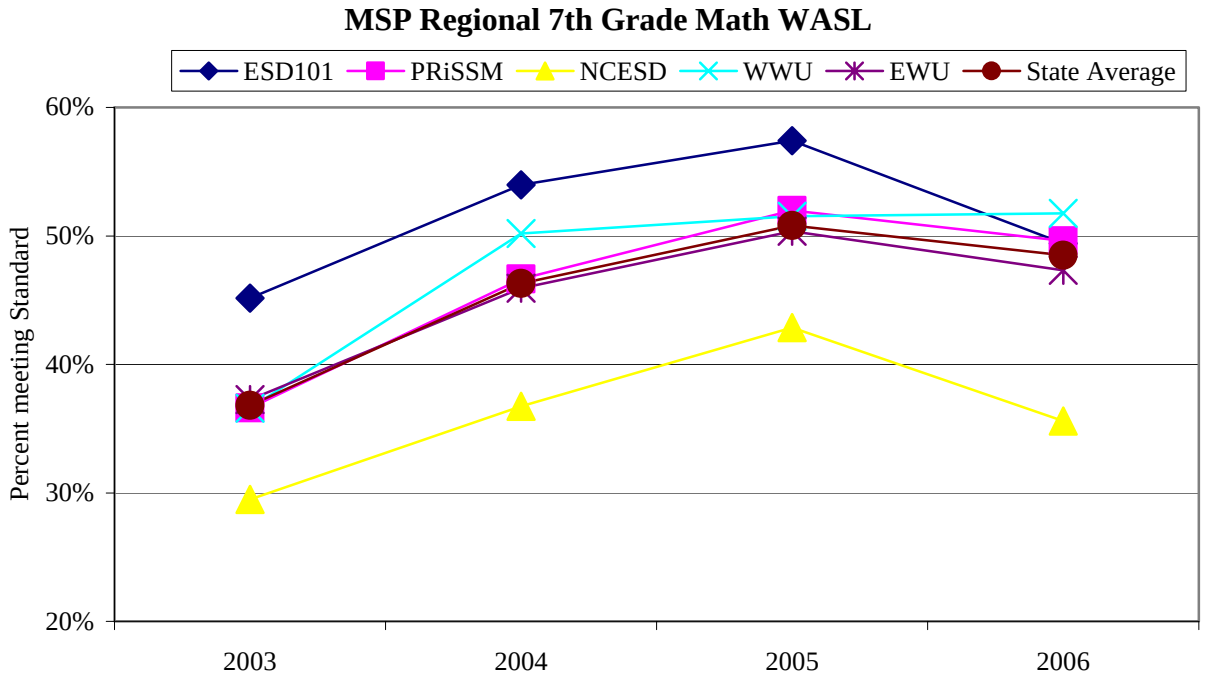
Teachers from at least 123 schools across the state belong to a MSP program. Although each school implements numerous strategies that influence WASL data, researchers aggregated school level WASL scores in math and science to identify changes in regional and statewide initiative WASL scores. The percentages of MSP participants in schools differ. Schools with a larger percentage of participants may have a greater impact on overall WASL scores especially when the teaching in grade taking WASL tests. This is beyond the score of the Year 2 analysis. Figures 13 – 20 show weighted WASL averages at the initiative and regional levels compared to the state average.[1] There are regional differences for the MSP initiative. In general, ESD 101 is above the state average, and NCESD is below the state average. The remaining regions fluctuate around the state average. When combined, MSP schools perform similar to the state average, and the rate of improvement is similar to the state.

[1] Results from Year 2 differ slightly from Year 1 because researchers used school-level instead of district-level data.



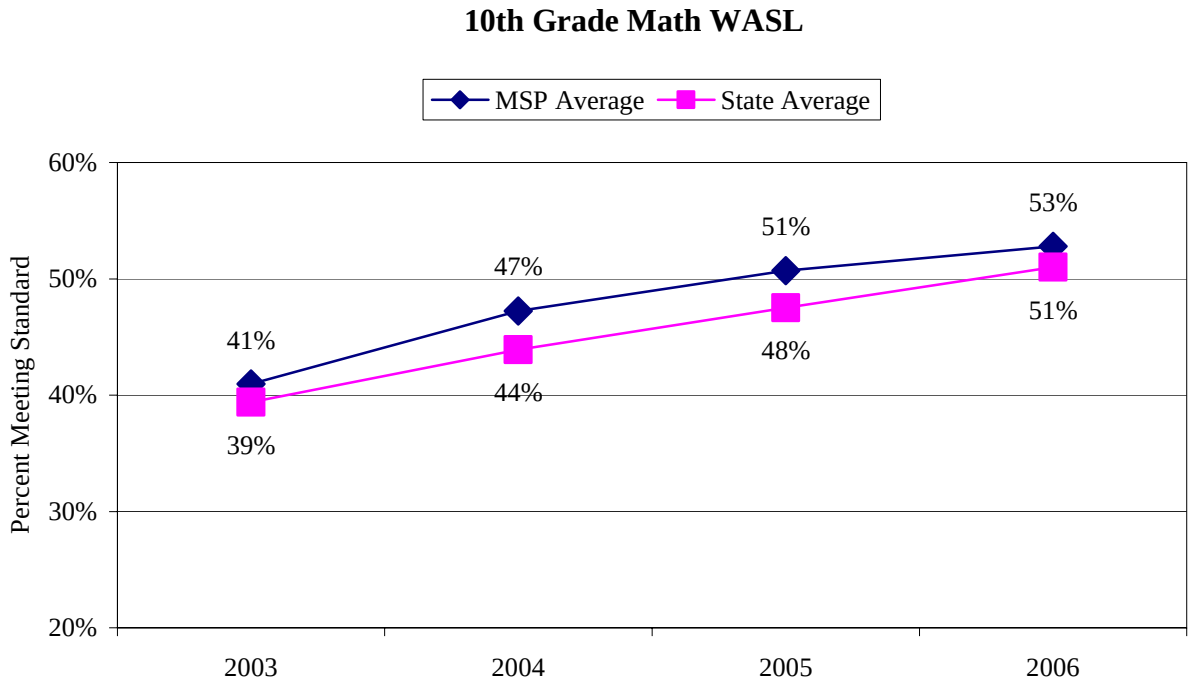
Take from OSPI Washington State Report Card http://reportcard.ospi.k12.wa.us/. Regional averages weighted based on school enrollment October 2004.

Figure 13. **7th Grade WASL Math (MSP Average vs. State Average)**



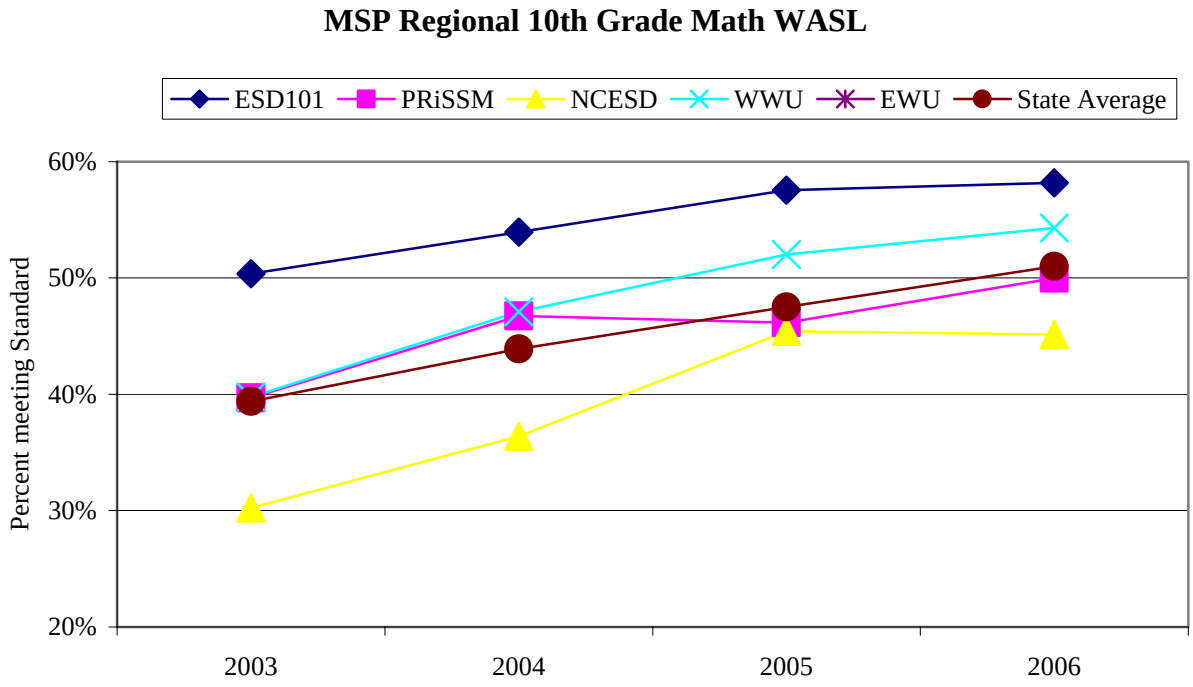
Take from OSPI Washington State Report Card http://reportcard.ospi.k12.wa.us/. Regional averages weighted based on school enrollment October 2004.

Figure 14. **7th Grade WASL Math (Regional MSP Averages vs. State Average)**



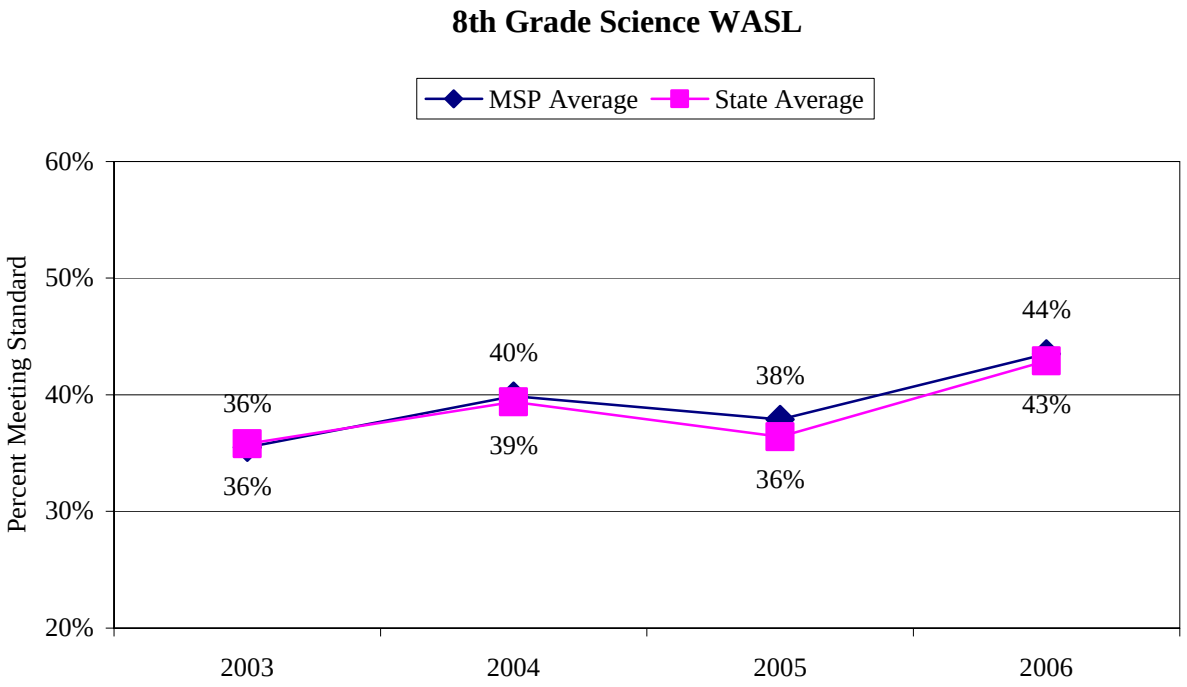
Take from OSPI Washington State Report Card http://reportcard.ospi.k12.wa.us/. Regional averages weighted based on school enrollment October 2004.

Figure 15. **10th Grade WASL Math (MSP Average vs. State Average)**



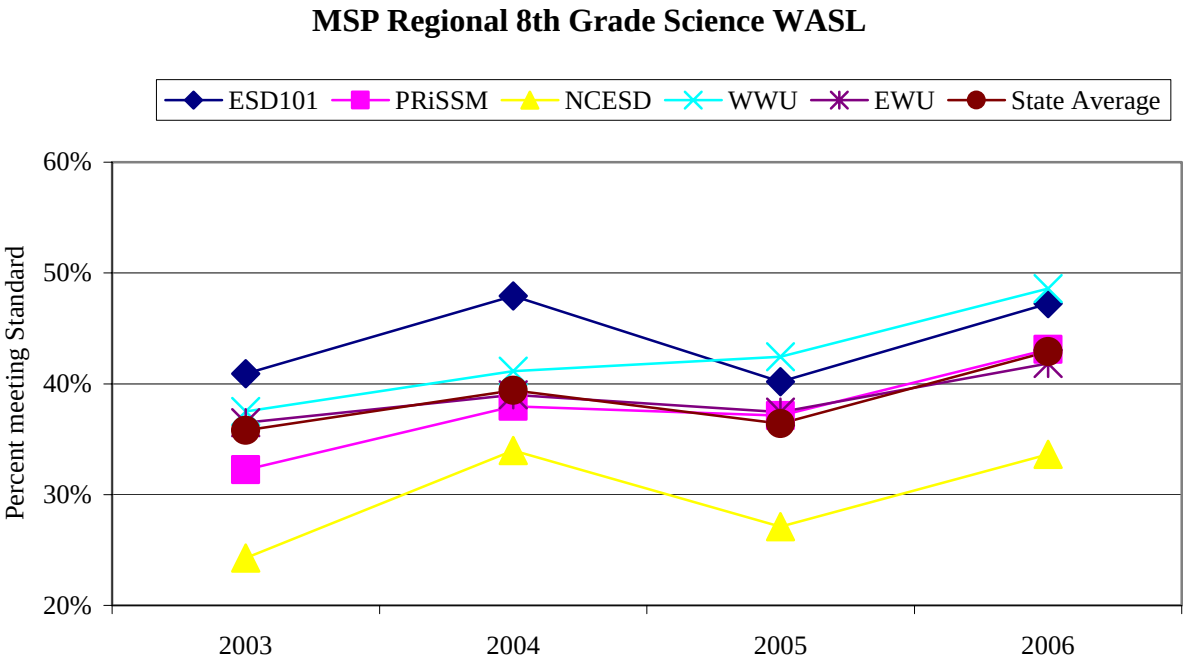
Take from OSPI Washington State Report Card http://reportcard.ospi.k12.wa.us/. Regional averages weighted based on school enrollment October 2004.

Figure 16. **10th Grade WASL Math (Regional MSP Averages vs. State Average)**



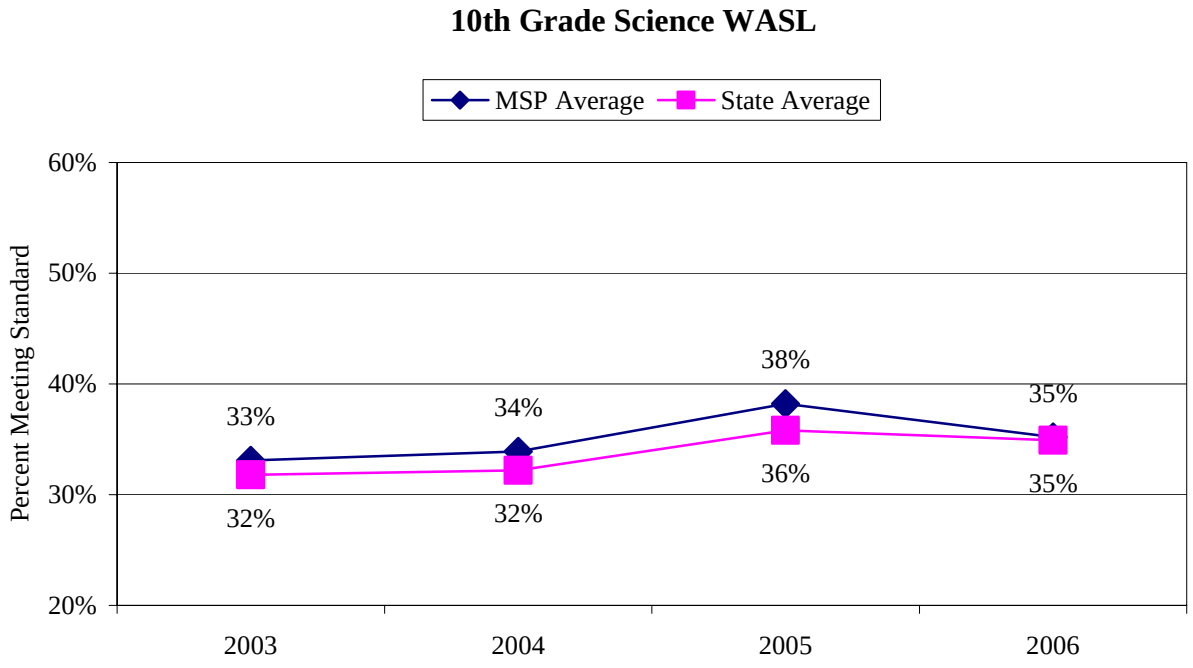
Take from OSPI Washington State Report Card http://reportcard.ospi.k12.wa.us/. Regional averages weighted based on school enrollment October 2004.

Figure 17. **8th Grade WASL Science (MSP Average vs. State Average)**



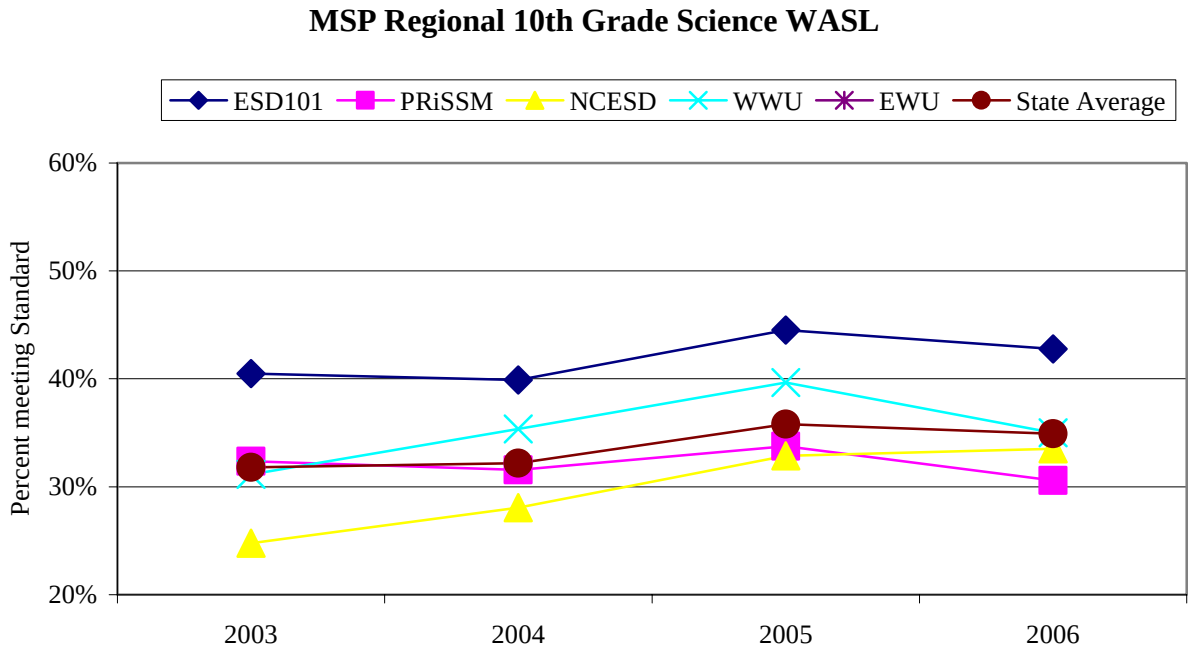
Take from OSPI Washington State Report Card http://reportcard.ospi.k12.wa.us/. Regional averages weighted based on school enrollment October 2004.

Figure 18. **8th Grade WASL Science (Regional MSP Averages vs. State Average)**



Take from OSPI Washington State Report Card http://reportcard.ospi.k12.wa.us/. Regional averages weighted based on school enrollment October 2004.

Figure 19. **10th Grade WASL Science (MSP Average vs. State Average)**



Take from OSPI Washington State Report Card http://reportcard.ospi.k12.wa.us/. Regional averages weighted based on school enrollment October 2004.

Figure 20. **10th Grade WASL Science (Regional MSP Averages vs. State Average)**

Evaluation Question #4: Are there regional practices that emerge as highly effective?

The fourth evaluation question has implications beyond the MSP effort for the future of ongoing professional development across the state. Whether regional practices are highly effective will be the subject of short-term, intermediate, and long-term data outcomes analysis associated with program goals. Therefore, the Year 2 findings are considered promising practices. Several regions in the MSP share similar professional development approaches including activities such as summer academies, collaborative working groups (PLCs), and ongoing professional development opportunities throughout the school year. The promising practices that emerged through Year 2 evaluation activities include utilizing effective professional development models, developing of partnerships at multiple levels, and fostering sustainability.

The Washington State MSP programs utilized a variety of strategies to create effective professional development programs. The strategies highlighted by participants included long-term professional development programs, opportunities for extended collaboration, hands-on activities, and a focus on relevant topics. Teachers appreciate the opportunity for long-term professional development that builds confidence and trust, that fosters networking, and that allows for in-depth study. One teacher said, "It's embedded and it's ongoing. So it wasn't 'you just have to do 80 hours this summer' it was, 'we're going to be with you all year. In fact, we're going to be with you for three years.'" Another teacher reported, "Just going to one isolated professional development opportunity oftentimes leaves you with a great idea that lasts about two weeks. … This program extends through three years. I'm being reminded constantly that I could be doing something like this instead of my usual curriculum." Participating teachers also appreciated opportunities to study topics that were relevant and focused on instruction. In one region, participants select their own area of inquiry via PLC activities and workshop topics. In another region areas of inquiry are selected by a steering committee. Teachers also benefited from hands-on activities. One participant reported, "Stepping into the role of being a student in this experience, when I'm usually the one that's watching the students suffer, but in this case I'm the student suffering. Then realizing, good grief, this is what I'm doing to my own students!"

Continued improvement within the K-16 educational system requires focused work among a number of different stakeholders. The MSP programs have promoted the development of partnerships between higher education, K-12 school districts, ESDs, and community members. Involving higher education participants as learners, not just organizers, may lead to broader changes in instruction. One participant, reflecting upon the involvement of higher education participants, said, "The University changes the way it is teaching, and the [college] students get the opportunity to change their learning. They will, in turn, change the way they're going to teach." Another teacher shared, "We talk about vertical or horizontal teaming, and in my mind that doesn't stop at grade 12. It continues." The creation of connections to the community is another important aspect of several MSP programs. Community partners provide venues for bringing subject matter to life and help teachers extend their classrooms beyond the school walls. For example, one region has focused on studying the local watershed. This has resulted in collaborations between building staff members, neighboring school districts, and community agencies in order to conduct inquiry-based lessons out in the field.

Program sustainability is necessary in order to obtain continuous improvement in student outcomes. Practices that create program sustainability include establishing and maintaining contact with school/district leaders, developing teacher leaders, and creating a culture of continuous improvement. Administrator buy-in and support is essential to program longevity. One region built administrator involvement into their partnership. One person shared, "We made it a component of participation that a principal or principal designee had to be affiliated. … Over time we've realized more and more how impactful that is for PLC support." One MSP leader said, "The big message that we're hearing from our teachers is that 'this has to be valued by our administration and that it has to be built into our workday.'" Growing teacher leaders is another strategy that MSP regions have used to create sustainability. One MSP region specifically aims to "increase teacher capacity at the local school level through leadership development." Utilizing teachers as program leaders and facilitators helps to create teacher buy-in and provides a built in feedback loop for MSP activities. Additionally, the creation of a culture of continuous improvement helps keep partnership activities relevant and fresh. A culture of continuous improvement involves collecting data and participant feedback to modify professional development activities to meet participant needs. One region utilizes a steering committee that reviews teacher needs and determines the direction of professional development. Another region measures changes in teachers and students in order to "look at what impact it [MSP] has on student learning [vis-à-vis teachers] and what happens in the professional learning communities."

Thus, the Year 2 MSP promising practices vary from region to region, but all share several common features. These features include utilizing effective professional development models, developing partnerships at multiple levels, and fostering sustainability. Several regions in the MSP share similar professional development approaches, but each one varies to meet local needs. Despite regional differences, all MSP regions recognize the need to create sustainable programs that partner effectively with higher education and community organizations.

Evaluation Question #5: What is the role of the college and university staff members, and how do they benefit from the partnership?

The disconnects between high school preparation and college/career readiness illustrated in the introduction reflect a serious need for developing a comprehensive K-16 curriculum that is combined with successful teaching and learning strategies. The State of Washington is trying to address these issues with initiatives such as Washington Learns, the Transition Mathematics Project, and the Mathematics and Science Partnership. The intent of the MSP competitive grant program in Washington State is to encourage institutions of higher education, local school districts, and individual schools to participate in professional development activities that increase the subject matter knowledge and instructional skills of science, mathematics, and technical education teachers. The fifth evaluation question aims to determine how the partners from higher education are involved in the MSP program and how they benefit from their participation.

When asked about the role of the university participants most teachers commonly viewed the university partners as fulfilling outside roles such as organizers, facilitators, or researchers, while a few teachers identified them as fellow participants. Additionally, several participants pointed out that the higher education partners acted as liaisons who provided resources and

created networks. One person said, "They're the people with the vision, and so their role was to communicate the vision to us." Another teacher shared, "They're really the drivers in my mind. You know, I see the teachers as more the recipients, which is unfortunate. I'd like it to be more of a two way kind of thing." Some MSP participants identified the higher education participants as researchers. One teacher summed up this idea by stating, "They're doing their own research, and their research, of course, is on us. So that provides them with the data." In both cases, the roles of organizer/facilitator and researcher do not reflect the ideal of equal cooperation, but rather of unequal levels of giving or receiving benefits.

Some people identified the higher education partners as fellow participants. One teacher said, "They're always there as participants with the person that's presenting, so they're also learning. They also have a learner role." Another teacher reflected on the impact of college faculty as fellow participants, by stating, "They also can see what kind of reactions they might get from college students as they apply this in their classrooms. Our professors are turning around and applying this at the college level. … It's not just teaching a method … they are practicing with you." A community college instructor shared, "I really thought our job was to teach the teachers content, and then I quickly learned about something I'd never heard of, which was inquiry. … I totally didn't expect to be learning things myself." Thus, the role of higher education partners as fellow participants was not an expectation of the MSP program, but appeared to develop in a cooperative environment where topics could benefit teachers at all levels.

The MSP participants also identified higher education partners as resource providers and network liaisons. One teacher said, "They're trying to provide us with things that will help us improve, and so I think they see themselves as a resource to us." Another teacher appreciated being able to access the higher education partners stating, "I can get on e-mail [to] one of the college professors, and they've been wonderful about responding and giving us some ideas." In addition, one participant summarized the networking role by stating, "One of the biggest things they're doing is that they are creating a network. They're liaisons for a network and not only for the high school and middle school teachers, but also liaisons for us getting to meet community college people and the university folks." These types of roles are important for communication and dissemination of information, but do not necessarily fall under the definition of partner if the information only flows in one direction.

When asked how the higher education participants would benefit from the MSP, some teachers simply answered, "I don't know." However, several participants shared ideas of how higher education benefited from the MSP, which included keeping connected to the K-12 environment and building a collaborative K-16 network. One teacher said, "I think how they benefit from it [MSP] is it keeps them in touch with the classroom." Another teacher summarized the ideas of many stating, "I really think that … to be relevant today in training up the next generation of educators, they have got to be in the public schools." Another person shared their thoughts on developing a K-16 network, stating, "It just gives us a really good partnership and we can see what it is that the college students are looking at preparedness-wise … because they're experiencing a whole different type of college education than we [did] 10 to 20 years ago. So it keeps all of us a little bit more grounded in reality. … It keeps everybody in the loop." Another person summed the need for a strong K-16 network by saying, "We complain about kids

coming from middle school and not having high school math skills, and people at the college level are complaining that kids coming to them don't have the skills that they need for college. So we all have the common concerns, and we're all trying to do a better job to get kids to a place where they can [succeed]."

Thus, many participants described the role of MSP's higher education partners as one of organizer, facilitator, or researcher. However, some teachers recognized the higher education partners as fellow participants, resource providers, and networking liaisons. The community college and university faculty that participate in the MSP as partners benefit from their participation by staying connected to the K-12 environment and by building a collaborative K-16 network. The role of higher education partners as fellow participants was not an expectation of the MSP program, but appeared to develop in a cooperative environment where the professional development topics could benefit teachers at all levels. Thus, regional activities that promote a collaborative relationship between K-12 and higher education partners may create a more sustainable and mutually beneficial program.

Summary

The intent of the MSP competitive grant program in Washington State is to encourage institutions of higher education, educational service districts, local school districts, and individual schools to collaborate around professional development activities that increase the content knowledge and instructional skills of science, mathematics, and technical education teachers. The development of teachers' content knowledge and instructional skill is intended to impact student academic achievement in science, mathematics, content area reading, and technical writing. Professional development activities are designed to be sustainable, intensive, classroom focused, and aligned with state and local standards in mathematics and science. These activities are designed for demonstrable and measurable improvement in student academic performance in mathematics and science, particularly for underrepresented student populations.

The MSP program specifically partners school districts with higher education faculty and Educational Service District personnel. These partnerships aim to provide professional development activities for 6th - 12th grade science, mathematics, and career/technical education teachers. Professional development activities focus on strong science and mathematics content knowledge applied in a real world context. Five regional programs make up the Washington State MSP program. Each regional program involved a summer academy/institute and ongoing professional development activities throughout the school year. Some regions also included school/classroom site visits, leadership development opportunities, and community events as part of their MSP activities. The five MSP regions served 545 teachers in 123 schools and the number of hours of professional development activities offered ranged from 70 to 130 hours. Many university and community college instructors provided professional development with several participating alongside their K-12 partners during activities.

Teachers rated the MSP program for its effectiveness for increasing content knowledge and instructional skill (1 to 10 scale, 1 being the worst ever and 10 being the best ever experienced). Regional responses for increasing content knowledge during Year 2 ranged from 5.05 (PRiSSM) to 7.72 (WWU), and the project average was 6.86. Regional responses for increasing instructional skill during Year 2 ranged from 6.67 (ESD101) to 8.7 (PRiSSM), and the project average was 7.45. Self-reported content knowledge and instructional skill ratings increased from Year 1 to Year 2 in each region that has participated for 2 years. The type of teaching identified as *Powerful Teaching and Learning* and correlated with student achievement in the state of Washington was observed in 24% of the 70 classrooms during Year 1 and in 33% of the 105 classrooms during Year 2. All regions improved their overall STAR performance from Year 1 to Year 2 and all the MSP regions outperformed the state average in Year 2. Several challenges remain in linking what is happening in MSP professional development and how it is helping students meet state learning standards. For tenth graders statewide in 2006, 51% met their WASL math standard and only 35% met the science standard.

The Year 2 MSP promising practices vary from region to region, but all share several common features. These features include utilizing effective professional development models, developing partnerships at multiple levels, and fostering sustainability. Several regions in the MSP share similar professional development approaches, but each one varies to meet local

needs. Despite regional differences, all MSP regions recognize the need to create sustainable programs that partner effectively with higher education and community organizations. Many participants described the role of MSP's higher education partners as one of organizer, facilitator, or researcher. However, some teachers recognized the higher education partners as fellow participants, resource providers, and networking liaisons. The community college and university faculty that participate in the MSP as partners benefit from their participation by staying connected to the K-12 environment and by building a collaborative K-16 network. The role of higher education partners as fellow participants was not an expectation of the MSP program, but appeared to develop in a cooperative environment where the professional development topics could benefit teachers at all levels.

At the end of Year 2, Washington State's MSP programs are making progress toward their unique partnership and professional development goals. Each region follows a cycle of continuous improvement to address shortcomings and to capitalize on discoveries. Each region has continued to define and redefine the role of their partners and worked to build capacity for K-16 sustainability. Areas of future focus involve collecting outcome measures to highlight the long-term value of this initiative for the various stakeholders.

Implications

There are several important implications from this evaluation that apply to the MSP and to statewide professional development models in general. In 2005-2006, only 35% of Washington's 10th graders met the science WASL standard, and only 51% met the 10th grade math standard. These statistics illustrate the need for identifying professional development models that effectively increase teachers' content knowledge while simultaneously developing their instructional skill.

Greater ownership results in increased involvement.

In several of the partnerships, teachers described how they were able to work on projects relevant to their school setting and personal areas of interest. In interviews, teachers discussed how others in their region were concentrated on different areas of focus, but what made this professional opportunity different was that they could personalize the details while participating in the general regional focus. This translated into large community projects that included teachers who were not involved in the MSP and resulted in expansions into other related content areas.

Institutions of higher education benefit from partnership activities.

Although many higher education participants reported entering the partnership with an assumed role of providing professional development, many commented on what they were learning about their own teaching practices. Across regions, higher education faculty reported that they are changing their pedagogy and that they have a better understanding of the K-12 education system because of their collaboration with MSP educators. For university professors teaching pre-service teachers, the MSP provides opportunities to network with K-12 teachers and expands the available opportunities for educators in training.

Partnerships grow their own leaders.

Many of the partnerships encourage participants to take on leadership roles within their region. This allows K-12 teachers to lead workshops, to facilitate PLCs in their schools and districts, or to expand their interests into new directions for future grants. The key to developing leaders may come out of the discussions that occur when individuals with similar interests have opportunities to collaborate over an extended amount of time. The MSP format appears to be conducive for growing leaders and fostering ideas for new projects.

Meeting individual professional development needs.

Each teacher has different professional development needs based upon their personal areas of strength and weakness in conjunction with the grade level and content area in which they teach. What appears to be most beneficial across the MSP regions is having the opportunity to talk about what they are doing and being held accountable for ongoing professional development. Those with greater content knowledge or instructional skill will often move into leadership roles.

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Appendix

Teacher Interview Questions

Math Science Partnership
Year 2 Teacher Interview Questions

MSP General Questions Developing In-depth Content Knowledge for Teaching:

1. How have you been involved in the MSP so far?

2. What are your plans for involvement next year and beyond?

3. How has the MSP helped you develop your subject-area content knowledge?

4. How has the MSP helped you develop instructional skills for your subject area?

STAR Protocol Specific Questions:

Strand 1 – Student Skills & Knowledge

5. Describe some instructional techniques you use to help students develop their reading, writing, problem solving, or other skills.

6. What do you do to keep the major themes, concepts, essential questions, or enduring understandings of a lesson in front of the students?

Strand 2 – Thinking

7. Describe ways you encourage or require students to reflect on their work to gain deeper understanding.

8. What opportunities do students have to describe and/or explain their own learning/thinking processes?

Strand 3 – Application and Relationships

9. What are some techniques or activities you use to make sure the learning is personally meaningful and relevant to students' lives?

10. What do you do to differentiate the delivery of the curriculum to meet specific student needs? (If they list grouping students, ask "How do you use grouping?"

Overall

Describe the role of the college and university staff members involved with MSP. How do you think they benefit from this partnership?

How has your students' classroom experience changed since your involvement in MSP?

Compared to other professional development opportunities you have had, how would you rate your overall experience in this (MSP) project? Why?

On a 1 to 10 scale, 1 being the worst ever and 10 being the best you've experienced, how would you rate the effectiveness of this program in increasing your ***content knowledge***?

On a 1 to 10 scale, 1 being the worst ever and 10 being the best you've experienced, how would you rate the effectiveness of this program in developing your ***instructional skills***?

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