



MATH SCIENCE PARTNERSHIP PROGRAM

EXTERNAL EVALUATION REPORT

Presented To

EDUCATIONAL SERVICE DISTRICT 123

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Math Science Partnership Program
External Evaluation Report 2010

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External Evaluation Report

EXECUTIVE SUMMARY

The Educational Service District 123 (ESD 123), in partnership with Washington State University (WSU), Columbia Basin Community College (CBC), Laser Interferometer Gravitational-Wave Observatory (LIGO), Southeast Washington Leadership and Assistance for Science Education Reform, Pasco School District, and Othello School District was awarded a 3-year grant beginning in May 2007 from the Washington State Superintendent of Public Instruction. This report covers the third program year from July 2009 to the end of June 2010.

The program's core components consist of an annual two-week summer teacher academy/ WSU graduate course held at the LIGO facility focusing on science inquiry and knowledge of grade level content, and follow-up training for teachers throughout the year consisting of site-embedded professional development provided at each teacher's school and multiple science-based workshops. Over this third year of the program, there were 17 teachers served – 12 from the Pasco School District and 5 from Othello.

The external evaluation team have employed assessment instruments including participant surveys, staff and participant interviews, and partner surveys, and have analyzed associated program data to measure the program's goals of 1) improving the science achievement of students in grades 4 – 8 through growth in the quality of classroom instruction; 2) sustaining the project goals by building leadership capacity among the teachers and collaborative capacity between the institutions; and 3) establishing a comprehensive tracking system that documents teacher growth and student achievement resulting from the project. The following are the major findings of the program's third year activities.

- All MSP program components continue to be successfully implemented. This includes the summer program, follow-up workshops, classroom observations, and the mentorship component.
- There were 17 teachers served this program year – 12 from the Pasco School District and 5 from Othello.
- Six individuals from the first and second cohorts served as teacher-leaders and have provided mentorship and guidance to year two participants in the summer program, follow-up workshops, and within their school districts.

- One hundred percent (100%) of teachers completing the summer program reported that they are able to apply inquiry-based instruction in their current teaching position – an increase of 76.5% over the program pre-survey.
- Over eighty-seven percent (87%) of teachers completing the summer program reported that they understood Nature of Science concepts – an increase of 75.7% over the program pre-survey.
- Over eighty-one percent (81%) of teachers completing the summer program reported that they had the abilities to apply Nature of Science concepts in their current teaching position – an increase of 75.4% over the program pre-survey.
- Over ninety percent (90%) of teachers completing the MSP program reported that they have a good understanding of the Washington State EALRs and GLEs for the subjects they teach – an increase of 26.2% over the program pre-survey.
- Almost all participating teachers indicated that the program has significantly impacted their teaching practices and that their students are more engaged in the science classroom, have become more actively involved in their own learning, and are able to approach scientific processes more independently.
- At the beginning of the MSP program, no cohort teachers indicated that they effectively connect mathematics and science concepts in their classroom. This increased to over 90% by the completion of the program year.
- MSP teachers reporting that they had strong content knowledge in science and mathematics increased by 40.1% and 52.9%, respectively over the program pre-survey.
- The mentor program is becoming increasingly effective. Program staff and teacher-mentors interviewed believed that this component has reached a “critical mass” where there is sufficient representation by MSP mentors in the participating school districts as well as buy-in of district administrators.
- All program partners felt that the third year program has been very successful, has provided high-quality professional development opportunities to program teachers, and had continued to expand its broad range of educational and scientific partnerships.
- The Moodle online collaboration website continues not being utilized to its fullest potential. Efforts should be made to identify processes and incentives to ensure participants will visit the website to access content, interact with MSP staff and participants, and share their own experiences and knowledge.

External Evaluation Report

Educational Service District 123 • Pasco, WA

1. INTRODUCTION

RGI Corporation is pleased to present this evaluation report for the Educational Service District 123 Math Science Partnership (MSP) *Southeast Washington Science Learning Community* Program. This report covers the third program year from July 2009 to the end of June 2010. RGI Corporation is a local consulting firm contracted by the ESD 123 to conduct the external evaluation of the MSP program.

In 2009, the ESD 123 applied for and was awarded two additional years of funding for MSP activities. This program, entitled *Science Alliance* provides further professional development for teachers in districts currently participating in the Southeast Washington Science Learning Community. Science Alliance program activities began in July 2010.

The Math Science Partnership Program was authorized through the *No Child Left Behind Act of 2001*. This Act provided for funding to be awarded through a competitive grant process to encourage institutions of higher education, local school districts, elementary schools, and secondary schools to participate in professional development activities. The goal of these activities is to increase the subject matter knowledge and instructional skills of science, mathematics, and technical education teachers with respect to student achievement in science, mathematics, reading to learn, and technical writing, particularly with under represented student populations.

The Educational Service District 123 (ESD 123), in partnership with Washington State University (WSU), Columbia Basin Community College (CBC), Laser Interferometer Gravitational-Wave Observatory (LIGO), Southeast Washington Leadership and Assistance for Science Education Reform, Pasco School District, and Othello School District submitted a proposal to the Washington State Superintendent of Public Instruction for the 2006 fiscal year competition and was awarded a 3-year grant that began in May 2007. The primary goals of the ESD 123 MSP Program are: 1) Improve the science achievement of students in grades 4 – 8 through growth in the quality of classroom instruction; 2) Sustain the project goals by building leadership capacity among the teachers and collaborative capacity between the institutions; and 3) Establish a comprehensive tracking system that documents teacher growth and student achievement resulting from the project. The program's core components consist of an annual two-week summer teacher academy/ WSU graduate course held at the LIGO facility focusing on science inquiry and knowledge of grade level content, and follow-up training for

teachers throughout the year consisting of site-embedded professional development provided at each teacher's school and multiple science-based workshops.

Participating teachers were drawn from elementary schools in the Southeast Washington State School Districts of Pasco and Othello. The Pasco and Othello School Districts are experiencing low academic achievement in meeting science and math state standards. These districts have a large Hispanic student body (69.1% and 80.9%, respectively), high poverty (70.2% and 77.2% free or reduced-price meals). According to the Office of Superintendent of Public Instruction (OSPI), Pasco students scored significantly lower on the 2009 5th grade Washington Assessment of Student Learning (WASL) in science (29.0% passing compared to State average of 44.9%) and in math (38.4% compared to State average of 61.9%). Othello students also scored significantly lower on the 5th grade WASL in science (22.3%) and in math (35.5%).

2. EVALUATION BACKGROUND AND METHODOLOGY

2.1 Evaluation Team

The local program evaluation is being conducted by the educational research firm RGI Corporation. This independent consulting corporation has extensive experience in evaluating federal and state educational projects within local and regional school districts including those funded by the U.S. Department of Education and the National Science Foundation. RGI Corporation is a Washington State Minority Business Enterprise (MBE) specializing in evaluation services for projects serving minority and under-represented populations. The evaluators are Ryan A. Landvoy, a doctoral-level mathematician with over 16 years of experience in secondary and post-secondary education, and Robert Ozuna, MPA, a Harvard educated professional with extensive evaluation experience. Both principals of RGI Corporation have broad knowledge of scientifically-based evaluation methodologies, evaluation design and implementation, and reporting requirements of federal and state-funded programs.

2.2 Methodology

The goal of the evaluation is to measure, in both qualitative and quantitative terms, the effectiveness of this program from its inception through its current implementation. An evaluation plan was developed in coordination with the MSP planning team that centered on the measurement of the program's primary goals and objectives. The principal sources of data are participant pre- and post-surveys, summer program surveys, participant and program staff interviews, and partner surveys.

This evaluation report covers the third program year/ cohort of the MSP program. This evaluation report will focus primarily on program implementation objectives and the professional growth of the third group of educators to participate in the program. An analysis of quantitative data obtained from participant pre-and post- surveys for both the

summer program and the overall program, and partner surveys will be provided. Information derived from participant interviews and other qualitative data sources is also included. Comparison of applicable data between year two and three of the program is also provided.

2.3 Data Sources

Qualitative and quantitative data and information pertaining to the Math Science Partnership program was collected from several of sources. The following are the types of data obtained and the manner in which they were acquired.

- **Participant Pre-Surveys** – This survey was provided to participating teachers prior to the 2009 summer program before any MSP professional development activities had been conducted. It was designed to establish a baseline for program goals and outcome measures for each cohort. It asked participants to rate their level of understanding and confidence in nature of science and inquiry-based instruction concepts, state academic standards, and content knowledge.
- **Summer Program Post-Surveys** – This survey was provided to participating teachers following the completion of the two-week summer program. It was designed to measure growth in course content areas including nature of science, inquiry-based instruction, and design and evaluation of scientific experiments. It also asked to what extent their expectations for the course were met.
- **Participant Post-Surveys** – This survey was provided to participating teachers in May 2010 following the completion of their professional development activities. It was designed to measure the professional growth of each cohort of participating teachers with respect to the program goals and objectives.
- **Participant Interviews** – These telephone interviews were conducted with most participating teachers during February and March of 2010. The goal of these interviews was to solicit qualitative information regarding program activities, and how these activities have impacted their classroom instruction and student learning. Suggestions on program improvements were also solicited.
- **Program Staff and Mentor Interviews** – These formal and informal interviews were conducted intermittently throughout the year with program staff, mentors and stakeholders regarding the program, its successes and challenges, and its progress in meeting its goals and objectives.
- **Partner Survey** – This online survey was provided to program staff, partners, and other stakeholders regarding partnerships, collaboration beyond the scope of the MSP program, and relationships between participating organizations. Feedback on program successes, challenges, and suggestions for improvement were also solicited.

3. PROGRAM IMPLEMENTATION EVALUATION

The following section details progress made in the implementation of the MSP program over the past twelve months. It also describes the successes, challenges, and highlights of program operations. All program activities including the two-week intensive summer program, follow-up site visits to observe participants, and professional development seminars have been implemented as described in the grant proposal.

3.1 Program Management

The project is managed by the MSP Core Planning Team (CPT) which is made up of program administrators and stakeholders from the ESD 123, LIGO, WSU Tri-cities, and the Pasco and Othello School Districts. The team plan and schedule program activities, make operational decisions, and assess program successes, challenges, and impacts. In addition, the team regularly communicates via e-mail, telephone, and meets in sub-groups as necessary to develop educational content and conduct program business.

3.2 Participants Served

The MSP program model provides cohort-based training to elementary and middle school teachers in the Pasco and Othello school districts. Teachers from the Pasco and Othello schools were recommended and/or recruited by district administrators to participate in the program. As this project requires a year-long commitment, potential candidates were carefully screened to ensure that the individuals selected were able to fully meet their time and work responsibilities to the program. As the MSP program is cohort-based, one group of teachers is served each year. Over this third year of the program, there were 17 teachers served – 12 from the Pasco School District and 5 from Othello. Six of the individuals from the first and second cohorts were identified as teacher-leaders and served as mentors to the year three participants.

3.3 Summer Program

The MSP two-week intensive teaching seminar was conducted in July 2009 and served as the project's central supporting activity. The program was held at the LIGO Hanford Observatory, a world-class research facility located Northwest of Richland, Washington.

**“I now understand how I
should be teaching
science.”**

MSP Participant

It was taught by Washington State University faculty in collaboration with MSP team members from LIGO. This seminar, also a WSU graduate course provided participants graduate credit. During their two weeks at LIGO, teachers completed readings on scientific inquiry and Nature of Science (NOS), participated in instructor-led and group discussions where they talked about their reactions, ideas, reflections, and questions about NOS and inquiry. They explored and developed their own inquiry-based lessons designed for their own classroom, and presented their lessons during the final two days of the course. Teachers also created their unique Instructional

Improvement Plan (IIP) based upon their assessment of their own teaching strengths and weaknesses. In addition, teachers met and interacted with scientists and technicians from the LIGO facility who provided tours, opportunities for job shadowing, and access into careers and cutting-edge applications of science.

Prior to the start of the summer program, a pre-program survey was given. In this assessment, participants were asked to respond to a series of eleven statements by rating the extent to which they agreed or disagreed. These questions established a baseline not only for the shorter term goals of the summer course but the longer-term project goals as well. At the completion of the summer course, participants were asked to complete a summer program post-survey that was designed to measure growth in core MSP summer program objectives. This survey therefore only addressed six of those questions that directly pertained to objectives for the two-week course. These areas included nature of science, inquiry-based instruction, and design and evaluation of scientific experiments.

The following table gives results for these six questions. The value in the pre- and post-survey categories represents the percentage of respondents who strongly agreed or agreed with the statement. The percentage change between pre- and post-survey results is also provided.

MSP Summer Program 2009 – Pre/Post Comparison			
	Summer Pre-Survey (Strongly Agree or Agree)	Summer Post-Survey (Strongly Agree or Agree)	Change
I understand the concept of inquiry-based instruction.	52.9%	100.0%	47.1%
I (have the skills to) apply inquiry-based instruction in my current teaching position.	23.5%	100.0%	76.5%
I understand Nature of Science concepts.	11.8%	87.5%	75.7%
I (have the skills to) apply and/or communicate Nature of Science concepts to students in my current teaching position.	5.9%	81.3%	75.4%
I am confident in designing scientific experiments.	11.8%	75.0%	63.2%
I am confident in evaluating scientific experiments.	23.5%	50.0%	26.5%

For all statements, participants indicated an improvement in their skill level, understanding, and confidence. Particularly dramatic were the changes in 1) Ability to apply inquiry-based instruction (+76.5%); and 2) Understanding of Nature of Science

concepts (+75.7%); Ability to apply Nature of Science concepts (+75.4%); and Confidence in designing scientific experiments (+63.2%).

As part of the summer program post survey, participants were also asked to describe how their expectations for this course were or were not met. The following quotes are representational of the overall set of responses:

- *“I now have a better understanding of how to make my students be deeper thinkers and own their learning.”*
- *“I will be a better science teacher and that was my goal.”*
- *“I feel way more confident about my abilities to teach inquiry science and Nature of Science activities.”*
- *“All of my expectations were met. We learned about Nature of Science, talked about it and then did it.”*

3.4 Follow-Up Activities

A number of regularly scheduled follow-up workshops were provided to program participants. In addition, program staff conducted site visits to observe the classrooms of MSP teachers and teacher-leaders mentored second-year participants. The following sections describe these and other follow-up activities as well as the program’s online communication tool, the “Moodle” site.

Workshops. As a follow-up to the summer program, four professional development workshops were offered to participating teachers over the academic year. These opportunities were hosted at the ESD 123 and took place in September, December, February, and May of the 2009 – 2010 academic year and provided participants clock hours for State certification requirements. These three-hour workshops were structured events, each with formal agendas and stated goals that aligned closely with MSP program objectives. Each session was held in the late afternoon and typically involved presentation and discussion led by project team staff, small group discussion and presentations, hands-on activities, and dinner.

- The first follow-up workshop was held on September 17, 2009 from 4 – 7 p.m. at the ESD 123. Program staff first led a discussion of upcoming teaching observations and expectations for participants. An overview of the online “Moodle” communication site and a panel discussion of mentor teachers discussing classroom management and inquiry-based learning followed. The final activity was a surface tension inquiry lesson led by Todd Rogers of Columbia Basin College.

- On December 10, 2009 the second follow-up workshop was held. An update on Washington State Science Assessments was given followed by a presentation on teacher collaboration experiences. Following dinner, reports on teacher observations and VOSI-E data collection were given. Nature of Science and Nature of Math activities such as “The Great Fossil Find” and “Fibonacci Numbers” followed.
- The next follow-up workshop was held on February 25, 2010. The goal of this workshop was to improve understanding and ability to teachers in incorporating math into science instruction. In this workshop participants discussed how students use math every day, how math and science are integrated in curriculum, and how to identify connections in science units.
- The final workshop for this cohort of MSP teachers was held on May 20, 2010. A large group discussion on how scientific inquiry has been implemented in participants’ classrooms, next year’s plans for inquiry and NOS implementation, and sharing of instructional materials was the major activity. Views of Scientific Inquiry (VOSI) surveys, a Post Classroom Characteristics survey and external evaluation surveys were completed at this workshop. Certificates of participation were also presented to teachers.

Program teachers had positive feedback regarding the follow-up workshops based upon survey results and participant interviews. All participants interviewed described the workshops as helpful and that they are well integrated with other program activities such as the summer program and teaching observations.

As part of the mid-program year evaluation, participants were interviewed about whether the follow-up workshops have been helpful. The following quotes are representational of the overall set of responses:

- *“By continuing to provide me with opportunities to acquire new skills and get new ideas I am better able to facilitate inquiry science lessons in my classroom. It has helped me gain a more clear understanding of how to use the inquiry model more effectively.”*
- *“I have liked the opportunity to share what we're doing in the classroom at the follow - up workshops. The stations with examples of inquiry lessons and activities have been useful, too. Georgia Boatman has been a wealth of information, sharing the latest from the state level in the area of science.”*
- *“The follow-up workshops have given me a chance to realign with the beliefs that I have about science. I appreciate that they value us and it keeps me on my toes with the check-ins.”*

- *“The main thing is having the refresher. It is an easy way to hold ourselves accountable and giving the inquiry process opportunities to be used.”*
- *“I enjoy the time that I have to learn from others in the workshop setting, as well as hearing about strategies teachers have implemented in their own classrooms in regards to inquiry science. The follow-up sessions have also provided additional hands-on inquiry for us as well which I find beneficial.”*

Teaching Observations. Program staff also visited the classrooms of program teachers to observe, mentor, and help reinforce and build upon the experiences from the summer course. A primary objective of these visits was to help participants improve their own ideas about inquiry science, the nature of science, and specific science activities and content. MSP program staff including representatives from Washington State University and Columbia Basin College, and LIGO visited each classroom twice during the academic year and provided detailed feedback on science content and inquiry. The first classroom observations were conducted in late 2009 while the second follow-up visits were made in Spring 2010. Program staff observed lessons prepared by MSP teachers based upon their Instructional Improvement Plan. The first lesson was critiqued primarily on science content while the second observation focused upon how rigorously teachers were implementing scientific inquiry. Discussions with participants followed the observations where in many cases content-based guidance on LASER kits was provided.

Presentations. In March 2010 MSP project principals Mark Muxen and Georgia Boatman presented at the MSP Regional Conference in New Orleans. This presentation titled the “Southeast Washington Science Learning Community MSP Program” detailed the project activities, partnerships with districts, LIGO and WSU, the evaluation design and current evaluation results.

Moodle Site. To enhance collaboration between program participants and project staff, the ESD 123 hosted a “Moodle Site” – a web-based application that is designed as a vehicle for online collaboration, dialogue, feedback, and sharing of resources and information. The site also provides feedback and on-going communication/information to school administrators, teachers, and other interested educators on the progress of the project.

Although the Moodle site was demonstrated and utilized in several of the follow-up meetings during years one and two of the program, the tool has continued to not be used to its fullest potential as a mechanism for participants to share and discuss program content, and regularly communicate throughout the academic year. Project staff posted required readings and supplementary materials to the site although in some instances these documents were also e-mailed to participants. However, many program

stakeholders and participants believe that the Moodle site has significant potential although a different format and set of incentives may be necessary to increase its use.

4. OUTCOMES EVALUATION

As described above, the goals of the ESD 123 MSP Program are to: 1) Improve the science achievement of students in grades 4 – 8 through growth in the quality of classroom instruction; 2) Sustain the project goals by building leadership capacity among the teachers and collaborative capacity between the institutions; and 3) Establish a comprehensive tracking system that documents teacher growth and student achievement resulting from the project.

The primary data sources utilized in the outcomes evaluation that follows are participant pre- and post- program surveys, participant interviews, and the partner survey. All survey instruments can be found in the appendices.

4.1 Growth in the Quality of Classroom Instruction

As described previously, prior to the start of the summer workshop in July 2009 participants completed a pre-program survey that assessed their level of understanding and confidence in nature of science and inquiry-based instruction concepts, State academic standards, and content knowledge. At the final meeting for the first cohort in May 2010, teachers completed a post-survey which again asked them to rate the same series of statements from the pre-survey.

The following table gives results for these eleven questions. The value in the pre- and post-survey categories represents the percentage of respondents who strongly agreed or agreed with the statement. The percentage change between pre- and post-survey results is also provided. Note that the first six of the questions were evaluated as part of the summer program assessment where the interval between pre- and post-surveys was two weeks. In the following case, the period between pre- and post-surveys was approximately 11 months so as to capture teacher growth over the entire program year.

MSP Program: Cohort 3 – Pre/Post Comparison			
	Program Pre-Survey (Strongly Agree or Agree)	Program Post-Survey (Strongly Agree or Agree)	Change
I understand the concept of inquiry-based instruction.	52.9%	100.0%	47.1%
I apply inquiry-based instruction in my current teaching position.	23.5%	90.9%	67.4%
I understand Nature of Science concepts.	11.8%	90.9%	79.1%

I apply and/or communicate Nature of Science concepts to students in my current teaching position.	5.9%	81.8%	75.9%
I am confident in designing scientific experiments.	11.8%	72.7%	61.0%
I am confident in evaluating scientific experiments.	23.5%	63.6%	40.1%
I have strong mathematics content knowledge for my current teaching position.	47.1%	100.0%	52.9%
I have strong science content knowledge for my current teaching position.	23.5%	63.6%	40.1%
I have a good understanding of the Washington State EALRs and GLEs for the subjects I teach.	64.7%	90.9%	26.2%
I connect the Washington State EALRs and GLEs to the content I teach.	70.6%	90.9%	20.3%
I effectively connect mathematics and science concepts for my students.	0.0%	90.9%	90.9%

For all statements, participants indicated an improvement in their skill level, understanding, and confidence. There was strong improvement in the level to which participants understood and were able to apply both inquiry-based and Nature of Science concepts in their classroom. Teachers who were able to apply inquiry based instruction in their classroom increased from 23.5% to 90.9% of the cohort. In addition, teachers who 1) understood Nature of Science concepts and 2) who were able to apply those concepts in the classroom increased by 79.1% and 75.9%, respectively.

Participants also expressed increased science and mathematics content knowledge over the program year. The percentage of individuals who reported that they “had strong content knowledge for my current teaching position” increased by 40.1% in science and 52.9% in math. There was also a gain by 26.2% of teachers who had a good understanding of Washington State EALRs and GLEs.

The increase in participants who felt that they effectively connected mathematics and science concepts in the classroom is very significant. No teachers (0%) reported in the pre-survey that they effectively connected the two areas for their students. Following the completion of the MSP program, this jumped to 90.9%.

Participant interviews. During February and March 2010 participant interviews were conducted to gather qualitative data regarding program activities, and how these activities have impacted classroom instruction and student learning.

When teachers were asked *to what extent their participation in the MSP program impacted classroom instruction*, every respondent who has utilized inquiry in their subject area stated that the program has changed for the better how they teach science. They indicated that their students are “asking more questions and are coming up with more things on their own.” A number of teachers are expressing that they are more comfortable with inquiry and are being more intentional in how they design lessons to allow for more exploration and a less scripted learning environment.

“The program has forced me to release responsibility so the students are in charge of the learning instead of me spoon-feeding it to them.”

MSP Teacher

MSP Teachers were also asked *how their participation in the MSP program impacted their confidence in science content or instruction*. All teachers interviewed answered affirmatively although to different degrees. Many said that through their deeper utilization of inquiry, they understood that “it’s okay not to know everything” and that “I may not have all the answers, but I can say let’s look it up together and find out.” Teachers in the program have expressed an overall increase in confidence, not only in science content but in their approach to instruction. One teacher states:

I feel more confident in collaborating with teammates and telling them “I don’t know” and “I need help.” I feel like I’ve learned that it is not my job to spray information at students and hope it sticks. It is to get students to think, explore and synthesize.

My students frequently ask, “Are we going to do science today?” When they hear, “Yes” they cheer.

MSP Teacher

When asked *how their participation in the MSP program impacted their students*, all teachers interviewed believed that there had been a very positive impact. Most said that their students were more enthusiastic about science and they are getting much more out of science. “Students have had more opportunities to make meaning from their data,” states one teacher describing how their students have talked more about what their data tells them about science. Many participants have said that science is now their favorite part of their student’s day.

4.2 Leadership and Collaborative Capacity

Teacher Mentors. The second program goal involves the building of leadership capacity among the teachers and collaborative capacity between the institutions. At the completion of the first program year, six program participants were identified as teacher-leaders and agreed to serve as mentors to the year two participants. Two of these second year mentors were retained for year three and four additional mentors were added again providing six mentors for the third year of the program. These leaders provided expertise to second year MSP teachers as well as other teachers in their respective districts on inquiry-based instructional methods, science content, and best practices. They also supported MSP program staff in the summer program and at follow-up workshops, and served as a liaison between district administrators and MSP staff.

Stakeholders in general felt that this first year of the mentor component of the program was effective but indicated that they were several areas that could continue to be strengthened. Based upon program staff and mentor interviews, the second year of the mentor program was increasingly effective. Mentors were able to further participate in MSP activities such as teaching observations and were able to impact educators within their building as well as others within their district. Program staff and teacher-mentors interviewed believed that this component has reached a “critical mass” where there is sufficient representation by MSP mentors in the participating school districts as well as buy-in of district administrators.

Amanda Baumgartner, teacher at Maya Angelou Elementary School in the Pasco School District, has been a MSP Program mentor for the past two academic years. She had directly mentored 4 teachers in her district and serves as both a math and a science coach at her school. She supports teachers by providing teaching resources, inquiry training, feedback from classroom observations, and encouragement as they implement new strategies. During her work as a mentor she has expanded her duties from mathematics to science due in part to the MSP program. She has seen how the MSP program has positively impacted her school and district by helping teachers implement science inquiry in their classrooms and how it has changed their approach to teaching science. “Student interest in science is way up,” states Amanda. The teachers she has mentored have described a defined improvement in student performance in science due to the utilization of inquiry-based techniques. Within her district she sees “teachers getting excited about science training” and an increase in participation and commitment of science teaching staff as a whole. Amanda is grateful for the opportunities the program has provided. She feels that the support provided by program staff has been invaluable and that the stipends have allowed her to purchase additional supplies to help further MSP program goals within her school and district.

Program Partnerships. There have been numerous opportunities for program staff, partners, participating teachers and their districts to interact and strengthen educational opportunities for students. To gauge the quality of collaboration and relationships

between MSP program partners, an online survey was administered to program partners and other stakeholders in June 2010. The following table gives the results of each question of the partnership survey broken down by response percentage.

MSP Program Partnership Survey Results						
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know
The MSP program has provided high-quality professional development opportunities for participating teachers.	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
The MSP program has established a broad range of educational and scientific partnerships.	77.8%	22.2%	0.0%	0.0%	0.0%	0.0%
Over the past year, my district/school/organization has participated in collaborative science education projects with other project partners outside of the scope of the MSP program.	55.6%	44.4%	0.0%	0.0%	0.0%	0.0%
Strong relationships have formed between my district/school/organization and other participating MSP organizations.	66.7%	22.2%	0.0%	11.1%	0.0%	0.0%
Overall, this past year's Math Science Partnership program has been very successful.	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%

All respondents felt that this past year's program had been successful and had provided high-quality professional development opportunities to program teachers. The goal of the third question above was assess the extent to which additional collaboration was conducted beyond the scope of the MSP program. This is particularly important as a measure of how the MSP program helps facilitate additional educational partnerships. All respondents either strongly agreed or agreed that the MSP program helped further science education partnerships within the participating school districts.

“We are reaching critical masses of trained teachers in a number of schools and they are affecting behaviors of teachers in buildings who have not had training opportunities.”

MSP Partner

LIGO Partnership. In addition to providing the venue for the summer program, LIGO staff have provided significant support to cohort one and two MSP teachers, their students, and students' families over the past academic year. Students have been served by field trips to the LIGO facility as well as by presentations by LIGO staff and researchers at science fairs, career fairs and classroom visits. Over the past program year, LIGO hosted or LIGO representatives participated in eight major events with MSP

program districts. These events included two field trips to LIGO serving 140 students, and six Science Fairs/ Science Nights serving over 350 students and parents.

Dale Ingram, Science Outreach Coordinator at LIGO Hanford has been working with the MSP Project since its inception. Together with LIGO's Observatory Head Fred Raab, he has helped provide logistics, content and support for the program's summer academies, classroom visits, and follow-up workshops. "The MSP Program has been a big benefit to LIGO," says Mr. Ingram. "The job shadowing component of the summer program has helped our scientists connect with K – 12 educators and allowed them to interact with teachers on a personal level." The impact on MSP teachers is evident as Mr. Ingram describes how they are struck by the many aspects of the scientists' work including processes directly related to scientific discovery and inquiry. He has seen changes in teacher professional demeanor and has described individuals who were previously reluctant to implement inquiry-based methods in their classrooms now providing high levels of leadership to their school and district. LIGO's partnership with the MSP Program also fulfills a primary goal of the National Science Foundation (NSF) – the agency providing funding for the facility. Educational outreach is a primary objective of NSF, and LIGO's connection with K- 12 education through MSP helps ensure that knowledge and scientific inspiration reaches future generations of students and teachers.

Dr. Todd Rogers, faculty member in the sciences at Columbia Basin College (CBC) is a partner representative with the MSP Program. He performs many critical services for MSP by helping design and present in follow-up workshops, conducting classroom observations, and providing assessment and feedback to participating teachers. Dr. Rogers has also seen the direct impact of the program on participating teachers and their students and believes that the MSP program is providing a "critical mass" of teachers who are helping change the way science is taught in participating schools. He enjoys seeing the "little scientist in kids" and is often amazed at the truly profound things students say as they are utilizing inquiry to learn about the world around them. Through this partnership, college students at Columbia Basin are also designing curriculum around inquiry, helping motivate and inspire future teachers in science education.

4.3 Tracking System

The third program goal involves the establishment of a comprehensive tracking system that documents teacher growth and student achievement resulting from the project. This system is to maintain a database of MSP program participants, the grade levels they teach and their teaching credentials, their students including demographics, and academic indicators including student WASL scores and grades. This tracking system is under development but progress has been made in organizing important demographic, academic, and professional development for cohort participants.

5. ACHIEVEMENTS AND RECOMMENDATIONS

Overall, the Math Science Partnership program has had a successful third year. The following are the major third year achievements of the MSP program:

- All MSP program components continue to be successfully implemented. This includes the summer program, follow-up workshops, classroom observations, and the mentorship component.
- There were 17 teachers served this program year – 12 from the Pasco School District and 5 from Othello.
- Six individuals from the first and second cohorts served as teacher-leaders and have provided mentorship and guidance to year two participants in the summer program, follow-up workshops, and within their school districts.
- One hundred percent (100%) of teachers completing the summer program reported that they are able to apply inquiry-based instruction in their current teaching position – an increase of 76.5% over the program pre-survey.
- Over eighty-seven percent (87%) of teachers completing the summer program reported that they understood Nature of Science concepts – an increase of 75.7% over the program pre-survey.
- Over eighty-one percent (81%) of teachers completing the summer program reported that they had the abilities to apply Nature of Science concepts in their current teaching position – an increase of 75.4% over the program pre-survey.
- Over ninety percent (90%) of teachers completing the MSP program reported that they have a good understanding of the Washington State EALRs and GLEs for the subjects they teach – an increase of 26.2% over the program pre-survey.
- Almost all participating teachers indicated that the program has significantly impacted their teaching practices and that their students are more engaged in the science classroom, have become more actively involved in their own learning, and are able to approach scientific processes more independently.
- At the beginning of the MSP program, no cohort teachers indicated that they effectively connect mathematics and science concepts in their classroom. This increased to over 90% by the completion of the program year.
- MSP teachers reporting that they had strong content knowledge in science and mathematics increased by 40.1% and 52.9%, respectively over the program pre-survey.

- The mentor program is becoming increasingly effective. Program staff and teacher-mentors interviewed believed that this component has reached a “critical mass” where there is sufficient representation by MSP mentors in the participating school districts as well as buy-in of district administrators.
- All program partners felt that the third year program has been very successful, has provided high-quality professional development opportunities to program teachers, and had continued to expand its broad range of educational and scientific partnerships.

Recommendations

The following recommendations are based upon observations made and conclusions drawn during the third year of the program.

- **Increase Moodle site participation.** Moodle site participation has been an ongoing challenge over the past three years of the program. Based upon interview and survey feedback from MSP staff and participants, the Moodle online collaboration website continues not being utilized to its fullest potential. Continued efforts should be made to identify processes and incentives to ensure participants will visit the website to access content, interact with MSP staff and participants, and share their own experiences and knowledge.
- **Continue to develop tracking system.** During year three, progress was made in collecting and maintaining participant data in a centralized. Continued development and formalization of the tracking system should be undertaken to include second and third year participants, electronic entry and access, and data on participants’ students.

The ESD 123 Math Science Partnership program has had a successful third year in terms of both its implementation and the achievement of its goals. It has implemented all of its program components, and has been particularly successful in achieving key program objectives relating to teacher understanding and confidence in applying inquiry-based instruction, nature of science concepts, and connecting science and mathematics within the classroom. The MSP program, as it continues as the *Science Alliance* over the next two years, has a solid foundation in which to build upon these successes to further impact Washington State teachers and the students they serve.

6. SUMMARY OF THREE YEARS OF TEACHER PROGRESS

The following tables provide summary statistics over the past three years of the *Southeast Washington Science Learning Community* MSP Program. The first table gives the number of teachers served in each of the three cohorts and the second provides each cohort’s percentage change pre- and post-program to the set of outcome measures.

I. Participants Served

Participants	Pasco	Othello	Total
Year 1 (2007 – 2008)	15	3	18
Year 2 (2008 – 2009)	23	4	27
Year 3 (2009 – 2010)	12	5	17

II. Participant Impact

Percent increase of participants who:	Cohort1/ Year 1	Cohort2/ Year 2	Cohort3/ Year 3
understand the concept of inquiry-based instruction.	+14.3%	+19.0%	+47.1%
apply inquiry-based instruction in their current teaching position	+47.6%	+40.5%	+67.4%
understand Nature of Science concepts	+59.6%	+66.7%	+79.1%
apply Nature of Science concepts to students in my current teaching position.	+52.4%	+23.8%	+75.9%
are confident in designing scientific experiments	+26.3%	+16.7%	+61.0%
are confident in evaluating scientific experiments	+9.5%	+35.7%	+40.1%
have strong mathematics content knowledge for their current teaching position	+33.3%	+31.0%	+52.9%
have strong science content knowledge for their current teaching position	+33.3%	+28.6%	+40.1%
have a good understanding of the Washington State EALRs and GLEs	+9.5%	+28.6%	+26.2%
effectively connect the Washington State EALRs and GLEs to the content they teach	+7.9%	+2.4%	+20.3%



Instructions – Please select one response for each of the statements below. Thank you.

MSP Program Pre-Survey					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I understand the concept of inquiry-based instruction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I apply inquiry-based instruction in my current teaching position.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I understand Nature of Science concepts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I apply and/or communicate Nature of Science concepts to students in my current teaching position.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I am confident in designing scientific experiments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I am confident in evaluating scientific experiments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I have strong mathematics content knowledge for my current teaching position.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I have strong science content knowledge for my current teaching position.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I have a good understanding of the Washington State EALRs and GLEs for the subjects I teach.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I connect the Washington State EALRs and GLEs to the content I teach.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. I effectively connect mathematics and science concepts in my classroom.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. What are your expectations for this program?					

What is the month of your birthday? _____
 What is the date of your birthday? _____
 What is the number of your house or PO box? _____



Instructions – Please select one response for each of the statements below. Thank you.

MSP – Summer Program Post-Survey					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I understand the concept of inquiry-based instruction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I have the skills to apply inquiry-based instruction in my current teaching position.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I understand Nature of Science concepts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I have the skills to apply and/or communicate Nature of Science concepts to students in my current teaching position.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I am confident in designing scientific experiments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I am confident in evaluating scientific experiments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Describe how your expectations for this course were or were not met.					

What is the month of your birthday? _____
 What is the date of your birthday? _____
 What is the number of your house or P0 box? _____



Instructions – Please select one response for each of the statements below. Thank you.

MSP – Year-End Teacher Survey					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I understand the concept of inquiry-based instruction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I apply inquiry-based instruction in my current teaching position.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I understand Nature of Science concepts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I apply and/or communicate Nature of Science concepts to students in my current teaching position.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I am confident in designing scientific experiments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I am confident in evaluating scientific experiments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I have strong mathematics content knowledge for my current teaching position.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I have strong science content knowledge for my current teaching position.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I have a good understanding of the Washington State EALRs and GLEs for the subjects I teach.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I connect the Washington State EALRs and GLEs to the content I teach.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. I effectively connect mathematics and science concepts for my students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

-Please continue on the other side-



<p>12. What aspects of the MSP Program did you like the most?</p>	
<p>13. What aspects of the MSP Program did you like the least?</p>	
<p>14. What suggestions would you make to improve the program?</p>	

What is the month of your birthday? _____
What is the date of your birthday? _____
What is the number of your house or PO box? _____

MSP Teacher Participant Interview

Teacher Name _____ School _____ Date _____

- Was the summer program helpful for you professional development? How so?

- Have the follow-up workshops been helpful? How so?

- To what extent have you applied what you have learned in the summer program and follow-up workshops?

- Are you using any online resources – the Moodle site?

- Has your participation in the MSP program impacted your classroom instruction? How so?

MSP Teacher Participant Interview

- Has your participation in the MSP program impacted your confidence in science content or instruction?

- Has your participation in the MSP program impacted your understanding of the science EARL and GLE's? How so?

- Has your participation in the MSP program impacted your understanding in designing and evaluating scientific experiments?

- Has your participation in the MSP program impacted your students? How so?

- Do you have any suggestions for improvements in program?

MATH SCIENCE PARTNERSHIP

Partner Survey

INSTRUCTIONS: As part of the evaluation for the Math Science Partnership (MSP) program, we would appreciate your feedback in the following survey. You are asked for your e-mail address only to ensure the completeness of the survey - no individual responses will be reported.

Please select one response for each of the following statements.

The MSP program has provided high-quality professional development opportunities for participating teachers.

Strongly Agree Agree Neutral Disagree Strongly Disagree
Don't Know

The MSP program has established a broad range of educational and scientific partnerships.

Strongly Agree Agree Neutral Disagree Strongly Disagree
Don't Know

Over the past year, my district/school/organization has participated in collaborative science education projects with other project partners outside of the scope of the MSP program.

Strongly Agree Agree Neutral Disagree Strongly Disagree
Don't Know

Strong relationships have formed between my district/school/organization and other participating MSP organizations.

Strongly Agree Agree Neutral Disagree Strongly Disagree
Don't Know

Overall, this past year's Math Science Partnership program has been very successful.

Strongly Agree Agree Neutral Disagree Strongly Disagree
Don't Know

What have been the MSP program's primary successes this first project year?

What have been the MSP program's primary challenges this first project year?

Do you have any comments or suggestions for program improvements?

Email: