Mathematics

Evaluation Brief, 2017-2018 School Year

AESD ASSOCIATION OF EDUCATIONAL SERVICE DISTRICTS

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Supporting Washington's Schools and Communities.

Kauffman & Associates INCORPORATED

Dear ESD and OSPI Colleagues,

It is with great pleasure that we share this Evaluation Brief to communicate what we have learned thus far in our exploratory pilot study focused on measuring the "Influence on Student Mastery of Content" in the OSPI/AESD Professional Learning Network Theory of Action.

The OSPI/AESD Professional Learning Network Theory of Action was developed collaboratively by ESD Regional Coordinators. The documents reflect the comprehensive and strategic approach to getting timely information from OSPI education leaders into the hands of our local teachers to improve student learning. It is the way we tell the story between the actions of the Regional Coordinators and teacher and student outcomes.

This brief provides an example of the type of information we are gathering to probe the assumptions in the Theory of Action that specifically focus on Regional Coordinators' work. By studying one mathematics teacher, the through line from Regional Coordinators' work to student mastery of content is illuminated.

Together, let's celebrate the collective effects of OSPI/AESD professional learning sessions on teachers and students across Washington state.

Sincerely yours,

Gene Sharratt, AESD, and Kathe Taylor, OSPI

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Student Learning Exploration

Throughout Washington state, Regional Content Coordinators serve as the conduit of information from our state education leaders to school districts across 71,362 square miles, spanning the snow-capped mountains of the Cascades to forested islands in Puget Sound to the rich agricultural fields in Eastern Washington. The Regional Coordinators work diligently in their Educational Service District (ESD) Regions to take common resources from the Office of Superintendent of Public Instruction (OSPI) addressing equity, standards, and assessment to help teachers improve instruction and student learning. They offer courses throughout the year and work within schools, supporting instruction through professional learning communities, classroom demonstrations, and embedded coaching practices in cooperation with teachers, instructional coaches, and administrators.

Last year, work began with the collaborative development of the OSPI/AESD Professional Learning Network Theory of Action. Over the course of a month, Regional Coordinators from all nine ESDs and four content areas were guided through a series of conversations. With diligent attention to detail, they passionately shared the multi-faceted nature of their work and intended outcomes. After synthesizing volumes of information, Kauffman & Associates, Inc., (KAI) created the resulting Theory of Action that depicts the relationship between Regional Coordinators' actions and tasks to desired outcomes. This framework allowed for an evaluation to test assumptions about OSPI/AESD Professional Learning Network activities. By collecting data to confirm, modify, or refute these relationships, the evaluation aims to ground practice in a clear analysis of what is working well and what may need to be improved.

Using a participatory approach to conduct research for this brief, KAI's Dr. Janet Gordon collaborated with teachers to explore how their engagement in OSPI/AESD professional learning has influenced students. Dr. Gordon used quantitative (assessment scores, surveys, classroom work) and qualitative (videos, audio, interviews) data to tell the story of the teachers' cycle of inquiry, from professional learning to classroom implementation, adjusting practice, and the influence on students.

Spotlight — Mathematics

Ben Garcia teaches at Brewster Elementary School in Brewster, WA, approximately 65 miles north of Wenatchee. Brewster Elementary is a small, rural school surrounded by orchards. Brewster serves Pre-K through fifth-grade students divided among 36 teachers. Students come from the following racial back grounds: 6% White, 93% Latino, with the remaining students being two or more races, Asian and African American. Of these students, fewer than 94% use the Free or Reduced Lunch program. Most of the students are English Language Learners (ELL) and are children of parents from Mexico. Some of the students are migrants and have parents who work in the orchards or packing sheds. Mr. Garcia has been a math specialist for grades K through 5 for 7 years and works with struggling math students and special education students.

Implementation of Professional Learning

Mr. Garcia has been an active participant in professional learning offered by his ESD for over five years. Some of his most useful trainings learnings include the Common Core Standards, STEM Summit, Number Talks, and the Professional Learning Summer Institutes. He found the STEM Summit highly enjoyable and applicable because he strives to give his students a wider perspective of the application of mathematics for problem solving and everyday life.

Additionally, the Math Regional Coordinator's professional learning session on Number Talks built his capacity to incorporate mathematical discourse into daily instruction. Mr. Garcia shared that what he particularly values in Number Talks is that all students' responses are honored and recorded, not just the correct response. Mr. Garcia has practiced providing space for students to develop and express ideas and finds this direction *"very important to build struggling students' confidence in mathematics."*

He continued to explain that one of his goals is to structure his lessons to help guide students toward deeper math reasoning, starting with concepts and mathematical procedures and then moving on to applying their knowledge for problem solving. He encourages his students to talk about how they approached a problem and their reasoning. Most of his students are ELL so he uses pedagogical strategies that he learned at the ESD trainings to foster mathematics-related communication and language development. The summer institutes and workshops that the ESD held introduced him to using active problem-based learning and allowed him to safely practice with other teachers on how to use open-ended problems that have multiple solutions. Mr. Garcia explained that the open-ended problems require students to communicate with each other to arrive at a solution.

In the Summer Institutes, Mr. Garcia worked with other teachers from the North Central ESD region and commented that the different ideas presented for geometry and math modeling and the ensuing discussion were extremely useful. He shared, *"The group activities and collaboration was one of the most useful and productive aspects."* One of their foci was how to incorporate place-based, locally relevant mathematics into their classroom. After the Summer Institute, he is now able to engage his students in culturally relevant problems that connect abstract mathematics (including geometry) to the world around them. He believes that using culturally relevant and place-based mathematics will "*provide access to [geometry and modeling] skills for all students in an effort to close the opportunity gap in mathematics."*

Ben Garcia, PreK through fifth-grade math teacher at Brewster Elementary in Brewster, WA

Mr. Garcia appreciates how the Regional Math Coordinators structure the professional development opportunities to be interesting and active, rather than "*just sit and get*." The rich, authentic mathematical problems and guidance allowed him to be immersed in mathematics content while simultaneously learning pedagogical strategies, including formative assessments.

Application of Knowledge and Skills Learned

"The changes I made in how the learning is structured in my classroom is directly inspired by the professional development I've received at the ESD," Mr. Garcia shared. He said that one of the biggest changes he made in his practice was to emphasize and encourage group learning and hands-on activities. All his prior professional learning experiences have equipped him to design effective teacher-developed lessons that have "*improved student engagement and math learning and application*."

He described two of the *"place-based, locally relevant math lessons"* that he designed for his students to teach number sense, algebraic thinking, and geometry. The first lesson, Stepping Up & Down Steps, uses the long, gently sloping steps outside of the school building. Students acted out algebraic thinking by jumping up and down the steps patterns. He said, "*My special education students loved it!"* He noted that, if a student jumped too many steps up or down, it was a fun and easy "*correction*" and no one feared "*getting it wrong*."

The second math lesson, Building Bridges, brought local relevance into the math lessons by using the three bridges that surround their town. Mr. Garcia explained, *"I wanted to use something that they see every day. Every day, the bus goes over the bridges, and I got them to think about it."* Children in his third- and fourth-grade math classes built bridges out of toothpicks and marshmallows, which provided an opportunity to talk about right and obtuse angles and applied mathematical modelling. His students worked in groups engaging in number talks and mathematical discourse, which *"was particularly helpful to my ELL students."* The sharing of ideas and the group discussions also allowed individual students to *"pick-up skills or knowledge from group members that they did not have in a non-threatening way. Every kid wanted to participate. They didn't hang back!"*

Mr. Garcia also implemented Gallery Walks for his students, which he found very helpful. He learned about Gallery Walks in a professional learning at the ESD. During the professional learning, teacher participants formed small groups and collaboratively worked on posters that illustrated solutions to an active, open-ended math problem. Once the posters were completed, each small group displayed their poster on the wall to form a gallery of mathematical solutions. Each small group rotated around the gallery studying the various methods each group employed to solve the math problem. Mr. Garcia replicates this concept in his classroom and has his students examine the work of other groups and receive feedback. He used this strategy as a formative assessment and allowed students to re-address their solutions and make any changes they thought were necessary to their work.

Influence on Student Achievement

Using the formative assessment process, he honed from an ESD training, Mr. Garcia informally assessed students' understanding throughout the class period. He also used a standardized measure called the Measure of Academic Progress (MAP) by Northwest Education Association to track students' growth as he implemented his locally relevant lessons and problem-based learning. The MAP was administered in the Fall 2016 and Spring 2017 and provided growth data in varying strands, such as geometry and algebraic thinking. He explained his reaction when he first saw the increase in his students' MAP scores:

> "I was impressed because my second graders…I have never seen this. They made 26-point gains but the average gain for one year is usually 16 points for second grade. I saw the same pattern for first graders. I asked myself, 'What did I do differently this year?' and I did five to six exercises this year using techniques I learned at the ESD."

He explained that the large increases in math achievement were also realized by his below-proficient students and his special education students. 1st grade students mean MAP score increased 19%, and 2nd grade mean MAP score increased 14% between Fall 2016 and Spring 2017. A two-tailed matched t-test revealed statistically significant differences between students' Fall 2016 and Spring 2017 scores, as shown in Table 1.

Table 1. Overall MAP Mathematics Score Fall 2016 and Spring 2017

Grade	Mean Fall '16 MAP Score**	Mean Spring '17 MAP Score	Standard Deviation	P-Value	N	Percent Increase in Mean MAP Score
1st	146.78	174.67	8.00	.000*	9	19%
2nd	189.88	215.82	9.74	.000*	17	14%

**significant at p < .01*

Additionally, the MAP assessment scores for the geometry strand showed significant increases for the 13 students who participated in the locally relevant, active, problem-based lessons with geometry-oriented learning objectives, as shown in Table 2. Out of 20 possible points, students went from a mean score of 2.54 to a mean score of 19.23. This difference was statistically significant ($p<.01$).

Table 2. Geometry Strand MAP Score Fall 2016 and Spring 2017

Grade	Mean Fall MAP Geometry Score	Mean Spring MAP Geometry Score	Standard Deviation	P-Value	N
2nd	2.54	19.23 (out of 20 maximum)	1.70	.000*	13

**significant at p < .01*

Mr. Garcia enjoys applying what he has learned and emphasized the importance of receiving continued ideas and support from teacher colleague participants. He continues to implement his knowledge and skills. He reports heightened student engagement and interest when he uses locally and culturally relevant, problem-based learning. Now, many of his students simply ask, *"Why don't we do this every day?"*

Next Steps

Dr. Gordon will continue to explore the influence of teacher professional learning on students with the larger group of ELA early learning, mathematics, and science teachers. Also included in the evaluation are school administrators who are Fellows and Instructional Coaches. This analysis will be included in the year-end evaluation report. Factors that professional development participants identified as having shaped their classroom practices and, in turn, their students' learning will be shared. Learning from this exploratory pilot will prompt action in the upcoming 2018-19 evaluation and inform next steps to maximize the OSPI/AESD Network's investment of time and resources and set the course for teacher and student success.