

IMMERSION BULLETIN

A Newsletter of the IMMERSION Project: Montana State University and Bozeman Public Schools

Fall 2015

Bozeman Teachers Explore Math Modeling in Summer Workshop

Twenty-six Bozeman teachers have completed intensive professional development in mathematical modeling as part of their participation in the IMMERSION Project, an important new collaboration between the Montana State University Department of Mathematical Sciences and Bozeman Public Schools.

During the five-day workshop, held July 27-31 at Willson School in Bozeman, teachers explored their own thinking and practices in mathematics during each day's program of group discussion and problem-solving.

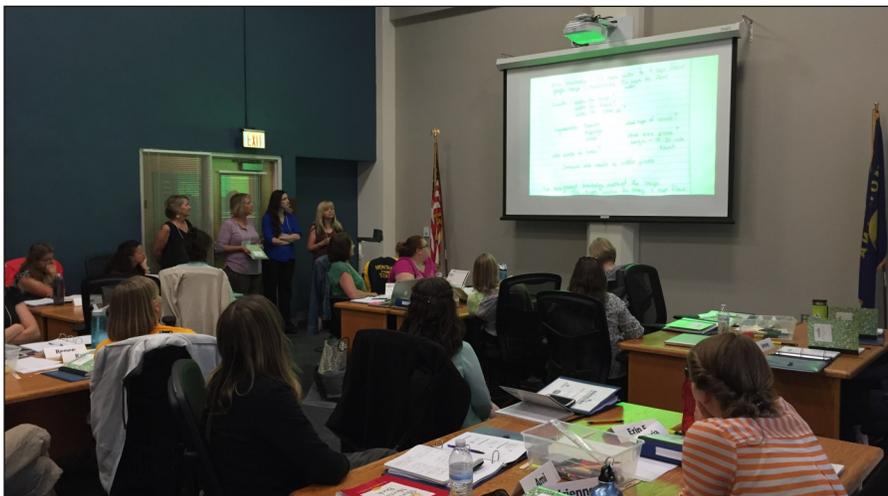
The select group of Bozeman teachers (see list on page 3) are part of the first cohort in three states to take part in a groundbreaking national study that will examine how focused coursework can affect teachers' classroom use of mathematical modeling—a practice that can have far-reaching effects on how students perceive and use mathematics.

Funded by a \$1.3 million grant from The National Science Foundation, IMMERSION will involve approximately 70 Bozeman teachers over three years and will benefit thousands of local students during that time and beyond.

"IMMERSION is part of a national call for greater student proficiency and critical thinking in STEM," says Principal Investigator Beth Burroughs, professor of Mathematics Education at MSU. "Common Core standards identify mathematical modeling as one way that students should use mathematics to solve problems they'll encounter at work and in life." Furthermore, Burroughs adds, mathematics education research has shown that students who work on such real-world problems feel less anxiety about mathematics and are more likely to see mathematics as relevant and useful.

Joining Burroughs on the workshop leadership team were Mary Alice Carlson,

"Through their participation in this project, and the invaluable support of their principals, our schools in Bozeman really are among the leaders nationwide in encouraging greater use of mathematical modeling in K-8 classrooms."



A team of Bozeman teachers explains their model to other participants.



Elizabeth Fulton, Jenny Green, and Megan Wickstrom from the MSU Department of Mathematical Sciences, and teachers Kristi Gaines and LeAnne Yenny from Bozeman Public Schools.

Real-World Mathematics

Through an engaging mix of discussion and activities, the workshop explored fundamental topics in modeling such as the mathematical modeling cycle and a framework for teaching modeling to elementary-grades students. Participants completed modeling tasks themselves and began designing tasks for their own students.

One distinguishing feature of modeling is that students must pose the mathematical problems, Burroughs explains. The teacher's role is to identify a real-world situation that lends itself to students' asking and answering questions using mathematics.

"Even young children can engage in the modeling process," Burroughs says. "For example, teachers can pose to students a real-world problem like 'What can we do with this pile of blocks in our classroom?' Students can then ask mathematical questions about organizing based on attributes, which is a content standard for first-grade students."

Other features of modeling include an open-ended process and an open-ended solution. Older students can solve a problem such as "Where should fifth-graders take a field trip?" by quantifying aspects of it like cost, safety, and fun. Different students can arrive at different recommendations. "This kind of solution method that uses quantifiable features in an open-ended process mimics the way that professional mathematical modelers solve problems," Burroughs says, "and it helps develop habits of critical thinking and mathematical literacy for students."

Unlike other kinds of problem-solving, mathematical modeling produces solutions that can always be tested and improved. "Including this aspect of modeling in classrooms gives students experience in perseverance," Burroughs says, "where they continue to work on a problem until they're satisfied that the problem is solved, rather than just working toward producing a certain number."

National Leadership

Apart from their activities at the workshop, the Bozeman teachers also have engaged in two rounds of online assessments so that researchers can understand their knowledge of and attitudes toward mathematics and modeling both before and after the professional development.

"We are so grateful that these extraordinary, hard-working teachers have taken valuable time from their summer to expand their knowledge and examine their practices," Burroughs says. "Through their participation in this project, and the invaluable support of their principals, our schools in Bozeman really are among the leaders nationwide in encouraging greater use of mathematical modeling in K-8 classrooms."

In addition to the collaboration between MSU and Bozeman Public Schools, IMMERSION involves similar partnerships between George Mason University and Fairfax County Public Schools in Fairfax, Va., and Harvey Mudd College and Pomona Unified School District in Pomona, Calif. Those districts held their own professional development workshops during the two weeks following the Bozeman event.

What's Next for Participants?

Participation in the IMMERSION workshop in July marks only the first step toward teachers' incorporation of modeling into their mathematics teaching. Beginning this fall, the 26 Bozeman teachers making up the first cohort in the study will continue to collaborate with MSU faculty and one another as they start to implement new practices.

Contact Us:

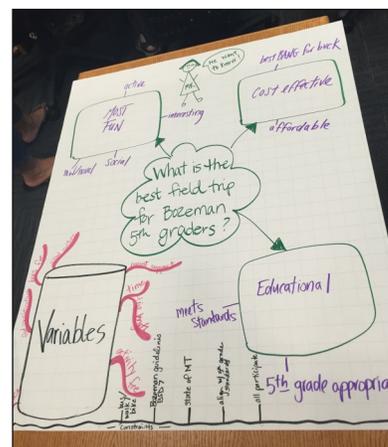
IMMERSION Project
Montana State University
Department of Mathematical
Sciences
P.O. Box 172400
Bozeman, MT 59717

Phone: (406) 994-3322
burroughs@math.montana.edu

Principal Investigator:
Dr. Elizabeth Burroughs



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Teachers developed a concept map that anticipates students' models.

As part of the process, project leaders and teachers will develop mathematical modeling activities, lesson plans, and methods for assessing student performance that are in line with the district's standards. During the 2015-16 school year, participants also will engage in "teacher study groups" in which six smaller groups of teachers will collaboratively plan, teach, evaluate, and refine a modeling lesson. Teachers will meet four times during the academic year with project instructors to continue their professional development as they implement rigorous math content, materials, and strategies. This process will culminate with a final meeting on November 14, when the different groups will report the results of their modeling lessons.

A smaller number of teachers will be invited to undergo in-depth interviews and classroom observations to yield detailed case studies about how they engage their own students in mathematical modeling tasks. IMMERSION also will work with the district to expand these modules and make them available to other teachers in their schools.

"We feel that the legacy of this project should live on and continue to benefit Bozeman students well past the three years of the NSF study," Burroughs says. "In the end it's all about engaging our students in meaningful mathematical work." ▲

SPECIAL THANKS

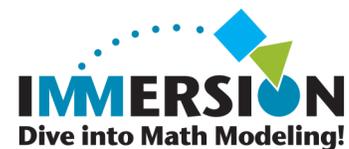
to the following 26 Bozeman teachers who attended IMMERSION professional development this summer:

Tracy Aytes, Irving Elementary School
Michele Beitel, Meadowlark Elementary School
Kathy Braaksma, Morning Star Elementary School
Joan Bush, Hyalite Elementary School
Jenny Cade, Hyalite Elementary School
Roxanne Cook, Hyalite Elementary School
Kristi Crawford, Longfellow Elementary School
Natalie Ely, Emily Dickinson Elementary School
Lisa Fabian, Morning Star Elementary School
Erin Farrell, Emily Dickinson Elementary School
Alison Feddes, Hawthorne Elementary School
Evelyn Franklin, Irving Elementary School
Renee Gilpin, Meadowlark Elementary School
Kelly Hayden, Hawthorne Elementary School
Joanne Heusel, Hawthorne Elementary School
Cheri Jakovac, Morning Star Elementary School
Kimberly King, Meadowlark Elementary School
Dacia Lackey, Hyalite Elementary School
Gia LaForge, Hyalite Elementary School
Ami Lakatos, Morning Star Elementary School
Christine O'Shea, Hyalite Elementary School
Adrienne Petch, Meadowlark Elementary School
Kim Quigley, Hyalite Elementary School
Patti Ritter, Longfellow Elementary School
Whitney Todd, Morning Star Elementary School
Lena Wessel, K-8 Gifted Coordinator

Principals: Please Refer Interested Teachers to Us!

Next spring, IMMERSION researchers at MSU will begin recruiting two dozen new Bozeman teachers to make up the second cohort (2016-17) of participants in the three-year study. The new group will undergo the same experience as this year's cohort, including five days of professional development during the summer of 2016. Teachers receive stipends for their attendance at the workshop and their participation in group collaboration during the school year—a total of \$1,000.

It's not too early for Bozeman's principals to refer the names of K-8 teachers who might be interested in participating next year. Please send your nominations to Beth Burroughs, MSU Department of Mathematical Sciences, at burroughs@math.montana.edu. Teachers are also welcome to nominate themselves. Next spring each nominated teacher will receive a short online application for consideration by the project team. ●



On the Web:

<http://nsfimmersion.gmu.edu/>