

Executive Summary of Rocky Mountain Math Teachers' Circle

Calendar Year 2011

Project Overview: The [Rocky Mountain Math Teacher's Circle](#) is for middle-level math teachers who would like to focus on improving teachers' mathematical problem solving. Our local chapter began in 2009 in partnership with the St. Vrain Valley School District, and is part of a national network of Math Teachers' Circles loosely organized through the American Institute of Mathematics. We have now expanded to include teachers from any district, and while most participating teachers are from the Denver Metro area, we do have participants come from as far away as Aspen and Ft. Collins. We hold a one-week summer immersion workshop in which a variety of mathematicians, statisticians, and teachers facilitate mathematical problem solving sessions for participants. In addition, academic year sessions are held on Saturday mornings approximately once per month. Graduate Credit or Continuing Education Units are available to participants.

Program Director: Dr. Diana White, assistant professor of mathematics and mathematics education, University of Colorado Denver. In addition to her role as Program Director, Dr. White is involved with the national Math Teachers' Circle program in various advisory capacities, and is part of a research team to study the impacts of Math Teachers' Circles on teachers and their students.

Co-Director: Carmen Rubino, high school teacher, St. Vrain Valley School District. Ms. Rubino is nationally board certified and has been leading professional development for teachers for over 15 years.

Activities in 2011 (60 contact hours):

Spring 2011: Four Saturday workshops – 3.5 contact hours each, 14 total contact hours

Summer 2011: Weeklong summer workshop – 35 contact hours

Fall 2011: Four Saturday workshops – 3.5 contact hours each, 14 total contact hours

Three Math Chats – 2-2.5 hours each, 7 total contact hours

Summer Workshop Topics: Throughout the week, six different facilitators led sessions on problems chosen from a variety of mathematical areas, to include combinatorics, geometry, number systems, and statistics.

Summer Workshop Outcomes: Supported 23 teachers from 12 districts.

Participants reported a wide variety of gains. These can be loosely separated into gains as a *learner* of mathematics and gains as a *teacher* of mathematics. In their role as learners, many

commented that they were challenged by both the content and problem solving, and that they had not previously been asked to work collaboratively to this extent on mathematics. They also commented that they felt incredibly supported by the various facilitators throughout the week.

In their role as teachers, they commented that they intend to require more justifications and explanations from students. They also plan to incorporate more group work, more open ended-problems and problems requiring exploration, and more mathematical discussions into their classrooms. They reported that they were able to learn some teaching strategies, effective questioning techniques, for example, by observing the instructional practices that the facilitators modeled.

Additionally, they showed statistically significant gains on a pre-post assessment that measures aspects of what is known as *mathematical knowledge for teaching*. This refers to the mathematics needed to teach mathematical, as opposed to the mathematics commonly needed in other professions that use mathematics, like science and engineering. Teacher performance on this instrument has been linked to student achievement in a large scale study in California, so we consider this improvement a substantial impact.

We now share some sample quotes from the summer 2011 workshop:

“This workshop was awesome! 1. It was great to network with other teachers to see what they are doing in their classrooms. 2. It was geekishly fun to really stretch your math brain and challenge yourself. 3. It definitely helps to get you excited for the upcoming school year. 4) It’s really exciting to see so many people excited about math education in our state.”

(The workshop was)amazing! I feel transformed. I have definitely gotten some insight and my paradigm has shifted from “skills” – problem solving as a way of teaching to problem solving and the “skills” will come from solving the problems.

I will get back into a primary focus of problem solving. My balloon was burst when my district adopted an exercise centered curriculum and this workshop has rejuvenated my resolve to do things differently!

Yes - let a problem sit for several days with time to revisit. Yes, discuss different strategies with different people whose background, knowledge, skill set, or perspective helped me formulate a solution. Yes. Let students bubble up specific questions to general problem. Encourage clarifying questions.

Although I am an elementary teacher I thought the workshop was enhancing, practical, engaging and very applicable as a teacher and learner!

When I was stuck, I listened or looked at others’ approaches or saw how far they got and was able together piggy-back or take off in a new direction. Very supported by instructors; they asked open-ended questions; made me feel able to solve problem.

It was great working with a variety of different people. It made me look at problems in a new perspective which can be both enlightening and frustrating- the frustrating part isn't necessarily negative- it just makes you want to justify your thinking more- which can be a good thing!

Academic Year Workshops: In Spring 2011, a total of 29 teachers from 11 districts participated in at least one of our workshops, with an average attendance of 15 teachers per session. In Fall 2011 our numbers increased, with 40 teachers from 13 districts participating, with an average of 18 teachers per session.

Academic Year Workshop Outcomes: Participants report that their ongoing participation helps keep them thinking mathematically throughout the year. There are several schools in which multiple teachers have committed to attending as a team for at least a semester. They then report co-planning and discussing what they have learned together at their schools.

Math Chats – Connecting to the Classroom: In Fall 2011, due to participant demand, our assistant director started a new thread of meetings aimed at facilitating participants exchange of idea on how to incorporate problem solving into their classroom, or just to discuss concerns and share ideas about math teaching in general.

Future Goals:

Priority 1: Sustain and grow the middle-level program. This includes

- a. Sustaining the annual summer workshop for new participants,
- b. Sustaining the nine monthly academic year sessions and the six Math Chats per academic year.
- c. Developing a new summer workshop as a follow-up for participants who have already attended a summer workshop,
- d. Expand the program to the Aspen/Pitkin County area. Districts from Aspen, Summit County, and Roaring Fork have sent teachers to the summer workshop and to an occasional academic year workshop. They have asked us to expand to a “Western Slope Math Teachers’ Circle”, including requesting a workshop for Summer 2012 to be held up in their vicinity.

Priority 2: Expand the program to include a separate workshop series for elementary teachers. Following the same design plan that was so successful for the middle-level program, there is now tentative design team in place to use Academic Year 2012-2013 to design an immersion workshop for Summer 2013. This will likely include using Spring 2012 for some pilot sessions on Saturday mornings.

Implementation Plan (pending sufficient funding):

Summer 2012:

1. Hold annual summer workshop for new middle-level participants. Scheduled for June 4- June 8.
2. Hold follow-up workshop for middle-level participants who have attended one of the first three workshops. Scheduled for July 30-August 1.
3. Hold a workshop in the Aspen/Pitkin County area from June 18-22, recruiting teachers from Garfield and Eagle Counties also. We would ideally also like to support travel and lodging cost for other Western Slope teachers who are further away, but would like to join for the week.

Fall 2012:

1. Hold one Saturday session per month for middle-level teachers
2. Hold one or two follow-up all day Saturday sessions for middle level teachers in Aspen/Pitkin County.
3. Hold a one-day retreat and biweekly planning meetings for elementary design team

Spring 2013:

1. Hold one Saturday session per month for middle-level teachers
2. Hold one or two follow-up all day Saturday sessions for middle level teachers in Aspen/Pitkin County
3. Hold biweekly planning meetings for elementary design team
4. Hold at least two Saturday kick-off/pilot sessions for elementary teachers

Summer 2013:

1. Hold annual summer workshop for new middle-level participants.
2. Hold follow-up workshop for middle-level participants who have attended one of the first four middle-level workshops.
3. Hold a middle-level follow-up workshop in the Aspen/Pitken County area.
4. Hold first summer immersion workshop for elementary teachers.