

Four Years of Enrichment Grants and Counting . . .

By Semra Kilic-Bahi, Kelly McKinnie, and Nancy Ann Neudauer

The MAA Dolciani Mathematics Enrichment Grants program (DMEG) has awarded 40 grants to projects providing enrichment activities for talented middle and high school students, supported by the Mary A. Dolciani Foundation and the MAA. The funded projects over four years showcase a wide diversity of project types and geographical areas. We invite distinctive, fresh, and innovative proposals for this year (by February 12, 2014) and give here a sampling of some supported projects from the project directors themselves.

Math in Missoula

The Missoula Math Beyond the Classroom program (DMEG funding 2010, 2011, 2013) consists of two components: Math Day, a one-day event for eighth- through 12th-graders held on the University of Montana campus each fall, and Math Circle, which meets throughout the year.

Our first Math Day in 2010 attracted 60 students, but slight changes to the format caused drastic growth in numbers—for each of the last two years we have welcomed more than 200 students to campus to participate! On Math Day, students attend three hands-on math workshops on a wide variety of interesting topics. Last year some of the most popular were “Math Puzzles and Games,” “When Is a Knot Knotted,” and “Forever Frets,” a foray into math and music.

After two workshops, a career panel features scientists from around campus or professionals from off campus who tell us in eight minutes how they use math in their work. Last year a biologist, a geoscientist, and a professor of public health from the university spoke. It was fascinating. After lunch on campus (many enjoying their first college experience and eating in the dining hall), students attend their final workshop.

We use Math Day to recruit students to attend the ongoing portion of our program. During 12 Thursday-afternoon Math Circle meetings throughout the fall and spring, we introduce eighth- through 12th-graders to engaging mathematical topics not generally covered in the high school curriculum.

In response to students who could not attend because it was too far to drive each week, we have recently added the capability to hold our program virtually. Teachers organize their students and set up the technology so that we can see each other while we run the Math Circle. We feel that this is a viable way to reach more students since the Montana population is so spread out.

After three rounds of MAA DMEG funding support-

ing the program for more than four years, we have plans to sustain it indefinitely. Kelly McKinnie and Jennifer McNulty started this program, and the majority of the University of Montana mathematics faculty members have participated in it.

Coding for Success

Secret Communication Summer Camp—(SC)² (DMEG 2012, 2013)—is a summer camp on codes and ciphers run in collaboration with Colby-Sawyer College and a local charter school, Academy for Science and Design (ASD). The camp participants range from sixth- through ninth-graders with a total of 30 students and five camp assistants.



A camp assistant preps for a daily activity in ciphers camp.

Participants deciphered messages by playing games, solving puzzles, participating in interactive activities, and doing a scavenger hunt while figuring out who the spy was in their groups. They also constructed pocket enigmas using CD covers. Everyone enjoyed learning about a variety of secret communication methods and sending secret messages to each other while exploring the mathematics behind some coding and ciphering methods.

After mastering modular arithmetic, participants learned about check digit schemes through Universal Product Codes, zip codes, and ISBN numbers. They

Continued on p. 17

parents to STEM, we will help build the next generation of scientists. 📍

Talithia Williams is an assistant professor of mathematics at Harvey Mudd College. She serves as a governor-at-large for minority interests for the MAA Board of Governors and as a board member for SACNAS, a society dedicated to advancing the number of Chicanos, Hispanics, and Native Americans in Science.

Rachel Levy is an associate professor of mathematics at Harvey Mudd College. She is the editor-in-chief of SIURO, SIAM Undergraduate Research Online, and a member of the editorial board of Math Horizons.

This conference is jointly funded by an MAA Tensor SUMMA grant and the HMC Mathematics Department.

Bibliography

Floyd, L. 1998. "Joining Hands: A Parental Involvement Program." *Urban Education* 33, no. 1: 123–35.

Hoffman, Herbert L., Timothy St. Louis, and Jennifer Lee Hoffman. 2010. "Understanding the Influence of Parent Engineers on the College Major Choice of Their Daughters." *Journal of Women and Minorities in Science and Engineering* 16, no. 3: 237–56.

Llagas, C., and T. D. Snyder. 2003. *Status and Trends in the Education of Hispanics* (NCES 2003–008). Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Lopez, Gerardo, Jay D. Scribner, and Kanya Mahitivanichcha. 2001. "Redefining Parental Involvement: Lessons From High-Performing Migrant-Impacted Schools." *American Educational Research Journal* 38, no. 2 (June 20): 253–88.

Marschall, M. 2006. "Parent Involvement and Educational Outcomes for Latino Students." *Review of Policy Research* 23: 1053–76. doi: <http://dx.doi.org/10.1111/j.1541-1338.2006.00249.x>.

Muller, Chandra. 1998. "Gender Differences in Parental Involvement." *Sociology of Education* 71, no. 4 (October): 336–56.

Modi, Kamla, Judy Schoenberg, and Kimberlee Salmond. 2012. Girl Scout Research Institute. *Generation STEM, What Girls Say about Science, Technology, Engineering and Math*. New York: Girl Scouts of the USA.

Moles, O. C. 1993. "Collaboration between Schools and Disadvantaged Parents: Obstacles and Openings." In *Families and Schools in a Pluralistic Society*, edited by N. F. Chavkin, 21–49. New York: State University of New York Press.

Town Hall, *continued from p. 5*

Reach out to encourage underrepresented students to continue their study of mathematics.

This discussion will continue at the 2014 Joint Math Meetings in Baltimore on Wednesday, January 15, 9:30–11:00 a.m. during the session "Access and Opportunities in STEM Education: The Challenges of Building an Equitable Diverse Society" led by University of Maryland at Baltimore County President Freeman Hrabowski and Presidential Medal of Science awardees James S. Gates and Richard Tapia. There is obviously still lots of room for growth and improvement.

We hope that each MAA section will discuss these questions and recommendations at their upcoming meetings and send a list of their top three recommendations to Frank Morgan at Frank.Morgan@williams.edu. We will post each section's list on the town hall webpage given above. 📍

Alissa S. Crans is on the faculty at Loyola Marymount University; Frank Morgan is at Williams College; and Talithia Williams is at Harvey Mudd College.

Enrichment Grants, *continued from p. 14*

used "dits" and "dahs" to send Morse code messages, and through a generous discounted membership provided by CodeHS, the participants were also introduced to basic computer programming.

Four ASD teachers attended the camp as guest speakers and explored different aspects related to secret communication methods. A biology teacher facilitated a lab session on forensic science, where students tried to find out "Who Stole the Cheese?" through a lab exercise on DNA testing. Another biology teacher managed a session on animal communication in which camp participants reenacted how a bee communicates the location of flowers to other bees by doing a "waggle" dance in the right direction.

Participants learned how to send messages through semaphore and explored Braille in a mathematics teacher's session. And ASD's history teacher talked about the hieroglyphics and history of the Rosetta Stone. Semra Kilic-Bahi, an associate professor of mathematics at Colby-Sawyer College, collaborated with Jennifer Cava, the director of ASD, to develop this program. 📍

Semra Kilic-Bahi is an associate professor of mathematics at Colby-Sawyer College. Kelly McKinnie is an associate professor at the University of Montana. Nancy Ann Neudauer is the program director for the MAA Dolciani Mathematics Enrichment Grants program.