

EDUCATION COLUMN

Education Column Editor: Jackie Dewar, Loyola Marymount University, jdewar@lmu.edu. This issue, there are two contributions to the column.

Get Involved in Outreach!

Betsy Yanik, Emporia State University; Suzanne Lenhart and Kelly Sturmer, University of Tennessee, National Institute for Mathematical and Biological Synthesis

AWM has been active in the area of supporting outreach programs, principally with its organization and sponsorship of Sonia Kovalevsky Mathematics Days for over twenty years. (See <https://sites.google.com/site/awmmath/programs/kovalevsky-days>.) Unfortunately AWM has not received funding to support SK Days for the 2013–2014 academic year, but the organization is still working to find future support. However, opportunities to be involved in outreach through colleges and institutes abound. The authors of this column will describe outreach efforts that we have organized and mention additional examples. There are many great ways to engage students in the enjoyment of mathematics. The need for more students with STEM skills is well known, and we hope the column will inspire you to design or join an outreach program in your locality.

At Emporia State University (ESU), we have developed five programs to reach out to underrepresented populations. This year marks the 20th anniversary of two of these programs. The first, Enhancing Your Future with Mathematics and Science, is our own locally developed version of the national outreach effort, Expanding Your Horizons in Science and Mathematics. (See <http://www.expandingyourhorizons.org/> for more details). This one-day statewide program offers young women in middle school a wide variety of sessions with career discussions and hands-on workshops, all of which are led by women professionals in mathematical and scientific careers. The second ESU program celebrating its 20th anniversary is our Sonia Kovalevsky Mathematics Day program for women in the junior year of high school. The first two years of this program were made possible by AWM sponsorship. The program has been maintained since then by local sponsorships. The third program, specifically designed to reach out to young women, is a week-long summer program, MASTER IT (Mathematics And Science To Explore caReers—Investigating Together) that has been in existence since the summer of 2000.

In 2007, ESU began an outreach program, entitled Si Se Puede Hacer Ciencias y Matemáticas, for Hispanic children in middle school. This program paralleled the earlier work with young women by having Hispanic professionals lead workshops and career discussions for these students. This has been followed up by our newest program, ESU Summer Scholars, which is a three day camp for Hispanic middle school children filled with activities that highlight a variety of STEM skills and careers.

For two summers, the National Institute of Mathematical and Biological Synthesis (NIMBioS) at the University of Tennessee has co-organized the week-long Adventures in STEM summer camp, which introduces middle school girls to science, math, and engineering through hands-on activities, labs, and team projects. The camp is in cooperation with CURENT (Center for Ultra-wide-area Resilient Electric Energy Transmission Networks) and 4-H. In one activity the girls experienced the creative side of science when they used 3D modeling software to design and print their very own plant cell using NIMBioS' new 3D printer. After watching our 3D printer at work, the girls learned how to use free 3D modeling software called SketchUp to help design different organelles from a plant cell. After drafting potential artistic interpretations of the organelles, final designs were saved and sent off to be printed in 3D. Each organelle took about half an hour to print. The final step involved combining the organelles into one single plant cell. The activity was intended to show the campers how scientists use special tools, like computer software and 3D printers, for visualization and modeling. In another activity, the girls were divided into groups to interview NIMBioS scientists and mathematicians. Then the girls introduced the person whom they had interviewed to the whole group. They really seemed to enjoy asking questions and reporting back and summarizing the answers.

New ideas for outreach activities and new sources for funding such activities are continuing to emerge. For example, the MAA Dolciani Mathematics Enrichment Grants Program (<http://www.maa.org/dolciani-mathematics-enrichment-grants>) awards grants for enrichment activities for talented middle and high school students. [1] This program helped to fund the Secret Communication Summer Camp on codes and ciphers for sixth- through ninth-graders, organized by Colby-Sawyer College and a charter school, Academy for Science and Design.

In 2011, the Harvey Mudd College (HMC) mathematics department hosted a day-long workshop for high school girls, co-organized with Sacred SISTAHs, a nonprofit collective of

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African-American women. At the end of the day an informal session for parents arose through discussions with parents who were waiting for their children. When the workshop was offered at HMC the following two years, a concurrent workshop was offered for parents to learn about preparing their daughters for STEM careers. [2] Consider getting parents involved in your activities!

The Somerville Mathematics Fund is an all-volunteer non-profit organization founded in 2000 with a mission to celebrate and encourage mathematics achievement in Somerville, MA. (To read about their activities, see <http://somervillemathematics.blogspot.com>.) Each October, they host the Scrapheap Showdown in a gym at Tufts University. High school students create three-member teams in advance and arrive to find out what their challenge will be that year. In the middle of the room is a large scrapheap of interesting junk to use in meeting the challenge problem. Problems have included: building bridges, cantilevers, musical instruments (bonus for automation), windmills, and marble race/Rube Goldberg machines. Not every problem results in the same type of machine, such as when they needed to figure out a way to get different small items from the floor to targets on a table. The students usually spend three to four hours constructing and testing their machines before they compete against each other. The Board of the Somerville Math Fund designs and tests each of the problems in advance to make sure that they are solvable and to develop a scoring rubric.

If you are interested in additional ideas for outreach programs, one opportunity to see a variety of such programs highlighted is the annual poster session on mathematical outreach at the Joint Mathematics Meetings each January. For example, this year in Baltimore the posters described such projects as a year-round schedule of out-of-the-classroom mathematics activities at a community college, a summer program for high school students on digital image analysis, Math Circle programs, a year-long program for a group combining women in their senior year in high school with undergraduate women, a summer camp on the connections between mathematics and music, a Saturday program for minority students focusing on applications of mathematics, a middle school student summer program on using mathematical software, a program for students in grades three through twelve focusing on mathematical literacy, a workshop for high school teachers and students on preparing for the High School

Mathematics Contest in Modeling, a program to mentor faculty members on teaching a course on women and mathematics, and a summer camp on methods of secret communication systems.

References

1. S. Kilic-Bali, K. McKinnie, and N. A. Neudauer, Four Years of Enrichment Grants and Counting..., *MAA Focus*, December 2013/January 2014, pages 14, 17.
2. T. Williams and R. Levy, Hitting the Target: Connecting Parents to STEM, *MAA Focus*, December 2013/January 2014, pages 15–17.

Revisiting the Topic of Contingent Faculty

Column Editor's Note: A concern arose following the publication of Patricia Hale's January–February 2013 Education Column, "Contingent Faculty, What is the Problem?" In response, Patricia Hale and Cathy Kessel have collaborated to write the following clarification.

First, the definition used for contingent faculty was "individuals doing the same work done by ladder faculty, but to whom the institution has made no long-term commitment." In the column, the discussion was focused on teaching even though the data included individuals who had few, or no, teaching responsibilities.

Second, the survey statistics used to identify the extent to which contingent positions occur included some that are very desirable such as "research postdocs" that involve little or no teaching, "teaching postdocs" with an emphasis on teaching and related scholarly work, or positions that are due to an individual's stature in the profession such as those held by visiting emeriti. They may include positions that are not contingent, such as part-time positions held by ladder faculty who have a reduced load for family or medical reasons.

Thus, the statement in the column that 36% of faculty positions in mathematics at doctoral institutions for the academic year 2005–06 were contingent positions does not indicate that these positions had all the characteristics discussed in the column. In particular, it does not say that 36% of the positions were undesirable.

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