Sonia Kovalevsky Days and Encouraging Young Women in Mathematics

For the past twenty years, the Association for Women in Mathematics (AWM) has been providing funds on a competitive basis for hosting “Sonia Kovalevsky Days”. These SK Days are daylong events for encouraging young (middle school and high school age) women to pursue their mathematical interests. In the fall of 2011 the mathematics department at Dartmouth College hosted such a day, and it was a resounding success as well as (to be honest) a somewhat surprising success, considering our small rural community. We thought it worthwhile to communicate our basic template for the day in the hope that other institutions might be inspired to host their own SK Days. We hope that the relatively low cost of the event coupled with its potential benefits might make it an attractive proposition for other math departments (possibly with a little help from a provost or dean!). We now intend to institute it as one of our yearly outreach events.

The SK Day was organized by Dartmouth faculty Rosa Orellana and Zajj Daugherty and mathematics graduate student Patricia Cahn. We originally had planned for a total of fifty participants, but had to close registration two weeks before the event when the number of registrants reached eighty-one. Ultimately, there were seventy-four participants (sixty-four students, seven teachers, and three parents). We had many more people contact us and ended up with a long waiting list. We already have good connections with many of the “local” (which in Hanover, NH, can mean over twenty miles away) schools through yearly math summer camps that we run, mainly in the service of our graduate teaching seminar training, and we used those contacts to generate invitations.

After registration and a continental breakfast we opened with a few welcoming remarks by the chair of the Mathematics Department, followed by a short introduction from Rosa Orellana, who talked about Sonia Kovalevsky and her struggles as a female mathematician of the nineteenth century. After this, Dartmouth faculty member Carolyn Gordon gave a gentle introduction to the subject of spectral geometry with a plenary lecture “Can you hear the shape of a drum?” We followed this with two hour-long hands-on group activities in fractal geometry and the game SET (“SET Magic Tricks”) led by our graduate students and undergraduates from our local AWM chapter. These activities bookended a catered buffet lunch during which the participants played an icebreaker game: at registration each student was given a SET card, and students were asked to form “sets” with other participants. Once they found two other students with whom they formed a set, they were asked to write down something interesting about those other participants. At the end of the day, we awarded prizes to the three students who had found the most sets.

During the afternoon, students again split into two groups and participated in one of the group activities. This was followed by a “featured activity”: an active panel discussion, led by Dartmouth women undergraduate and graduate students, on the subject of “Why study math?” The panel was designed to provide a closer connection for the participants to the Dartmouth women who have been successful in studying mathematics. This was very exciting for all involved.

The members of the panel addressed the following questions: (1) Which experiences led you to realize that you wanted to study math? (2) What do you think you will be doing with your math major? For graduate students, what other careers did you consider before you decided to go to graduate school? (3) What difficulties have you faced and how did you overcome them? (4) Can you share personal stories of earlier failures (or disappointing outcomes), as they relate to math, e.g., not liking a particular course, etc.? How do you feel about those experiences now? Panelists were also asked to share their interests outside of mathematics. The goals of the panel were to encourage young girls to study math and provide role models with whom the girls can identify, as well as to give reasons to pursue math and remove reasons not to.

Following the panel the students wrote a short positive essay about their strengths, capabilities, and hopes for the future. Several studies have shown that this type of activity can have a significant effect on future success. The prompt for our essay was:

Name something (extracurricular activity, sport, subject in school, or a job you have) that you are good at (don’t be shy) and explain how you became an expert at it. If you wrote math, explain how what you learned today can help you continue to succeed. If it is not math, explain how you could succeed in math using the same strategies you used to become good at the activity you wrote about.

The day ended with a short evaluation of the day’s activities and prize presentations for the SET game winners.

The results of the evaluations were extremely positive overall, but particularly overwhelmingly so amongst teachers and students in grades 6–8. In the future, we may concentrate on grade 6–10 students so as to accommodate more of them and reach the group with whom we seemed the most successful. Here are some samples of some of the particularly enthusiastic comments:

“I am excited about learning that math is in everything”
“I LOVED learning about fractals”
“It was nice to laugh with the teachers”
“It was awesome! I had so much fun!”
“I thought it was very fun and I want to do this every two weeks”

We also received lots of emails from parents thanking us for the wonderful day their girls had experienced. For example:

“My daughter has done summer math camp with you twice, now this wonderful Math Day, and is finally beginning to see that math is bigger than beginning algebra. These kinds of programs you provide are hugely eye opening for kids like her. This could not happen without the inspiration of very cool young Dartmouth math women.”

We hope that this description of our SK Day might make the idea of hosting such an event seem less daunting. The return on your efforts would be well worth it.

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