

Supporting a National Treasure

It is a sunny July afternoon on the campus of Hampshire College, and the five o'clock "Prime Time Theorem" talk has just ended. The talk is part of the daily ritual for the high school students participating in the Hampshire College Summer Studies in Mathematics (HCSSiM). A group of students ambles toward the dining hall with the speaker, James Propp of the University of Wisconsin, who works in probability and dynamical systems and is an HCSSiM alumnus himself. Propp's talk had finished with a picture illustrating ideas from his current research. He remarks that it would be nice to have an animation showing the picture developing so that one could see the patterns emerge. By the time the group wanders back to the computer room after dinner, one of the students, Peter Fidkowski from Macungie, Pennsylvania, has already written a little Basic program to produce the animation. The speaker and a gaggle of students crowd around the computer to watch the picture unfold.

This alacrity in pursuing mathematical ideas as they arise is just what the HCSSiM tries to foster. "It's so different from high school," says Jake Gottlieb from Scottsdale, Arizona. "Here you are with a lot of kids who are interested in the same things you are." He finds his high school mathematics classes boring and repetitive, the work in the summer program new and challenging. Students in HCSSiM must take much more initiative in their work, for the goal is not to cover material but to really understand mathematical ideas. "Whatever you put into it, you get out of it," Gottlieb remarks. The students rise to the occasion with great enthusiasm.

Programs like HCSSiM are national treasures that need to be supported and nurtured, and this is the purpose of the AMS Epsilon Fund. The name derives from Paul Erdős's predilection for calling children "epsilons". The fund, sustained through contributions by AMS members, makes small grants to support student scholarships for such programs. Over the past four summers, thirty awards totaling \$315,000 have been made. Last year about 1,500 AMS members generously contributed to the fund.

For the summer of 2003, eight programs, including HCSSiM, received Epsilon grants. The other programs are: All Girls/All Math, University of Nebraska; Canada/USA Mathcamp, Mathematics Foundation of America; PROMYS, Boston University; Ross Mathematics Program, Ohio State University; Stanford University Mathematics Camp; SWT Honors Summer Math Camp, Southwest Texas State University; and University of Chicago Young Scholars Program. All share the goal of bringing to young people the joy and satisfaction of mathematical exploration and discovery.

I first heard about these programs from mathematicians whose passion for mathematics had been kindled when they participated in such programs as teenagers. One of the best known of these is the Ross Mathematics Program, founded by the legendary Arnold Ross and run since Ross's death last year by his longtime colleague Daniel Shapiro. The Ross program has been especially influential and has served as a model for other successful programs. One of these, the SWT Math Camp, run by Max Warshauer, was recently profiled in the *New York Times* ("Bring on the Problems? It Must Be Math Camp", by Michael Winerip, July 30, 2003). As the *Times* article showed,

these programs can have a profound effect on students' lives, opening horizons to them that they might not otherwise have dreamed of.

In the past several years I have gotten to know some of the dedicated people who direct and teach in these summer programs—people like Ross, Shapiro, Warshauer, and David Kelly, director of HCSSiM. These people love mathematics, and they know how to inspire that love in young people. "We want students to see themselves as creators of mathematics rather than learners of its results," Kelly remarks. This sometimes means that ideas and questions from students lead in directions the program instructors do not expect. Nevertheless, the enthusiasm of the students propels the discussions forward. "When you let students discover and formulate things for themselves, they pull you through the material much faster than you could drag them," Kelly says.

Kelly's soft-spoken manner belies an iron-willed commitment to students and to keeping the program alive. The survival of HCSSiM has been threatened many times by budget problems, but Kelly has managed to keep it going for all but one of the past thirty summers. As he puts it, "I love the program six weeks a year"—when the students are there—"and I hate it forty-six weeks a year"—during the annual grind of proposal writing and fundraising. The Epsilon Fund helps in a small but important way by providing grants that are low on red tape.

Kelly takes seriously the need to recruit female students. "We don't have as many women as we would like, but we have served them well," he says, pointing to such successful female alumnae as Susan Landau, a mathematician at Sun Microsystems. One 2003 participant, Mariah Kellam of Freeland, Maryland, wrote at the end of the program: "At my school, everyone thought I was crazy to do things like read Feynman lectures and math books in my free time, but now I realize that there are other people like that...I have never been this happy or this happy for this long."

It is getting on to ten o'clock in the evening, and about a dozen HCSSiM students sit around tables in a classroom, discussing a set of problems in knot theory. "So prove it then," one student challenges another. He draws a diagram on a piece of paper and slides it across the table. "But it could be a circle," the other replies. "Oh yeah," the first student muses, realizing that the situation is more complicated than he initially thought. These students are learning one of the main lessons of HCSSiM: that mathematics is a living subject constantly renewed through communication with others. The work continues, the exchanges flowing freely as the students wrestle with the problems into the night.

Whether these kids go into mathematics or into some other field, they will take with them the experience of really *doing* mathematics. The Epsilon Fund is helping to ensure that mathematically talented young people have access to these experiences. It is a cause to celebrate and to support.

—Allyn Jackson

For information on the Epsilon Fund, visit the website <http://www.ams.org/development/epsilon.html>. Information about applying for Epsilon grants may be found at <http://www.ams.org/employment/epsilon.html>.