For some, it was just another weekday afternoon. For the middle-school girls and mentors in the Girls Excelling in Math and Science (GEMS) program, it was time to solve a mystery.

“A student’s science fair project – Solution X, The Cure for the Common Cold – was stolen from a nearby school recently,” explained Megan Sanquist, a mentor for GEMS, to the class. “We have six suspects.” Another mentor read off the names of the suspects: “Kat Chacold. Ivana Tishu. Ronnie Nose...”

The girls laughed, but there was serious work afoot. Their mission? Analyze the thief’s ransom note to figure out which of the suspects had a pen that could have written the note. Today, they were using a technique called chromatography. Chromatography generally refers to a class of forensic techniques, but for them, its meaning was very literal: they were studying the colors that were produced when the inks were separated out in water. They drew a line across the paper with the pen they were testing, dipped it in water, and watched the colors slowly crawl up the white slips.

“Oooh, that one’s pretty!” one girl exclaimed.

Lessons like this may seem trivial, but to the GEMS program, they fulfill a vital mission: teaching students to think like scientists. They learn to form hypotheses, design experiments to test their hypotheses, and compare their results to what they expected. In the chromatography experiment, they also discussed the validity of their results: Could someone be convicted based only on the color of their pen? Of course not. “DNA evidence would be better,” one student suggested.

GEMS began in 2006 when Edna Crocker and Joelle Carter, backed by the American Association of University Women (AAUW) and the University of Maryland’s College of Computer, Mathematical and Physical Sciences’ STAND program (Science and Technology Addressing the Need for Diversity), had the idea to create a program that would inspire girls to go into math and science by teaching them to think critically and enjoy the scientific process. The mentoring aspect of the program would be very important as well; having female role models in science would help the girls to identify with math and science, and not feel intimidated by a male-dominated field. GEMS started as a pilot program at Hyattsville Middle School, and has since grown to encompass Nicholas Orem Middle School and William Wirt Middle School, all in Prince George’s County.

About a dozen UMD mentors volunteer for GEMS each week. STAND has now dissolved, but GEMS continues to recruit students and collaborate with various campus groups, including the Women in Mathematics group, Women in Engineering, AstroTerps, Women in Physics, and the Alpha Omega Epsilon engineering sorority, which held a 5K run to raise money for GEMS last year.

GEMS lesson plans are focused on hands-on exercises to help students learn actively. Research in educational psychology, established by researchers like K. Ericsson as early