Engaging with the Ensemble: Alissa Crans' Journey through Mathematics

Priyanka Nanayakkara

Mathematics has long been part of Professor Alissa Crans' life. Hers is not so much a journey *into* mathematics, but rather a journey *through* it. When she was in elementary school, her father, who majored in mathematics, used to review her math homework with her. Her enjoyment was twofold; she liked the math, but she also loved the fact that it gave her a chance to spend time with her father.

In middle school, she flourished with support from her teachers. During one exam in the sixth grade, her teacher Mr. Peschman "pointed to a problem and said, 'I put this problem on the test to see if you wouldn't get 100% this time.'" She can't remember if she got 100% on the exam or not, but she remembers that Mr. Peschman saw her talent, and challenged her.

By her senior year of college, she was ready to become a mathematician ... or a musician. She wasn't yet sure which one.

At the University of Redlands, she majored in mathematics, but immersed herself in several music classes as well, almost double majoring. She wrote proofs and played preludes, finding a rhythm she could call her own. When she couldn't make headway on a problem set, she would step away with her clarinet. Note by note, her mind cleared. When it was time to return to her problem set, she had new ideas that her subconscious had been working on.

So when it came time to apply to graduate schools, she wasn't sure whether to pursue music or mathematics, and applied to programs in both. Both fields would allow her to pursue something she loved; both would encourage her creativity. But mathematics offered her something that music could not: the chance to perform away from the stage, without hundreds of eyes watching, hundreds of ears listening, hundreds of minds judging. So she decided to keep music a personal hobby, focusing her studies on mathematics.

Five years later, in the summer of 2004, she earned her PhD in mathematics from the University of California at Riverside. Since then, she has been on the faculty in the Department of Mathematics at Loyola Marymount University (LMU) in Los Angeles and has held positions at various institutions, including Pomona College, The Ohio State University, and the University of Chicago. Today, she is an associate professor at LMU, as well as an Associate Director of Project New Experiences in Teaching (NExT). In her free time, she plays the clarinet with the Santa Monica College Wind Ensemble.

Professor Crans enjoys mathematics both with others and alone. When she wants to learn a new topic, she gets a textbook and studies the material, quietly grappling with the ideas and letting them sink in. However, when she wants to discover something new, she likes working with others. Bouncing ideas back and forth is what has led to many of her and her coauthors' findings.

Some of her scholarly interests are "quantum algebra, geometric topology, relationships between mathematics and music, and the scholarship of engagement." She sees a "beautiful, intimate relationship between algebra and geometry," and explores this relationship through her research. Crans isn't as focused on the applications of her research; instead, she seeks out new mathematics for the sake of mathematics. She says that just as some people enjoy going to art museums or the symphony, she enjoys math.

And she doesn't want to be the only one with this enjoyment. She deeply values her role as an educator, and the opportunity she has to share mathematics with students. She says, "I would much rather have a student say they took another math class because they enjoyed my class than say, 'I cited your theorem.'" In the classroom, she puts her students in small groups, often grouping female students together, for a moment giving them a chance to experience mathematics without being The Only Woman In The Group.

Her commitment to women in mathematics extends past her own classroom. As the Associate Director of Diversity and Education at the Mathematical Sciences Research Institute (MSRI), she recognized the lack of women (and especially women of color) earning advanced degrees in mathematics and worked to close this gap. Additionally, she has taught in the Enhancing Diversity in Graduate Education (EDGE) program and the Summer Program for Women in Mathematics (SPWM). She also works with a program called Pathways, which is "a mathematics outreach program for LA County schools," where she is "part of a team of mathematics faculty members who teach at LA County colleges and universities and who visit K–12 classrooms to share [their] love and passion for mathematics."

The motif of Crans' mathematical work is her commitment to sharing mathematics through community. She doesn't see mathematics as an exclusive field, a private

concert only to be enjoyed by a select few. Instead, it's a symphony of ideas for everyone. From her days as a young girl reviewing her math homework with her father, to her current roles as a committed teacher and researcher of mathematics, her relationship with mathematics has been grounded in working with others.

Crans is breaking the mold of the solitary mathematician, a man holed up alone in a room with a piece of chalk and a question. Crans is in that same room, but with her students or with colleagues, sharing mathematics and finding new mathematics to share. She prefers the ensemble to the solo performance, inclusivity to exclusivity. The melody she creates is strong, and crisp, and refreshingly inviting. Her way of mathematics makes you want to pull up a chair and listen, to pick up an instrument and play, to discover for yourself the harmony within mathematics.

About the Student:

I'm Priyanka Nanayakkara, and I am a sophomore at UCLA majoring in statistics. One of my favorite books is *Mathematicians: An Outer View of the Inner World* by Marina Cook, because it gives a glimpse into what wonderful and intriguing personalities mathematicians often have. Within mathematics, my favorite subjects are logic and probability. Outside of mathematics, I like running, blogging about my life through food, and creating NPR-style radio stories for Daily Bruin Radio. Also, this past October, I attended the Graduate Research Opportunities for Women (GROW) conference at Northwestern University, which is how I found out about AWM!

STUDENT CHAPTER CORNER

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Colorado School of Mines AWM Chapter

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The Society for Women in Mathematics (SWiM) is an AWM chapter at the Colorado School of Mines. Approximately 20 students and faculty attend bi-monthly meetings. For one of these meetings each month, SWiM brings in a mathematician to discuss her "mathematical story" with

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Frances Vallejo, Vice President for ConocoPhillips and CSM Board of Trustees member, shared her mathematical story and community involvement.

CALL FOR PROPOSALS

Research Collaboration Conferences for Women

Supported by a National Science Foundation ADVANCE grant, the AWM is working to establish and support research networks for women in all areas of mathematics research. As part of the grant, the AWM will provide mentorship and support to new networks wishing to organize a research collaboration conference for women (RCCW), including: help finding a conference venue, help developing and submitting a conference proposal, and help soliciting travel funding for participants.

Mathematicians interested in organizing a new RCCW are invited to submit a proposal to the AWM describing the conference topic, potential co-organizers and project leaders, and potential participants. Proposals should be no more than one page (PDF files only, please) and should be sent to awm.rccw@gmail.com. Deadline for submission: **July 1, 2016**.

More information about the ADVANCE Grant, Research Collaboration Conferences for Women, existing RCCW networks, and related initiatives can be found at http://awmadvance.org/.