# Know Your Wisconsin Mathematician

Interview with Shubhangi Stalder, UW-Milwaukee at Waukesha, by Clare Hemenway

**Where did you grow up?**

I was born in Nairobi, Kenya. I lived until age 7 in Lindi, Tanzania, and then until age 23 in Pune, India, after which I came to the United States for a Ph.D. at the University of Wisconsin-Milwaukee.

**When did you decide that mathematics was what you wanted to do with your life?**

As far as I recall, mathematics came to me with ease where I could even teach it to others from a very young age. However, I did not get very good grades initially. But I still remember the moment during my second-to-last year of undergraduate studies at Sir Parshurambhau College in Pune, India, where I attended a mathematics lecture on space-filling curves. The teacher started by saying to write anything – even doodles – and he could come up with the mathematical representation of it. I remember being mesmerized by this concept that you can take anything and come up with a mathematical model that describes it fully. That was possibly a turning point for me in deciding to do mathematics.

In college and graduate school, I figured out how to overcome anxiety on exams and started getting amazing grades. This is when I knew I had to help others do the same. I felt that if I could do it, anyone could do it with hard work and tenacity.

**Where did you go to undergraduate school?**

I did my undergraduate studies at Sir Parshurambhau College located in Pune, India.

**What about graduate school?**

I did a master's at Pune University, India, after which I came to the University of Wisconsin-Milwaukee and received a second master's and then a doctoral degree studying Ring Theory with Mark Teply.

**What was the influence of your family on your education?**

Both my parents were teachers. My dad taught math and science at a teacher's college. My mom taught math in high school. My ancestors on my dad's side were all educators also, except for my grandpa who was an award-winning surgeon in East Africa. My dad died when I was only 12 and my mom raised us as a single mom. My mom's uncle and a cousin were also professors of mathematics. But my mom's influence was the strongest. It is with her support and guidance that I have accomplished what I did. I strongly credit her for the drive I have now. At the same time, I want to mention that there were some family members and teachers who openly doubted I would succeed academically. My mom helped to counter their negative influence.

**Are there any teachers who had influenced you to become a mathematician?**

Yes, there have been many teachers that influenced me in becoming a mathematician. Dr. Railkar and Dr. Modak in Sir Parshurambhau College and Dr. Joshi and Dr. Gopalkrishnan at Pune University. Dr. Modak would personify mathematical objects like vector spaces and functions. He would talk as if these objects lived in space and had feelings. This was very impactful, and when I teach I try to bring in what I learned from him so long ago. Dr. Railkar always started class with questions and would let me and my friend struggle to find the answers which cultivated an intuitive sense of mathematics. He would always say that it's just a matter of time until we would stumble upon the truth that is waiting out there to be found. Even if someone else has found it before us, happening upon it for the

first time ourselves is exciting! It gave us the same joy that whoever discovered it first might have felt.

After coming to the University of Wisconsin-Milwaukee, I want to mention Mark Teply who was my advisor, Eric Key, and Kevin McLeod. Mark Teply always pushed for more when I thought I had nothing left to give, and he kept me motivated and gave guidance to complete my thesis. Eric Key developed further my intuitive ability, and Kevin McLeod showed me how I could let students find their intuitive sense of mathematics even at earlier levels like mathematics for elementary teachers. I have been lucky to have taken classes with these amazing teachers without whom I could not do what I do today, and am very grateful for their hard work. As one of my students said, "You can never erase the influence of a good teacher."

**How did you end up at the University of Wisconsin-Milwaukee at Waukesha?**
After getting my doctorate, I knew I wanted to teach at the undergraduate level, and my first job was at the University of Wisconsin Marathon, a campus of the former University of Wisconsin Colleges that is now called the University of Wisconsin-Stevens Point at Wausau. After two years there, I transferred to the Waukesha campus which is now the University of Wisconsin Milwaukee at Waukesha. I have been here ever since.

**What have your students meant to you as a teacher and mathematician?**
In my culture, they say students are a gift to you from above to help you learn your subject even better. Every single student who has touched my life has changed me bit by bit, increasing my knowledge of mathematics and how an individual learns and grows from their mistakes. They have taught me a little more on the hidden intricacies of even basic elementary mathematics that suddenly become visible. The depths of understanding can be more vast than you first think. To truly know something, you need to remain open to learning from different angles and different contexts. As I heard a teacher say once, there is a beginning to learning but no end.

**What courses do you like to teach?**
Although I like teaching all my classes, my favorite courses to teach are probably College Algebra the corequisite model, Mathematics for Elementary Teachers, and Calculus II.

I mention Calculus II because there I can share the presentation of parametric functions (e.g., mathematical models to represent a doodle) that were part of why I became a math major.

The College Algebra corequisite model is a course I have developed with other colleagues that integrates developmental and college algebra all in one semester in six credits. Here I have developed a text that incorporates mindfulness and growth mindset ideas to help students who have fear and anxiety or low self-confidence. Also, the non-standard arrangement of topics includes projects that use STEM discipline simulations that students have to make sense of by using the mathematics learned in class. Even at this level, we can show students how beautiful mathematics is and develop an intuitive sense of mathematics beyond rote memorization. There are many students who say they will keep my book forever because of the mindfulness training. They say it has helped make a difference in their lives beyond math in reducing anxiety and fear and creating a general sense of well-being.

I also love teaching Mathematics for Elementary Teachers courses as I get to show the beauty in the simplest of concepts like fractions that cause so many students headaches. For example, a visual

representation of division of rational numbers like \frac{4}{15}\div\frac{2}{5} can show students how the problem is equivalent to \frac{4\div2}{15\div5} and \frac{4}{15}\times\frac{5}{2}.

**How have you found that teaching of mathematics has changed over the years?**
Teaching math has changed dramatically over the years. From not having even the simplest of calculators, to massive computers that only a few privileged could use, to handheld devices with algebra systems that can graph in a few seconds. This has transformed what a teacher can now bring to the students. From a pure lecture-based course to flipped courses, and now you can even get some conceptual knowledge without an in-person teacher through YouTube and other online sources. But this online information is just the first level of knowledge and drill skills. You still need a teacher to motivate and guide your thinking, someone you can have a dialogue with, to take your understanding to a new level that you may not be able to get from just doing automated drills with artificially intelligent software. To get a depth of knowledge still requires that human teacher-student interaction.

**How have you been you involved with the MAA?**
I have been a member since getting my Ph.D. I regularly read MAA journal articles and attend and present at MAA conferences. Learning from my colleagues about what are new and innovative ways to think and teach is the best part of being a member of MAA.

**What do you think is the best part of being a mathematician?**
Perhaps the best part of being a mathematician is getting that dopamine hit after solving problems. A natural way to feel high is to do mathematics. I also love to wander in my mind's universe looking for solutions, where in a way, all my worldly troubles take a back seat. Even when one consciously stops working on a problem and resumes daily life, there can be that epiphany even in dreams at times that presents a solution. I would not give that up for anything. I also think day-to-day problems can sometimes be solved with the general logic that comes from mathematical training.

**What is the worst part of teaching mathematics?**
The worst part of teaching mathematics is how U.S. society tolerates not being good at mathematics as sort of a given truth. When a child or student says "I hate math" or "I am bad at math," the parent or a friend who hears it might say "that's okay" or "I know, me too!" or even "you won't need it when you get out of school anyway." Parents can decide how to help their kids, but math is more doable than most think. I truly believe that in society, if everyone takes responsibility for not accepting this status quo, we can change how people see mathematics and help kids to succeed. In all my math courses, I stop class when someone says "I am bad at math" or "I hate math" or "I don't understand anything" to analyze why they said what they said. Most often it is only one step or a tiny concept they did not understand. This was apparently their way to deal with the discomfort when one does not understand something. I can usually get students to change their representation of mental distress into something more constructive. Later in the semester, I thankfully can hear students helping each other not to say such negative things about mathematics or themselves. Instead, they either choose to reword constructively or stay neutral in their describing of the discomfort. Being comfortable with the discomfort that arises from failure and from not immediately knowing a solution is an important step in doing mathematics. This can take a lot of patience, but it's worth it to train your mind.

**What of your work do you like the best? What are you most proud of?**

The excitement and twinkle or spark in students' eyes when they "get it" motivates me every day. I also love showing students how math is more than just right or wrong answers and helping them to find their own mathematical voice. I like designing questions so that there isn't just one answer so that all students have a chance of creating solutions at different levels. In this and other ways, I feel I have been able to reach students who feel they cannot do mathematics. I also love improving and learning from students and other teachers. I am proud of my latest textbook for the College Algebra corequisite model which was the result of months of hard work. I am grateful to have received teaching awards like the University of Wisconsin System Board of Regents Teaching Excellence Award in 2015 that was partly due to my work on a developmental corequisite flipped course.

**What is your advice to college students and new teachers?**

For college students from developmental math onward, I would say hard work and compassion toward oneself and others are the tickets to success. Barring brain dysfunction, you should be able to master mathematical topics at different levels. It will need trust in the natural state of human brains and letting go of preconceived notions of one's ability. For new and old teachers, I would say trust in your students' ability and believe that you can reach them. If a teacher believes in their students' ability, they are less likely to give up and may keep looking for how to build a bridge from what students know to what you want them to know. Always be open to learning from fellow teachers and your students.

Who is a Wisconsin Mathematician that you would like to know? Send suggestions for the next KYWM to Ben Collins, collinbe@uwplatt.edu .