



## Finding Compassion in Mathematics: Geillan Aly's MAA Spotlight

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MAA Member and Compassionate Math CEO and Founder Dr. Geillan Aly shares her mathematical journey for our January Member Spotlight. Reading Geillan's story, you quickly realize that mathematics has always been central to her life. When her educational path wasn't aligned at the start, she created a business encompassing mathematics's intellectual and emotional sides.

**MAA: Can you share the story of your path into mathematics.**

Geillan Aly (GA): Math was fun and enjoyable in high school. When I enrolled in AP Calculus, there were times when I predicted the next lesson. I would ask my teacher, “oh why don’t we do it this way”, and my teacher, Miss Pellegrino, would reply “that’s what we’re doing next week.” She had always encouraged me to major in math.

I majored in history when I went to college. Honestly, I didn’t know what I wanted to study and remembered Miss Pellegrino telling me that I should study math. However, all the classes I needed for a math major were at 8:30 in the morning [at my undergraduate institution] - no thank you. Also, whether or not it was true, I was also told the math professors weren’t very supportive; this was key to my ultimate decision. One thing I knew was that I needed really good teacher support, so I didn’t go down that road.

When I graduated, I worked in the magazine industry in New York City. It didn’t take long for me to feel intellectually frustrated and like my life didn’t have meaning. I felt like I was working really hard so that a billionaire could make more money and I kept saying that “corked walls are one step away from padded walls”.

[At the time] I started reading the books I never read in college and decided to return to school and study physics and math. Since I would have to fund my studies out of pocket, I could only choose one. I chose math.

I thought about it, and as hokey as this sounds: mathematics is probably the closest we could ever get to really talking to God. That’s why I decided to study it.

I quit my job, enrolled in math classes at Columbia University and...I did not do well. I struggled; the entire time when I was studying as a math major, nothing made sense. I didn’t realize that the discourse of a math major is very different from the discourse of a math student. I didn’t understand the significance of “definition, theorem, proof”. Where was the motivation? What were we doing? Why? I didn’t know that the crux of the major was to learn what proofs are, why they mattered, and how to prove theorems. All of that nuance was lost on me; I was really confused about the essence of researching mathematics.

I knew I was in trouble and asked my professors for help, but I didn’t know how to articulate what I didn’t understand. However, I was outwardly successful in my classes and was accepted into graduate school at the University of Arizona. At that point, things didn’t get any better or worse, but to add to my issues, Ramadan began shortly after I started graduate school. For the first time in my life I was fasting in a desert where the high was above 100 degrees! Needless to say, my cognition took a hit and my struggles compounded. I just didn’t understand the essence of what I was supposed to do.

By then, I was able to articulate my confusion, but the ability to verbalize my need for help didn't make things easier. The structure formal mathematics continued to be a source of discomfort. In class, we started from a premise and rapidly continued from there; the issue was that I needed to understand the premise. I needed an explanation of why a group is defined the way that it is. I did not know the motivation behind the idea of a topological space. These were details that I wanted, and needed, to know; but they seemed to be taken as granted. I continued to struggle, but not for reasons that would be immediately obvious.

I began to question my identity as a mathematician but soon realized that I was not alone. Students just like me, with non-traditional perspectives and broader challenges facing them, were struggling just as much. My issue, *our issue*, was actually a systemic problem that still looms over the mathematics community, and it began long before I ever stepped foot on Columbia or Arizona's campus. I was questioned about my place in mathematics ever since I went back to school.

I started thinking about this problem. What changed between being a star pupil in high school and the student who had difficulty relating to the subject in college and beyond? Although I was making progress, there was something holding me back from making the kind of progress I knew I could. Most importantly, rather than getting support, I was told I didn't belong by the 'Powers that Be.' The mathematics community seemed to value excluding, rather than including, others. As an older student, I was strong enough in my own identity to ignore these messages of exclusion and further question the assumptions I saw. Maybe my questions were better suited in the field of mathematics education? I started taking classes in mathematics education. Soon after, I was heavily recruited by my advisor to enroll in the College of Education at the University of Arizona. These classes helped me see how a lot of my story was tied to issues of equity and social justice. After graduation I became an Assistant Professor of Mathematics.

### **Developing Compassionate Math**

During the pandemic I took some time off but needed something to keep me occupied. A friend suggested professional development. I had never thought about that. I always just wanted to work with and research students; I never wanted to work with teachers. My friend insisted and helped get me into a school. I went in, had some conversations, and it was amazing!

I met teachers who were desperately looking to support their students during the pandemic and needed modern tools to implement best practices. As a researcher and recent PhD who has a pulse on more modern educational practices, I knew I could bring that to teachers. It has been unbelievable and that's Compassionate Math.

**MAA: How would you best describe Compassionate Math?**

GA: Compassionate Math is a math services support and consulting company which posits that learning math is both an emotional and intellectual endeavor. Most of my work is with teachers but I'm happy to work with parents' associations or business leaders who are training their employees. I foreground the emotional side of learning math. But just because I talk about affect doesn't mean that I ignore rigor. Interestingly enough this leads to a challenge of perception about the relevance and need for Compassionate Math.

In my PD I start by talking about math anxiety, engagement, identity, or belonging in math class and say all of those are issues of equity. Addressing these issues is necessary for learning mathematics. Unfortunately, the pushback [I receive] is well where's the rigor? So, I've started using this example: think about the difference between getting a manicure versus painting your nails in front of the TV. A manicure requires buffing the nails, pushing the cuticles back, moisturizing, and otherwise getting the nail bed ready to accept and hold the color so it goes on once, looks gorgeous, and lasts a long time. Compassionate Math helps teachers prepare their students and the learning environment so that the content sticks and lasts. I'm honored to say that my work has been tremendously successful in the schools I work with. My teachers have reported significantly higher classroom engagement, richer class discussions, and higher test scores. If teachers need help with content, I've readily supported them in that area as well.

**MAA: How has the MAA impacted you?**

GA: [The] MAA did not impact me until Compassionate Math came around. The impact is validation and a sense of belonging in the mathematics community. I had been given lots of signals about my place in the mathematics world and often it was that I didn't belong, was not good enough, and that my questions weren't relevant.

The MAA has said mathematics is so much more than what some people are saying and the mathematical community is so much bigger than what I first saw. I do have a place here. The MAA has supported and validated me and made me feel like I belong, and it's okay for me to think a little differently about mathematics and how it is taught.

**MAA: What is the best advice you have ever received?**

GA: My doctoral advisor said all the energy you're spending fighting to belong in a system that doesn't accept you would be better used to help you thrive by finding your own way.

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**MAA: What advice would you give to someone who wants to be a math educator?**

GA: Find your place and your community. It's hard if you're in the minority of the minority, but I will say that friendship is what got me through all of my challenges. There is always someone out there to help you or is struggling like you. Reach out to others because the mathematical community is larger and more diverse than you think and there is someone who can support you, and you them.

I recently became reacquainted with Dr. Lauren Rose at Bard College. One day we were talking about a math problem and I made an observation. Lauren was stunned at what I mentioned casually while on the phone, folding the laundry. Her response was that she couldn't believe I could see a problem with such depth of clarity and that it was a real shame that I decided to veer away from Pure Math. Her words made me cry. Never has anyone within the "pure math" community affirmed me the way she did.

It is my network now; women, people of color, misfits, and our allies who have helped me grow Compassionate Math. I am held up by those around me.

**MAA: Who inspires you and why?**

GA: My doctoral advisor, Dr. Marcy Wood. I think she is the only human I have ever met who so consistently looks for, finds, and then focuses on the good in people. She looks for the good in a person and that is the lens by which she interacts with them. It helps people build on their strength from a natural space, move forward, and be recognized and appreciated for what they contribute. And if she did not do that with me, I have no idea what would have ended up happening to me.