

professors and peers. Because—you want to know a secret? Everybody struggles. Even when you see them doing well in class, or publishing papers, or succeeding in any way, that success was most probably built on tears and sweat.

Currently all my research projects are collaborations. Even most of my undergraduate student research happens in groups of students that I advise. I work with a wide variety of researchers and students in many different disciplines. We take advantage of each others' strengths to make up for each others' weaknesses. Many of my collaborators have also become my friends and they advise me in other areas of my professional life, such as teaching, mentoring students, and university service. I am (mostly) not ashamed of asking for help now or admitting that I don't understand something. My collaborators make me a better researcher, and I hope that my students learn about the power of collaboration as I have.



Alicia Prieto-Langarica

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Author photo is courtesy of Alicia Prieto-Langarica.

A View of Mathematics from Behind the Veil

Robin Wilson

If we think of mathematics as a neutral science that is free of bias, it might be hard to comprehend how there is any other explanation for some groups' lack of success in mathematics other than the fact that they are less capable. But when we investigate how privilege plays out over the course of history, over one's lifetime, and over the course of one's day, we can see how one can be placed in a position to either access or be denied access to an equal chance at participation in society. And societal participation includes participation in the mathematical community. In her 2017 *Journal for Research in Mathematics Education* article "The Culture of Exclusion in Mathematics Education and its

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Persistence in Equity Oriented Teaching," Nicole Louie describes what she calls the "culture of exclusion" in the mathematics classroom:

The restrictive and hierarchical culture that has historically dominated American mathematics education limits all students' access to rich and meaningful mathematics learning experiences and further limits many students' opportunities to develop identities as mathematically capable learners and thinkers.

One of my first memorable experiences with the culture of exclusion in the mathematical sciences happened in my transition from middle school to high school. My mother, being the proactive mom that she was, engaged me early on in extracurricular activities around mathematics and science. For instance, she enrolled me in a science-themed summer program in elementary school. Later, when I was in middle school, she got me involved in the Mathematics, Engineering, Science Achievement (MESA) Program. The summer after I took pre-algebra in eighth grade, my mom placed me in a self-paced algebra class that was offered at a local college and taught by a college instructor. I struggled through the course the entire summer and suffered the experience of always being the slowest one, but I survived the long days in class and the long bus rides home. When I went to my high school for the first time to meet my guidance counselor, who happened to be a middle-aged white person, he looked first at me, then at my record, and placed me into pre-algebra again. Despite my summer spent learning algebra, he convinced me that it was in my own best interest to repeat the pre-algebra course. My mother, on the other hand, upon learning about my schedule, marched up to the school the next day to demand that I be placed in the appropriate mathematics class—algebra.

It wasn't until I was an adult that I was able to reflect on the significance of this experience. If I hadn't been given the opportunity to take algebra as a freshman, I wouldn't have been able to take calculus in high school, and I'm not sure where I would be today. I'm sure it's possible that I would still have gone on to become a mathematician, but I would have followed a different path with more obstacles. What's of much bigger concern to me, though, is the realization that there have been many other students, like me, who were placed in mathematics courses below their ability level by this same counselor or by other staff in similar positions of power. These gatekeepers were unintentionally (or perhaps intentionally) underserving the education of so many students. Multiply that number across all the high schools in my home town of Sacramento, the state of California, and the country, and the impact is staggering.

My high school was a public one and was exposed to its share of violence; more than a handful of my peers were victims of gun violence and the prison-industrial complex. For these students, having greater access to mathematics

early on could have made a very real difference in their lives. For many students today, the issue of access to quality mathematics instruction can literally mean life or death.

I have a very vivid memory of another incident that must have happened around my junior year of high school. I was at my school on a weekend, and when I walked past the cafeteria, I was surprised to find it full of people. I stopped to look through the window—I was trying to figure out what was going on inside. I didn't recognize many of the people. I noticed that the students didn't really reflect the entire demographic of our school, which was very diverse. After asking someone what was going on, I found out that it was a math competition! So, there I was, literally on the outside looking in. First, I wondered why I hadn't been invited. Then, I felt glad that I wasn't invited because I didn't think I'd fit in or perform well anyway. It's interesting looking back on that experience from the perspective of a student who also may have been capable but was not invited into the math community at my high school. In addition to being denied access to a mathematical enrichment activity, I was also denied the opportunity to network and build mathematical relationships with other students and teachers from across the metro area. What a perfect example of an experience in which a student may have been perfectly capable of performing well or excelling in a specific math community but was not invited into the room to even find out.

As an undergraduate, I was not invited into the math community by any students or faculty in the math department at my own university, but I was included in the emerging scholars program community which operated in a different space. It was outside of the department, but at the same time, it provided a "safe passage" that we could take to get in and out of the math department space. Almost no one in the math department (except for those in the emerging scholars program, which was outside the math department) ever expressed the slightest interest or confidence in me or my abilities until the last week of my senior year when I handed in my honors thesis project. Then, almost as an afterthought, my advisor suggested I might be capable of succeeding in a graduate program. Looking back, I find it puzzling that I had never even heard of the Putnam exam until my fourth year of graduate school, and I probably learned about the Math Olympiad around the same time. I didn't even know colleges had math clubs for students until I became a faculty member. Instead, my "math club" was the peer group that I formed in the emerging scholars program, the community of role models and mentors that I met through attending the NAM Undergraduate MATHFest conferences, and the mathematicians that I discovered on my own by spending lots of time on the Mathematicians of the African Diaspora website in order to find my own role models to look up to.

Things turned out all right for me in the end, but I wonder how different things might have been if I had been

exposed to the same opportunities that many of my peers and classmates in high school and college had access to. In some ways, it's as if my experience in mathematics has taken place behind a "veil," to borrow a phrase from W. E. B. Du Bois as it was articulated in his 1903 book *Souls of Black Folk*. For Du Bois, the veil is a reference to the experience of Blacks in America in which there is a world that they can see and are in many ways a part of but cannot access in the same way as their white American counterparts. The veil takes many forms. It appears as the metaphor of the glass ceiling for women and the bamboo ceiling for Asian Americans. As Howard Winant explains in his 2004 article "The New Politics of Race: Globalism, Difference, Justice," "For Du Bois the veil not only confined and excluded Black people, but also protected them from at least some forms of white violence and domination." He goes on to say that as a consequence of this double-consciousness that is imposed by the presence of the veil, "the veil not only divides the individual self; it also fissures the community, nation, and society as a whole." This metaphor plays out in the mathematical sciences as a fissure in the mathematical community that also passes beyond the community into the discipline itself.

For me, the repercussions of these experiences have been profound. My identity as a mathematician, how I see my role as a faculty member, how I relate to students, and how I relate to and socialize with others in the field are all shaped by these experiences. Now, as a full professor with little left to prove, I still find myself wondering from time to time what it would be like to experience a bit more entitlement around mathematics. I am still unsure of where I belong in relation to many of my peers. The impostor syndrome is still very real. And I often wonder what it would feel like to be able to participate in the discipline without it having to be so much of a struggle.



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