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Help Will Always Be Given at Hogwarts to Those Who Ask for It

Allison Henrich

When I was in third grade, I wanted to be a third-grade teacher; when I was in sixth grade, I wanted to be a sixth-grade teacher; and when I was in high school, I wanted to be a high school teacher. Finally, when I got to college, I settled on the idea of teaching some subject at the college level.

Throughout my first four years of college, I was enamored with philosophy and decided I'd pursue an advanced degree in philosophy to become a professor. I took Epistemology, Philosophy of Science, and Ancient Philosophy, but I got most excited about taking every kind of logic course I could get my hands on. When I was at the University of Washington, the philosophy department offered Advanced Logic, Axiomatic Set Theory, and Computability Theory. These were all gorgeous, fascinating courses! I learned about different sizes of infinity, the axiomatic foundations of the natural numbers, fascinating ideas like Russell's paradox, and I even built a universal Turing machine! Enjoying these courses as much as I did made me think that I might actually like to take more math. I had already

satisfied my math requirement for graduation by taking Calculus 1, but then I decided to take Calculus 2, Calculus 3, Multivariable Calculus, Linear Algebra, and Differential Equations—just for fun. After my Differential Equations final (which was, theoretically, going to be my last math class), my professor followed me into the hallway and asked if I was a math major. When I told him I was just taking the course for fun, he looked shocked and told me I should consider adding a second major in math. This moment of encouragement very likely changed my life.

I declared a second degree in math, and I devised a plan to finish my math degree in two years while absorbing all the philosophy, French, and German that I possibly could. I also quickly realized that I did not actually want to teach philosophy at the college level, but I thought I'd really enjoy teaching math.

The only problem was that math was getting incredibly hard as I got into real analysis, abstract algebra, topology, and geometry. What gives? Math used to be easy! Now, I'd spend hours every day attempting—not terribly successfully—to do my homework. I slept with piles of math books and scribbles of bad proof ideas in bed with me. I dreamt about finding solutions to vexing problems. "Of course! It's just $2+2=4$!" I was disappointed to learn upon waking that the solution was still completely elusive. I could ponder a single problem for hours, getting nowhere, getting discouraged. I'd eventually give up and go to my professor's office hours to beg for help. I distinctly remember spending four hours one evening trying to figure out how to show that one particular sequence converged. When I saw how to do the problem the next day in Professor Mitchell's office hours, I felt like a total idiot. The solution had been right in front of my face! Throughout the five or six courses I took from him, one professor in particular, Steve Mitchell, helped me through all of my mathematical woes. He helped me find solutions to my problems, but he also gave me pep talks and never let me forget how beautiful math is. Even though I no longer felt like I was a natural at math, seeing its beauty and being encouraged by Steve helped me stick with my plan of teaching math to undergraduates.

"What's the least amount of schooling you need to teach college math? A master's degree? Sure! I could probably handle that." By the time I was nearing graduation, I thought that there's no way in hell that I could prove something in math that has never been proven before—math is just getting too hard and I'm not good at it anymore. So I all but abandoned my idea of getting a PhD. Of course, it's much easier to get funding if you say you want to pursue a PhD than if you say you want to pursue a terminal master's degree. So what if I told a little fib and applied to PhD programs with the secret plan to stop at a master's? How much could it hurt? It's the only way I

could afford to pay for graduate school, so I decided I'd give it a try. Luckily, I pulled the wool over Dartmouth's eyes, and they accepted me into their PhD program.

When I got to grad school at Dartmouth, my courses were incredibly hard. But I had already experienced how hard math could be as an undergraduate, so I knew how to work my way through it. All I needed to do was take great notes in class, rewrite them afterwards, spend hours each day on my homework, visit my professors' office hours a few times a week, and study with my friends. Many of my peers had coasted all the way through their undergraduate math degrees, so they were struggling for the first time in these graduate-level courses. It took them a lot longer to figure out how to handle it. But I knew how to struggle. I knew I had good study skills, and I knew how to get help from my professors and friends when I needed it (which was pretty much all the time).

To pass my qualifying exams and earn my master's degree, I just had to apply these same study techniques to qualifier preparation. And it paid off! I passed all four of my oral exams on the first try. Looking back on what I had achieved, I saw how I could take a seemingly impossible task and break it down to tackle it piece by piece. So why couldn't I earn a PhD?

In the end, I kept going. I learned that it doesn't matter whether an understanding of difficult material comes naturally to me or not. What matters is that I know how to respond when things get hard. This frame of mind allowed me to recover when the proof of the main theorem in my thesis fell apart and I had to totally abandon the whole project. After some tears and beers, I found an entirely different topic to learn about and start working in. And although I had to shift the focus of my dissertation in my fourth year of graduate school, I completed an entirely new dissertation and graduated on time in my fifth year. In the end, I got a great job teaching college students—just as I had always wanted.

Allison Henrich is an associate professor of mathematics at Seattle University, where she has been a member of the faculty since 2009. She earned her PhD from Dartmouth College. Allison is passionate about teaching, and she is active in research in knot theory and recreational math as well as the scholarship of teaching and learning. One of the most rewarding activities she engages in as a professor is working with undergraduate researchers. Through knot theory research, Allison mentors students—many of whom are unsure about their career goals—to help them learn what may and may not excite them about a career involving mathematical research. In general, she gets the most enjoyment out of supporting students to do their best work as they learn about the beauty of mathematics. Allison recognizes that she would not be where she is today without the inspiration and encouragement of several of her own undergraduate professors.