

Bridging Worlds Through Mathematics

By Alan Zhang

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Interviewee: Alena Erchenko

Math isn't for women — variations of this stereotype have been perpetuated by both biased studies and outdated prejudices. Although I have never encountered this stereotype, I recognise we are still progressing towards true equality. However, I had never realized how empowering and universal math could be. The story of Alena Erchenko, an Assistant Professor at Dartmouth, showed me just how transformative and boundary-breaking math is, transcending not only gender but also cultural and political differences.

In the sprawling city of Moscow, a city that had just experienced the dissolution of the Soviet Union, Professor Erchenko began her journey through the chaotic dynamic system that is life. Throughout elementary school, Professor Erchenko enjoyed math, relishing unravelling the logic behind new concepts and learning more. However, she soon came upon a crossroads in her life which would shape her future.

In the Russian school system, children attend general elementary school up to around 8th grade, whereby they can choose a speciality school to hone their talent and interests. When Professor Erchenko needed to choose schools, she was unsure. One day in seventh grade, a family friend suggested math as her speciality. This man, named Victor Golubev, had been giving her puzzles to work on regularly; they frequently met at her house, working on problems over a cup of tea. He was a math puzzle-solving professional who supported her in math studies, and Professor Erchenko considers him to be the reason she pursued math. He recommended a school called Lyceum 1533, an information technology school that taught a wide variety of STEM subjects, mainly programming and math. Professor Erchenko reasoned that because the school offered more subjects than other tech schools, she could pivot subjects if she needed to.

The biggest difference between Russian and American high schools was the curriculum. “It was Algebra, Geometry, Programming, Physics, and more math. Oh, and P.E. because we exercise our brains so much we forget about our bodies I guess,” Professor Erchenko laughed. The schedule was packed with math and computer science to allow students to pursue these subjects more deeply, thus students decide their career path at the start of high school. This is in sharp contrast to the U.S. system, where students do not decide their careers until college.

After graduating from Lyceum 1533 with excellent grades, Professor Erchenko studied mathematics at the prestigious Moscow State University. She specialized in differential equations and earned a teaching qualification, believing that mathematics is both a research and teaching discipline. In the summer before her final year, she studied abroad at Pennsylvania State University through the Research Experiences for Undergraduates program (REU). Her mentor at Penn State suggested that she apply for a graduate program in the United States, and a lightbulb turned on in her head. She thought “Why not?” at this exciting idea. After graduating from Moscow State with honours, Professor Erchenko pursued her graduate studies at Penn State.

As Professor Erchenko started her studies in the United States, her world was changing. Under the guidance of her advisor, Anatole Katok—a leading mathematician in the field—she transitioned from differential equations to dynamic systems. She decided on the field of dynamic systems then, as she believes it is on the edge and boundary of many fields — “a bit of everything.” She worked on questions inspired by Katok’s Conjecture, particularly the rigidity and flexibility of data in a system. In addition to a change in career direction, she also encountered the problems of transitioning between two cultures. The people and society in rural Pennsylvania were very different from Moscow, though welcoming, the cultural difference still presented a barrier as she transitioned into teaching.

Professor Erchenko began her teaching career as she was studying at Penn State, and this brought out the differences in culture. Her first assignment was to teach a calculus class. She initially taught in the familiar Russian teaching style, by having students understand how everything works. She challenged students to prove and master the concepts and fundamentals. One day, another teacher approached her. The teacher told Professor Erchenko that the way she taught the class was too hard for students who had never learned calculus before, and applying concepts was more efficient than understanding and proving them. The way Professor Erchenko naturally taught was—according to her colleagues — incorrect! She adapted her approach to align more with American standards, and successfully continued teaching during her time at Penn State.

After earning a PhD in mathematics from Penn State, Professor Erchenko joined a postdoctoral program at Ohio State University. She later taught and conducted research at Stony Brook University and The Simons Center, followed by a pure research position at the University of Chicago. In 2023, she settled in Hanover, New Hampshire, and joined the Dartmouth Math Department as an Assistant Professor, in parallel to her research efforts. In her classes, she creates an environment where students are welcome to question so that students can fully understand the concepts. She was impressed by how American professors encourage students to question them, and through her classes, she embraced this spirit.

Professor Erchenko's journey does not come without challenges, experiencing homesickness and adapting to the new cultural and environmental differences in a foreign country. In moments of hardship, she relies on the support of her family and friends, grateful for the guidance and inspiration of her outstanding teachers. "I was very lucky to have such great teachers and mentors", Professor Erchenko recalled, "particularly Victor Gulobev and Anatole Katok." She tells people in similar struggling positions to "never give up and to be flexible," just as she adapted to a new culture and people.

Now, Professor Erchenko plans to continue her career as a Professor, beginning to mentor graduate students, and becoming the teacher she was fortunate to have. Her passion for math allowed her to odyssey from Russia to the United States, building a bridge over physical borders along with cultural and political boundaries, inspiring me to not only view math as a discipline but a force for progress.

I am Alan Zhang, an 8th-grader at Frances C. Richmond Middle School. I love mathematics and sciences, especially applied math and physics. In school, I captain the Quizbowl team and participate in the Mathcounts team. Outside of school, I swim on the UVAC swim team, compete with a local robotics team, and play piano and saxophone. I also like to research law, medicine, linguistics, and random stuff. In my free time, I like to learn, play games, and exist.