

Solving Challenges Off and On the Ice

By Maggie Feng

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Interviewee: Ina Petkova

Ina Petkova, a woman in STEM and coach for the Hanover Wild U14 girls ice hockey team, has been nurturing a love of math since she was 6, with her love of hockey coming almost a decade later. Now, she is greatly successful in both passions: she has become an Associate Professor of Mathematics at Dartmouth College, and her tier 2 U-14 team is a welcoming, joyous group of young women. Her story is evidence that working towards your aspirations and never giving up, despite setbacks, will ultimately pay off, resulting in a fruitful and fulfilling life.

Petkova was born in the pedestrian town of Plovdiv, Bulgaria, with her family working to keep young Petkova occupied. While trying to entertain her, Petkova's mother and grandfather discovered Petkova's interest in math and puzzles. They made up mazes, riddles, and simple math problems to help her pass the time. Petkova remarked that "[Those puzzles are] kind of the earliest memory I have of a family member trying to interact with me in math", and later suggested that, if it weren't for her mother and grandfather, she wouldn't be where she is today. However, she discovered her passion for hockey on her own, latching onto it and fighting in a world where female athletes are rare and get looked down on at every turn.

After moving to western Massachusetts to attend Amherst College, Petkova was reintroduced to hockey. Since it didn't exist in Plovdiv - except on TV and in newspapers - she had never actually played the sport on ice, instead joining her friends in pick-up games in her neighborhood. Once they found some old, wooden hockey sticks and grabbed their rollerblades, they were all set for some impromptu "hockey-ing". But now, at Amherst College, Petkova had access to an ice rink, and coincidentally, the boss of her post office side job was well-versed in hockey and spread his enthusiasm to Petkova. With her fondness for the sport rekindled, she bought her first hockey skates and stepped onto the ice for the first time when she was 19. Things didn't work out as planned, though. Brand-new skates are rarely sharpened, and in this case, they were dull as rocks. However, Petkova didn't give up as many might've after, no doubt, dozens of falls. She later took her skates to get sharpened, and now that the issue was fixed, Petkova rapidly improved. She went on to play organized hockey in grad school for Columbia and also for the Bulgarian national team a few times over several years. Unfortunately, her player career ended abruptly when she broke her ankle, but Petkova saw the silver lining and exclaimed that "[breaking my ankle meant] I get to coach now!!" with a light chuckle. She says that her favorite part of coaching is the cerebral part of it—designing drills and creating units within the larger team. She even told me, with a sort of quiet excitement, that coaching is kind of like collaborating on a math project, in the sense that you have to have both individual and team skills and be able to delegate and work with people.

Another idea marrying math and hockey is that there are specific mathematical ideas that could improve a player's play if applied. Petkova mentioned the following: basic geometry, like the angle at which you shoot a puck off the boards; physics and mechanics of motion, like the understanding of when the puck will catch up to a moving player; the angle of shooting since the amount of open space you can shoot the puck into will shrink or fluctuate based on how far out

the goalie is. Petkova remarked that being able to teach players to recognize and capitalize upon these little tricks brings her so much joy, and it also unifies two of her favorite hobbies.

When, at the end of our interview, I asked Petkova if she had ever had to deal with sexism in her field or sports, she said that she hadn't experienced sexism "a whole lot, compared to stories [she's] heard." She elaborated by mentioning that, in her adolescence, she had gone to many math competitions in which there was a large difference in the number of girls versus boys. Still, there had been no active discrimination there, and not in hockey either, she mused. Petkova admitted that sexism came to her in a bit of a culture shock and reflected that it was because either she had never experienced it as a kid in Bulgaria, she had experienced it or witnessed it but was oblivious to it, or she was just lucky that there was less of it around her. But this doesn't mean that she just lets it slide when discrimination happens. Petkova said with a proud laugh that she learned to call out sexism whenever it happened to her. She also said that a great way to deal with discrimination, in general, is to be supportive and to try to get younger girls opportunities earlier in life. An example of this idea is a fun math day for only girls, that Petkova co-organized. Called Sonia Kovalevsky Day, it was an event that was wonderful to be able to attend last year personally. It was well put together, and most importantly, the educators were mostly women, which was great for all the young girls that attended, including myself, to see!

All in all, what one could learn from Petkova the most from her story is, although cliché, to never give up. Her journey from having never stepped on ice until she was 19, to becoming a beloved hockey coach despite the sport being so male dominated, is mirrored in a mathematical sense in her journey from Bulgaria to New Hampshire. Her odyssey from being a baby in Plovdiv, solving equations like " $3 + ? = 5$ ", to becoming a wildly successful woman in STEM at Dartmouth College, is the epitome of working hard to fulfill your dreams, especially in a world that's not as forgiving to women.

My name is Maggie Feng, and I am a 10th-grader at Hanover High School. I am currently in Precalculus Honors at HHS, and I enjoy all kinds of math, especially algebra. I love playing hockey in my free time, previously for Coach Petkova, but now for the Hanover High School girls' varsity team. I also like reading, baking brownies, spending time with my family, and volunteering to help animals in need!