

Evelyn Lamb: [00:00](#) Welcome to the Lathisms Podcast. I'm Evelyn Lamb. In each episode we invite a Hispanic or Latinx mathematician to share their journey in mathematics with us. Today we're very happy to welcome Ricardo Cortez to the show. Hi. Can we start, maybe, by talking a little bit about your research area?

Ricardo Cortez: [00:28](#) Sure. I am an applied mathematician. I'm, basically, a computational mathematician. I do what's called, numerical analysis. What this means is, using mathematics to write computer codes, to do simulations of various phenomena. What I am mostly interested in is phenomena that have to do with fluid motion, in particular, the fluid flow that is generated around swimming micro-organisms. Things like cilia that are all over our bodies or flagella that are part of micro-organisms, like bacteria and sperm. They beat in certain frequencies and they generate flows to propel themselves or to do something else. We want to study those flows.

Evelyn Lamb: [01:24](#) Is that where you started your mathematical research or did you start somewhere first and end up with fluid flows?

Ricardo Cortez: [01:31](#) Well, I started doing, maybe, differential equations, but, as an undergraduate, I was a mechanical engineering major first. As part of that major you study fluid mechanics and, at the time, I didn't think I liked it actually, that area. But once I switched to applied mathematics, and I looked at the mathematics of the fluid flows, then I liked it a lot better.

Evelyn Lamb: [02:03](#) How did you get interested in engineering and mathematics in the first place? Did you have early experiences with mathematics as a child?

Ricardo Cortez: [02:11](#) I think I did. I don't remember too many, but that means I don't remember any unpleasant ones either. I remember being fairly good at math. For example, in seventh grade, the teacher caught me doing something I shouldn't have been doing in class. His way of dealing with it was, he made me come up to the board and do a problem. I think he was trying to embarrass me, or something, but I got it right. So it didn't work for him, and it gave me some confidence. I liked math from the beginning. In high school, I was also pretty good in math and people looked at me for help maybe, my peers, and things like that.

Ricardo Cortez: [02:57](#) I liked math all the time, I think, as far as I remember.

Evelyn Lamb: [03:01](#) Did you grow up in the US?

Ricardo Cortez: [03:04](#) I grew up partly in the US and partly in San Salvador, El Salvador. My parents and all their families were from El Salvador, but they happened to be in the United States

for some time, which is when I was born. I was born in New York City. When I was about four, almost five, years old, my parents decided to move the family back to El Salvador, so I went to school there until I finished high school. Then I came back to the United States.

Evelyn Lamb: [03:41](#)

Do you feel like there's a big difference in how the education system works in the US as opposed to El Salvador?

Ricardo Cortez: [03:50](#)

I think there is a difference. It's a little bit tricky for me to say from first-hand experience, because I did part of my education in El Salvador and part of it here, in the States. So I don't know the counterparts of each one of those sides, but I think that, as a general rule, mathematics, for example, in El Salvador and maybe in a larger region of Latin America, is not seen as something that only certain people should do, or could do, or people don't feel like it's okay to say, "I don't know mathematics, but that's okay, because I know other things." I think mathematics is taken to be something that everyone should know, to some degree, and is something that people strive to learn. I'm not sure that, that's the case in the US.

Evelyn Lamb: [04:54](#)

Did your parents encourage you to pursue math or other STEM careers?

Ricardo Cortez: [05:00](#)

Yeah. When we were looking for college majors, I remember thinking that I like mathematics, but, at the time, nobody in my family, including me, knew that mathematics could be a career. Mathematics, to us, sounded like a subject that you study and engineering sounded more like a career. So I was encouraged, by the people around me, to pursue engineering, in a sense, because I like mathematics. So that's what I did originally, and once I was in college, I took as many math courses as I could. As I was running out of courses, I decided that I wanted to take some more. My advisor, at the time, my engineering advisor, suggested that I add a math major, if I was going to be serious about taking more math classes for the rest of my semesters.

Ricardo Cortez: [06:02](#)

That's what I did and I ended up double majoring.

Evelyn Lamb: [06:06](#)

Were you encouraged by other professors in the math department or discouraged to pursue mathematics?

Ricardo Cortez: [06:13](#)

I don't remember being discouraged by anybody at the time, or maybe I just didn't understand subtle discouragement. I really wasn't very clear, in my head, about what I wanted to do. All I wanted to do was take some math courses, because I like math. I wasn't really thinking of a career. I certainly didn't know anything

about graduate school, and I didn't know anything about research in math as an undergraduate. I went, maybe, to one or two conferences, but I didn't really experience research in mathematics.

Evelyn Lamb: [06:55](#)

How did you learn that mathematics was something you could make a career of and decide to go to graduate school?

Ricardo Cortez: [07:01](#)

Accidentally. I had friends that were graduating college with me in mathematics and, in particular, one friend of mine, she knew all about graduate school. Her father was a physicist in Los Alamos. She went to graduate school in applied math at UC Berkeley. I actually stayed behind, still as an undergraduate, finishing my second degree, my engineering degree, which I had neglected a little bit. During that year, she encouraged me to apply to UC Berkeley. She kept telling me how great it was over there. I thought I wanted to study some more, so I applied to UC Berkeley in applied mathematics, and I applied for graduate school, I think, at Arizona State University, which is where I was doing my undergraduate degrees.

Ricardo Cortez: [08:04](#)

I was also, already, looking for jobs in engineering, because I just didn't know what I wanted to do. I didn't really have a lot of guidance, obviously. As it turns out, UC Berkeley accepted me, so I went there.

Evelyn Lamb: [08:19](#)

Do you feel like you had some important mentors in your education when you got ... either at Arizona State or at UC Berkeley?

Ricardo Cortez: [08:30](#)

Yeah, definitely in graduate school. As an undergraduate, I didn't have too many mentors. I had advisors who would look at my course schedule every semester, and that was about it. When I got into Berkeley, it turns out that my math advisor had been a graduate student at UC Berkeley many, many years earlier. So he was excited about it and he was encouraging me to go and do well. But that was at the time when I was almost already decided that I was going to do that. Once I got to UC Berkeley, the first couple of years were rough as a graduate student. It was at a time ... There were different times there, it was in the late '80s, and the math department there was accepting lots of students into their PhD program with the full knowledge that many of those students were not going to finish those degrees.

Ricardo Cortez: [09:36](#)

Somehow they justified it by thinking that they were giving people opportunities that they wouldn't otherwise have. I think I was one of those, probably. I happened to survive, I guess, somehow. My first couple of years were a little rough. I'm not sure I can point to any advisors or

mentors at the time, but I had a good set of peers, many of them survived too, many of them didn't survive. They ended up with a master's degree or something like that and left. But once I was in, passed my exams, then I found an advisor, Alexander Chorin is his name, who was really, truly excellent. He was very gracious all the time. He gave me a lot of opportunities to do research with him, and funded me as a research assistant, and sent me to conferences and other workshops and things. Did all the things that good advisors do. We used to have conversations about mathematics, and academia, and all these things. He was a great mentor to me.

Evelyn Lamb: [10:56](#) Did your experiences, at Berkeley, both in the beginning, where you didn't have as much mentorship, and then later, when you did have a good advisor. How have those affected how you've acted as a mentor, and teacher, and advisor?

Ricardo Cortez: [11:13](#) They had a huge influence on me. I don't think Berkeley does that anymore. In fact, they stopped doing that after I left. I always think of that when new graduate students come to my department here, at Tulane University. Of course, our programs are very different from Berkeley, but, in particular, Tulane is a small place. But I try to make sure that we have support for our first year graduate students. I understand, now, a lot better how people make transitions from undergraduate to graduate school and things like that. And how it's different for everybody. Some people take a semester, or even less, to make the transition, others take, maybe, a year to make the transition. One has to understand that everybody needs different kinds of support. It's a matter of getting to know the students and trying to understand what will work for them.

Evelyn Lamb: [12:17](#) Do you have advice to give to students about overcoming academic challenges?

Ricardo Cortez: [12:21](#) Well, I do have advice. I talk to my students a lot. I usually don't just offer advice unsolicited, but I tell them, sometimes, about my story or stories of other people I know. That I know are going to resonate with them. Also, with my friend, Dagan Karp, we have one of the American Mathematical Society Blogs. It's called, E-Mentoring Blog. We post a lot of comments about ... Well, what we think is good mentoring for undergraduate students, and graduate students, and even post-docs, and faculty.

Ricardo Cortez: [13:14](#) Yeah, I've served as mentor to some students through different organizations. I tend to talk to them a lot to make sure that, at the very least, they understand that whatever they're going through, they're not alone and

most of us have gone through something like it, and we can help them identify ways of getting past it.

Evelyn Lamb: [13:41](#)

Do you have a professional accomplishment you're most proud of?

Ricardo Cortez: [13:45](#)

I think so. In my field, there are lots of people that create computational models, or computational methods for simulating certain things. Early on, about 15, 16, years ago, I created something that is called, the method of regularized stokeslets. These are technical words, but it's a method for simulating the kinds of fluid motions generated by flagellated organisms, like I was telling you earlier. These are useful for flows around bacteria swimming, and spermatazoa, and things like that. Actually, it's become a really popular method all around the world, so I'm really proud of that one.

Evelyn Lamb: [14:45](#)

What are your thoughts on Hispanic Heritage Month?

Ricardo Cortez: [14:49](#)

Well, to me, Hispanic Heritage Month serves as a reminder, I guess, to some people that we are here and there are lots of Latinos, and Chicanos, for example, in the United States that are in all different places, all different corners of society. We have important contributions to the culture, to the society, to the science, to teaching, to the workforce. Sometimes I think people forget, especially, when it comes to minority populations. Maybe because they're just smaller populations or we're underrepresented in many cases in certain sectors.

Ricardo Cortez: [15:46](#)

I think it serves as a reminder to everybody. It's a good time to highlight accomplishments of people from Latin America, for example, or other of Hispanic origin, and their accomplishments and what they mean to society, what they contribute.

Evelyn Lamb: [16:12](#)

Is there anything else you wanted to close with?

Ricardo Cortez: [16:17](#)

Well, in spite of what I said about the education, the mathematics education in the US, I am very interested in making some positive change. I decided that, in order to do that, I should really be involved. I cannot be talking about mathematics education without being involved fully. So a few years ago, maybe about five years ago, I began to collaborate with people in math education, in particular, people that are directors of teacher preparation programs and things like that. I've been learning a lot about math education in the US and how to prepare teachers. In particular, things like mathematical modeling, which are ... Mathematical modeling is a little bit of a new subject for the curriculum in K-12, especially since Common Core State Standards came out.

- Ricardo Cortez: [17:31](#) We are doing a lot of research in terms of trying to understand how people develop competency in mathematical modeling and how that can be translated into effective teaching in K-12. These are new interests of mine that I keep in parallel with my mathematics research. I invite others to be part of it.
- Evelyn Lamb: [17:55](#) Well, thank you. I really appreciate your taking the time to talk with me today.
- Ricardo Cortez: [18:00](#) Thanks so much, Evelyn.
- Evelyn Lamb: [18:01](#) Thank you for listening to The Lathisms Podcast. It's produced by me, Evelyn Lamb, and made possible by a Tensor SUMMA grant from the Mathematical Association of America. Our music is Volveré, by La Floresta. Lathisms is an initiative to celebrate the accomplishments of Hispanic and Latinx mathematicians. It was founded in 2016 by Alexander Diaz-Lopez, Pamela Harris, Alicia Prieto Langarica, and Gabriel Sosa. You can find more information about the project at lathisms.org, that's L-A-T-H-I-S-M-S dot O-R-G. Join us next time to hear from another inspiring mathematician.