

Evelyn Lamb: [00:11](#) Hello and welcome to the Lathisms podcast. I am your host, Evelyn Lamb. In each episode, we invite a Hispanic or Latinx mathematician to share their journey in mathematics. Today I'm very happy to be talking with Bill Velez. Can you introduce yourself and tell us a little bit about yourself?

Bill Velez: [00:28](#) My stage name is William [Isles 00:00:34] Velez, I was a member of the faculty in mathematics at the University of Arizona for 41 years and I retired in 2018, so it's been now a year since I retired. For the first 15 years of my academic life, I was very active in research, primarily in number theory and algebra, but I was also very interested in applying mathematics. So when I got my PhD in 1975 my first job was at Sandia Laboratories and I worked on the command and control of atomic weapon systems. It was a really good job. I enjoyed it, but I actually missed the teaching. So I came back to the University of Arizona in 1977, but while I was a professor I, again, I was very interested in how mathematics is applied. Beginning in the late '80's I spent four summers working at the Naval Ocean System Center on communication systems for submarines.

And then in the early '90's, I served as a program officer at the National Science Foundation. I managed the algebra and number theory program there, and then I became president of [SACNAS 00:01:59] sometime thereafter. Then I became more involved in minority outreach, so I stopped doing research in mathematics. And since then, I've been very much involved in minority concerns, trying to increase the number of minorities pursuing degrees in the mathematical sciences, and also trying to change the culture in mathematics departments so they're more receptive to a diverse population. Those have been my activities for the last 20 years or so.

Evelyn Lamb: [02:43](#) Yeah. Well that'll keep you busy. Do you recall if you were interested in math when you were a child? Do you know how you got interested in math?

Bill Velez: [02:51](#) No, I wasn't much interested. I never thought of math as a career. You know, I was an okay student in grade school and high school. I went to Catholic schools the whole time. I was in a seminary during part of my sophomore year, studying to be a priest. To me that says that I follow my convictions. So that was a bold move to decide to become a priest, when you're ... When I was 14. Of course it wasn't for me, but the life in the seminary was actually very enjoyable. We had lots of time for prayer, lots of time for thinking. We went to school, of course, and had lots of homework. We had a three hour study hall. So, you know, I

enjoyed learning but I never, I had no idea what sort of a career to follow. When I arrived at the university in 1964 I was just a total disaster.

I took calculus because I was well-prepared in high school and I just couldn't understand anything. So I dropped it and took college algebra and trig and instead, and I got a D in that course. And also a D in chemistry. It was just awful. I still don't understand what happened to me, but fortunately, I have a lot of pride and I just thought, it's just ridiculous that I could not understand calculus. So I took it again the next semester, continued with it. And in my second year in college, I was so amazed by the mathematical structure that I decided I was going to get a PhD. I was kind of bold. I was just completely taken by it and it completely changed my life.

But I had no idea what it is that you did with a math degree, and advising at that time, who is just horrible. Mathematicians wouldn't talk to you about stuff. And so it was just decision that I made for myself, but I just, I had no idea what one would do with the undergraduate degree in math, or even worse, with the doctoral degree in math. When I graduated with my bachelor's degree, I went in the Navy and served on board two different aircraft carriers during Vietnam. And when I came back, everybody turned me down for graduate school.

I was pretty depressed and sometimes when I give talks, I point out that back in those days it took almost a miracle for a Chicano to get into graduate school. All of my degrees are from the University of Arizona. And I'm fortunate to have been in a town with a university, and I'm fortunate that this miracles happened, and I just think there are so many people just like me who could have had a successful career, but they were not fortunate like I was.

Evelyn Lamb: [06:16](#) And once you did get that break, were you then encouraged to go further in your education?

Bill Velez: [06:24](#) Well, yes and no. I told you that I went to Vietnam for a couple of years, and I started graduate school I was a bit rusty and our baby ... Then I got married after, while I was in the Navy, to a sweet person that decided not to tell me. So our baby was born in the third week of classes. That night, I didn't turn in a very good homework assignment, because I was so busy.

Evelyn Lamb: [06:59](#) Right, you had something else going on.

Bill Velez: [07:01](#) And the algebra instructor was this amazing mathematician, but one of these people that was ... Life didn't exist outside of mathematics. So the next day he came in with the previous assignments that we had turned in and he came to my paper and he wadded it into a ball and threw it at me across the room and yelled, "You will never be a mathematician." So, you know, I've thought about the story and I don't remember being dejected by that statement. So, first of all, it wasn't uncommon for a mathematician, when I was an undergraduate, to tell me to change my major to Spanish or something. So people weren't very kind back then.

But the amazing thing was that I went home that evening and I held this newborn in my arms. And so whatever that person said just was inconsequential to the emotion of holding your first baby. For me, having a family was a very comforting thing to have. It grounded me. So anyway, it was an amazing thing in graduate school. So this algebra instructor, he was ferocious. About a month later, he got stuck on a homework problem in class. He was very embarrassed and he graded the homework [inaudible 00:08:46] and realized that I had a much better solution to the problem than he had. So he presented it to the class and took great interest in me. And by the end of the semester he asked me if I would be his PhD student.

So I thought I just had an amazing career, as a graduate student. I was lost in thought, I just loved the mathematics that I was studying. I was successful at it. I was a much better graduate student than I was an undergraduate student. And this, again, has shaped my interactions with students as I function as an advisor. You just can't tell the mathematical abilities of a student and how dedicated they might be to the subject. It ebbs and flows. So when a student tells me that they're interested in mathematics and they want to study more, I don't care what their grades are, I'm in their corner and I will help them out. So the fact that I was such a poor student, I think, has made me a better advisor to students and I've been able to open up opportunities for students to study more mathematics and thereby make their lives better in the sense of better employment opportunities and better intellectual challenges.

Evelyn Lamb: [10:23](#) Did you become the PhD student of this advisor?

Bill Velez: [10:27](#) Yes. In fact, he was an amazing man. There was a huge cultural divide between my advisor and his family and us. But, and again, this guy was ... Life didn't exist outside of math, but he thought I had some ability. So I think we became friends. I

greatly appreciated the time he spent with me. He never, he was always very generous with his time. We talked a great deal. In fact, the problem that he gave me to solve for my thesis, it turned out I had to read his own doctoral thesis, written in Austria in the 1930s, in German. That was hard work. And it turned out that in his doctoral thesis, he couldn't solve one case of this problem. And in order to solve the problem I needed to solve, I needed that case.

So not only did I solve my thesis problem, I solved his thesis problem from 1937. So we had a very good relationship. And so, I've said some negative things about him, but really, it's because of him that I'm here. So in 1975 I didn't apply for any jobs and Sandia Labs called me up and said, "Would you like a job here?" And I said, "Yeah." So they offered me a job. Then sometime in April they called me and said that there's a hiring freeze, and so I couldn't come until the hiring freeze lifted. And I said, "Well, when will it lift?" They said, "Next week, next month, next year. We have no idea." And I'm like, what am I supposed to do in the meantime? And they said, "Well, we don't know." So I went to my thesis advisor said, "You know, I may not have a job next year."

He said, "Well, talk to the department head." So I talked to the department head and he said, "You know, I'm spent out. I made all of these commitments already, but, you know, I will try to find something for you." I said, "Fine, that's great." To be honestly, I wasn't that worried about it. And the next day the department head came over to my office to see me and he said, "You will never believe what happened. Your thesis advisor came to see me and he will retire early if I offer you his position. So I'm making you an offer to be an assistant professor in the department for next year." And so I said, "Thank you very much, but I don't want to be a professor. So, no thank you."

Okay, so, the hiring freeze lifted and I went to work at Sandia Labs, but two years later I decided I really wanted to return to academia because all of my family was in Tucson. I thought Tucson would be a great place. So I call up a friend and said, "I'm interested in coming back," and the department head told the story to people and they offered me a position. So this is how I spend my academic life. Another miracle.

Evelyn Lamb: [14:17](#)

Do you want to give any advice to someone who might be listening to this podcast who ... Or maybe a give a sales pitch for math to someone who might be listening to this podcast that isn't quite sure if math is for them?

Bill Velez:

[14:30](#)

Yeah, so, the purpose of talking to students about mathematics is not to make them mathematicians in the sense of going on and getting a Master's or a PhD in mathematics. I don't care what kind of a job you have, to have the analytical abilities that one obtains by studying mathematics is invaluable no matter what it is that you do. But more than that, mathematics also ... It's not just the analytical abilities, it also provides you with the tools to be able to model physical processes. So the reason that mathematics is now so important is not because mathematics has changed, it's because computers are now used to implement mathematical ideas. And so being able to use mathematics in the study of, I don't care, biology, chemistry, engineering, speech, computer science, all of these areas now are using computation in a much more profound way than they did 40 or 50 years ago.

So because computing is now such an important part of everyday life, we need individuals who understand the power of computers, and their limitations, and also how mathematical ideas can be utilized with computers. Incorporated into problem solving, to get information out. So one of the things that I've seen with our math majors is that we have many math majors who have two majors, because their interests really lies, let's say, in biology. But they also understand the importance of mathematical thinking in biology. So these students who have degrees in biology and math, for example, and to go to graduate school, they get into the best universities in the world; Princeton, Harvard, Oxford. And it's because they have this extra mathematical training.

So if you're thinking about going to graduate school in some area, having mathematics as a major will make you more competitive. But let's say you're not interested in going to graduate school. What you're interested in is getting a job. Well, my experience is that recruiters think that mathematics majors are smarter. If you can handle calculus and differential equations, you have good analytical abilities. The ability to think, the ability to address problems. So in mathematics, when we confront the problem, what we do is break it up into smaller pieces, solve the smaller pieces, and then put them together.

I think any employer would like to have an employee with those skills. So having math major on your resume, together with other things that interest you, or let's say even a math minor, makes employers or recruiters look at you more seriously. So I think mathematics is just good for lots of different reasons. You know, when I was 19, I just became enamored with

mathematical ideas. So I believe that mathematics as a subject is simply beautiful, and to be able to understand the great ideas that mathematicians have produced in order to understand nature. Wow, what a gift. What a gift it has given me to be able to do this.

Evelyn Lamb: [18:52](#)

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 [foreign language 00:19:03] 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.