

[Episode 15 - A Conversation Between Lourdes Gomez & Amanda Smart  
Transcript]

That's so cool to me. Yeah, they're mean people, but the majority of people that I've come across have been encouraging and supportive.

Oh, yeah.

So it's cool to hear that fellow student comradery, even with all the men. Men aren't out to get you most of the time.

No, I don't think I've had any experience in school at least where there's been any sexist things towards me.

Yeah.

Oh, we're on. Okay.

Do we introduce ourself?

Mmhmm.

(Smart) Hi! My name's Amanda Smart. This is Lourdes Gomez. We're both students at Cabrillo.

(Gomez) Amanda is a biophysics major. I'm marine biology.

(Smart) Cool! I guess we're going to have a conversation about females in science, and especially mathematics.

(Gomez) Because we're females in science.

(Smart) so Lourdes, why don't you tell me what you like about science and what you're going to do with it.

(Gomez) I love everything. There's not a lot I don't like in science and math. I've pretty much loved science since I can remember. I used to drag my mom to the library to check out books about sharks and read hours and hours about shark books. We were living in Sacramento when I was in the second grade and I remember showing up to school in a snorkel mask and flipper on career day because I was going to be a research diver.

(Smart) Oh, my gosh, that's so funny.

(Gomez) And here we are in the middle of California where we couldn't be more inland. I've always loved the ocean. When I find something interesting, I want to know more about it and why does this work. Every time you find out something new in science, you have a million more questions. There will always be things to learn and research, and you will never get bored. I love that!

(Smart) I totally agree with that. Whenever I start to research something, I find myself with 15 Wikipedia pages open and still no answer.

(Gomez) So when did you start liking science? Tell us more about your major specifically.

(Smart) I didn't know I liked science for awhile. I always did well in science in school. I always enjoyed math because that was my strong subject. It wasn't until I got to high school that some teachers told me they were surprised at my math level, even though I was in the regular math classes. They told me I should keep doing it, which was really exciting. I came from a family that isn't well educated. My mom was barely a high school graduate so I didn't get a lot of help from family. Having a teacher tell me that I was really good in a subject was super awesome. They were all male math teachers which is kind of interesting now that we're doing a female mathematician project. Coming to Cabrillo College is where I found my liking in science. I started taking chemistry classes, physics classes, and math classes. I enjoyed all of them and got to know my teachers well. Now I work in the math and physics learning centers as a tutor. I help prep chemistry labs. I enjoy all of the sciences, which is why I picked why I picked a science career like biophysics where you have to use biology, math, physics, and chemistry on a daily basis. I clearly love science.

(Gomez) biophysics is not a traditional subject or degree, at all, within a specific mold. When did you decide you want to do biophysics and why?

(Smart) In high school I decided I wanted to go into the medical field. In one of my classes we learned about all of the systems of the human body. We learned about the eye and how it worked, which was super interesting to me. We watched a video on cataract lens replacements and a lot of people left the class because it's disgusting. I went home and watched 15 more videos on it. After that I decided I wanted to go into biology to go to medical school and stuff. But at Cabrillo I found I really enjoy physics. One of my teachers was awesome and he explained stuff in a way that made you think rather than giving answers and going through problems. Since I like physics and chemistry and math, I decided I didn't want to do straight biology and I want to do some research. Biophysics is a field where you do

mainly research and you can go into medicine after. So I think that's where I'm going to go. Biophysics is very new and a lot of universities don't even have a major in the field yet. But a lot of long term research institutes across the country have a lot more to offer me.

(Gomez). That's awesome.

(Smart) Obviously, you've liked biology for a long time and all you want to do is marine biology. Is there any other parts of science that interest you? Do you like math?

(Gomez) I've always loved math. I did take a detour in high school. I was fortunate to go through a really great music program. I decided I wanted to be a music major and that was my plan through high school and into my first year of college. I attended Arizona State as a music major and totally loved it. I majored in music theory. Anyone who knows anything about music theory and composition knows there is a mathematical side to it. I used to tell people it's like the math of music. Everyone would roll their eyes at me and wonder why I chose it. I loved that something so beautiful had so much structure. There was so much intentionality in all this gorgeous music. When I studied 18th century composers, everything was intentional with patterns and order and systems. I love that at the base of everything -- whether it's music or a flower or algae -- there's a gorgeous order behind everything. You see the pattern and there's something deeper and you can add that to a million things. I love that you can go infinitely into things looking at the vastness of the ocean. We know more about the surface of the moon than the bottom of the ocean. At the same time, we can go really, really small and go deeper and deeper looking into molecular biology and atoms and structures of things and it's really beautiful. Whichever way you go there's this order and I think math is the basis for that. Calculus has been one of my favorite subjects and every time I stepped away from it, I missed it. I missed math. I missed science. And I missed the ocean. So I said okay, I would go back to what I wanted to do since I was a young child. So math is a favorite one. I love any kind of biology, anatomy, and physiology. I like the structure of things and how that structure makes something work.

(Smart) Did you end up getting a degree in music?

(Gomez) No. I was there for one year. It was a great year. I missed the ocean.

(Smart) I cannot even imagine. A California girl moving to the desert. I just could not do it.

(Gomez) I knew within two semesters that as much as I love music and will always participate in it in some way, definitely math and science and marine biology is where I should be putting my focus now. I feel more driven than ever to achieve a marine biology degree and dive into research. I know that this is what I want to be doing.

(Smart) That's awesome! You're in the right place -- Monterey Bay.

(Gomez) Yeah, this is amazing! Don't get me started on a marine sanctuary. I could talk for hours about that. You mentioned that you want to do research and you mentioned optics. What do you want to be doing? If I gave you a research grant and a lab, what do you want to be doing?

(Smart) I wish! I don't know. I've thought about it for a long time. One of the biggest things that I feel so lucky to have is sight. A lot of people are either born without sight or lose sight due to trauma. Now we're putting a lot of money into making a synthetic retina or a retina out of stem cells. I would love to get into that research. It's very complicated due to the fact that our eyes aren't just there, they're connected to our brains. That connection is very tiny, but you can't just replace an eyeball. Unfortunately, it's not like a liver transplant. I would love to do research in that field because seeing is the most beautiful thing in the world and I couldn't imagine not seeing. I want to hopefully break ground on some way to work on people's sight. Making people's sight better has long been worked on, but not until recently have we been able to think about restoring sight. It's very common in battle, due to explosions, that people's optic nerves, retina, or cones are damaged resulting in loss of sight. I would like to do research in that field.

(Gomez) That's amazing.

(Smart) Hopefully, I won't just practice. I would like to do research and take that research to a surgical room to perform that surgery myself. Hopefully, I'm lucky enough to do that and see that whole process. But who knows how long that could take.

(Gomez) What do you specifically like about math?

(Smart) Like I said, I've always enjoyed math. I like that math has a right answer, which is what everyone says. Not only does it have a right answer, but there are different ways to get to the right answer. I really enjoy calculus. You get this calculus problem and you wonder how you will ever do it. You try it over and over again, and you get the right answer. You

compare your answer to someone else in the class, and they may have done it a different way, but you can always get to the same answer. It's very reassuring. English is so conceptual for me and it's hard. I also like physics, which you know you're trying to get somewhere and you kind of know the answer without knowing how to get there, so you use math as a tool.

(Gomez) So you can use creativity there.

(Smart) Yeah, so you use math as a tool to get there. I'm glad that if I do go into biophysics, I will be able to use math everyday.

(Gomez) So your math classes have brought you where you are and will lead you to where you're going in biophysics?

(Smart) I think so. I really like math, which is also why I'm a math tutor. I love it. Tutoring math has made me consider being a math teacher instead of biophysics. I love working in the Math Tutoring Center because I teach classes from beginning algebra all the way up to differential equations, which is really awesome to go back and forth. You can help someone through an algebra problem that they are struggling with and you see the light in their eyes. They're so grateful because they think they would never have gotten it.

(Gomez) It's that satisfaction you only get in math.

(Smart) Yeah, it's super rewarding. People should love math because it's all around them. You always get that question, "When am I ever going to use this in real life?" Well, every single day.

(Gomez) They just don't realize it.

(Smart) Exactly. They just don't realize it. It's awesome how much math applies to every single field. I'm sure math is going to apply to marine biology with microscopes. I don't really know what you want to do. What do you want to do in marine biology?

(Gomez) All sorts of things. Oceanography is going to be a huge one with a lot of calculus and a little bit of physics, with the sediment at the bottom of the ocean, mapping with sonar, measuring wave patterns and wave lengths. I love oceanography. In the Monterey Bay we have the deepest water closest to shore within our Monterey Canyon. No offense to anyone in Arizona, but our Monterey Canyon is deeper than the Grand Canyon. We can joke about that's another reason I came back is the deeper canyon. I'm going to jump on the research thing along with you because we'll never run

out of new things to explore. I am a marine biology major. I love living things. Microbiology and molecular biology are very interesting to me. You can get pretty big in the ocean with whale sharks and whales and all kinds of things. I love sharks. I keep waiting to meet one when I'm swimming out there. I have this perception that it's going to be a glorious moment and maybe a little terrifying. I think sharks are great and I would love to do some research with them. Speaking of growing fields that haven't always been an area of classical study, I look at medicine and how many natural derivatives we get from terrestrial earth. We would have so much more available to us by utilizing things within our marine ecosystem. I believe there are clues and keys to medicine within the ocean.

(Smart) I agree with that. I hear a lot about allergies and how diets can benefit us, so I can't imagine what it could do for medicine.

(Gomez) Absolutely! There are natural antibiotics within some marine sponges that are being researched at UC Santa Cruz. We're told not to use antibiotics if we don't have to because these viruses and different things are growing an immunity. If we could use the natural antibiotics that didn't allow for immunities to grow, we'd solve a big problem. Because sponges have great simplicity, they are good tools for research and seeing how things work within a biological system. There's a sponge that's a key component in chemotherapy. I should say, one of the key chemicals in a marine sponge. There's research being done on sea lion cancer that relates to human cancer. I could go on forever. I think there's some great medical applications within marine science. Also there's finding things out just to find things out. Sometimes science is just science for fun, even if we don't see a 100% application the second we find something out. There's always a connection and reason that something is good to know and you never know when we'll draw from that later.

(Smart) That's true. About this whole podcast with chemo and science and mathematics and feeling oppressed, have you yourself ever felt oppressed studying science?

(Gomez) No. I've had some funky things that have been said to me that I thought, did you really just say that? For every demeaning thing that's been said to me -- and that's maybe two things in my life -- I've had a million people say to go for it. I've been fortunate to come from a supportive family and be in a wonderful country and state. I've been in schools that have been supportive and encouraging me to do whatever I wanted to pursue learning and excellence. Be excellent at whatever you want to do! I've been fortunate and very supported. I'm thankful to everyone that lifted me up. How about you?

(Smart) Yeah, I totally agree with you. I've been very fortunate to live in this state and this time. My family has always been super supportive and never doubted me at all. My mom and my grandma have always supported me. I've never had a teacher or anyone at school who gave me a second look. In high school, sometimes people would look at me because I was also a cheer leader and stuff. They'd be like, why are you in my calculus class? How are you getting the highest grades on your exam? They'd say some weird comments and I'd be, like, I'm just smart. All my male teachers have been super supportive. The teacher that's putting this on, I can't even believe what he's trying to do now. I think he's doing a great job of showing women have a voice in science. Nowadays it's not a big thing for women to produce a paper. But even in the early 1900s, women were barely allowed to attend or graduate universities and they were supposed to stay in the kitchen. If I'm in the kitchen, I'm probably doing some chemistry. I have not felt oppressed, but I've felt uplifted. If I've gotten any negative comments, I've gotten a million more positive ones. I'm very fortunate to be living in this time and in a beautiful place like Santa Cruz where you can study and go to the beach and study at the beach. I think the students at Cabrillo realize how fortunate they are because we have an amazing science department. I'm stoked to be here.

(Gomez) Amanda has heard this three to four times, but I love this so much. I did a recent podcast about a biography on Charlotte Scott. She was the first female to receive her doctorate in mathematics. She was a pioneer for math in the late 1800s and early 1900s. This was at a time when women did not have as many opportunities. Despite that, when she took her math exam at the University of Cambridge she scored eighth out of her whole class and she was not allowed to receive her degree or graduate because she was a woman. As discouraging as that is, it's all the more meaningful that her all male class supported her and during the graduation they honored her. I'm going to read this quote from 1880: "The man read out the names and when he came to eighth, before he could say the name, all the undergraduates yelled out 'Scott of Girton,' and cheered tremendously, shouting her name over and over again with tremendous cheer and raising of hats." I love the support of her fellow male students and how it reflects the majority. Don't get down about one person because usually there's a mountain of people behind you that supported you. So that's my experience and that's what Amanda did. It's encouraging to hear about all that support. Men are doing wonderful things for us ladies. As research grows and teams become a big deal, we're working hand in hand.

(Smart) It's awesome. I agree with everything. That's a great quote. Men are not trying to degrade women anymore. I don't think they ever were really. We're doing a great job.

(Gomez) We're on the same team. Thanks for listening to Women, The Limit Does Not Exist.