

While STEM education and funding in Puerto Rico is on the rise and shows promise as an engine to create well-paying jobs of the future, a long history of unfortunate political decisions and ongoing unfair treatment of the island's people puts its future there at risk.

[Leer en español](#)

---

When we talk about the impact that Puerto Ricans have had on the fields of science, technology, engineering, and math (STEM) in Latin America, it quickly becomes a complicated discussion. Culturally, linguistically, historically, anthropologically, gastronomically, ethnically, and most certainly geographically, Puerto Rico is clearly part of Latin America. However, because the island is a colony of the United States, more often than not, Puerto Rico is associated with the U.S. mainland.

To provide some context, here's a brief history of the U.S. colony of Puerto Rico:

Puerto Rico has had a brutal history under U.S. control that includes [sterilization of women](#) without their knowledge or consent, forcible removal of farmers off their own lands, using one of their smaller [islands to test out their bombs](#) containing depleted uranium and Agent Orange, and [forced labor](#) (including children under the age of 10) for the [sugar-cane syndicates](#). With the advancements made possible by the industrial revolution, the U.S.'s applications of colonization have "evolved" over time.

Today Puerto Rico has become a [tax-free haven to financiers](#) peddling this week's version of "economic development," which, despite the way it sounds, benefits nobody but themselves. Of course, none of this would be possible without the feckless political "leaders" who've spent the last 124 years lining their pockets at the expense of people whose only crime has been proximity and accessibility.

## **STEM education and resources are on the rise in Puerto Rico**

Amid all this doom and gloom of the history and political landscape of Puerto Rico, there is some great news: There is now a lot of money being funneled into the advancement of STEM in Puerto Rico, creating a huge potential for job growth across all STEM fields—particularly in science and technology.

The [National Science Foundation](#) (NSF), for example, awarded the island \$23 million to be used toward STEM curricula. (Nearly \$19 million of that money went to the island's public university, the University of Puerto Rico.) Public, private and non-profit institutions provide several STEM-learning options.

Thanks to that significant award by the NSF, the University of Puerto Rico (with campuses and various fields of study throughout the island) announced the creation of the [Resource Center for](#)

[Science and Engineering](#). UPR, as it's affectionately known, has continued to advance its STEM curricula and is among the most popular of the university's degree programs.

Other notable universities on the island that offer STEM studies include the Inter American University de Puerto Rico, Universidad Ana G. Méndez-Cupey Campus, and the Universidad del Sagrado Corazón.

In 2015, the [Hispanic-Serving Community Colleges](#) (HSCCs) published a report that revealed for the first time that women outpaced men for those receiving STEM degrees in Puerto Rico, with female graduates accounting for 52.5 % of STEM degrees compared to 47.5 % of male students earning their diplomas.

Beyond university education programs, other STEM resources have emerged to support people entering the field. For example, [CienciaPR](#), founded in 2010, is a non-profit comprising scientists and students committed to advancing science on the island. In 2012, the organization was awarded a sizable grant from the Puerto Rico Science, Technology and Research Trust, making its STEM program extremely competitive. Another, [Parallel18](#), now in its seventh year, is a global accelerator for STEM startups. Several years ago, it joined forces with Google Developers Launchpad to provide Puerto Ricans in STEM fields greater access to startups globally.

## The journeys of four Puerto Rican STEM leaders



**Image: Carmen Tosado Caceres** (courtesy)

[Carmen Tosado Caceres](#) of Lares, recalls her experiences in the late 1980s being one of just a few women studying Computer Science, and later as she was getting her M.S. in [Open Systems](#), in such a male-dominated field. “Although my family always encouraged me to choose a career

that I would like and would excel in, women accounted for only 25 % of my graduating class. I got my B.A. in 1990 and was recruited by one of the Big Pharma companies right out of college.

“When I met my husband, I was already working in Information Systems. He loved it. He has always been my biggest cheerleader. The same can’t be said about all women of my generation.

“I have stayed in the same company all these years, rising in the ranks. Today I’m the business technology services director (BTS) in Puerto Rico. I wear a lot of hats in this position. I manage the safety and efficiency of our network systems. Beyond firewalls, I identify where there are potential security leaks. Relying on a combination of hardware, software, and coding, above all else, we ensure the safety of our data. When upgrades are necessary, I oversee that team as well. My job is diverse and different each day. Despite more women getting into I.S. jobs, I estimate my department is only 30% women. I would love to see those numbers balance out.”

While Puerto Rico has been progressive to put so many resources into STEM, being a colony creates an untenable situation for a great many on the island—regardless of gender or profession: either remain on the island, and make considerably less while enduring a high cost of living, or move to the states, and make considerably more, but risk leaving behind parents, siblings, and sometimes even children.



**Image: Miguel Rios De Leon** (courtesy)

[Miguel Rios De Leon](#) of Barceloneta understands this conundrum firsthand. After graduating from a private college, in 2015, with a degree in Biomedical Engineering, Rios De Leon got a job monitoring and calibrating dialysis machines. He was offered better than typical starting pay for his position: \$10 an hour. Because his salary wasn’t enough for him to be self-sufficient, he kept his once full-time job in retail and reduced his hours to accommodate his full-time job.

Never able to get a full night's sleep, when he had a car accident because he'd fallen asleep behind the wheel, he knew it was time to make a change.

Rios De Leon relocated to Florida in 2017, and is doing the same thing, but his salary is now \$37 an hour. While his standard of living has significantly improved, what he's given up isn't a fair trade. His parents, siblings, aunts, uncles, nephews, cousins, best friend, and all his childhood friends are here. But the biggest person he had to leave behind was his now 11-year-old son.

No longer with the mother of his son, he praises her every chance he gets for being an exceptional mom *and* dad. All his vacation time is devoted to seeing his family.

According to census data from the summer of 2021, salary discrepancies like Rios De Leon's aren't atypical. The [median income on the island is \\$20,539](#). However, salaries are not keeping pace with the rapidly increasing cost of living.



**Image: Frances M. Zenón Meléndez, PhD.** (courtesy)

Frances M. Zenón Meléndez, PhD., is the STEM Education Program Director for the [Puerto Rico Science, Technology and Research Trust](#) (PRSTRT), a private, non-profit in San Juan that offers 18 programs with emphasis on STEM. Among Dra. Zenón Meléndez's responsibilities is to ensure that all the programs' initiatives continue, regardless of who's in Fortaleza (the Governor's mansion) and/or head of the Department of Education.

This is critical because PRSTRT partners with the Department of Education to provide numerous academic and technology programs. "We coordinate some virtual training sessions and seminars for the students of different teams. We study, for example, mycology and aeroallergens. We're really into robotics. We also work with Nautilus, which is like a submarine that studies sea life.

“I believe that Nautilus is one of the most amazing experiences we offer. We recently began a virtual reality program. Due to Covid, many of our programs went to Zoom, but not the virtual reality program because it relies on paracencial (senses, particularly touching and smelling).”

Dr. Zenón Meléndez said that when she first started working for the Science, Technology and Research Trust three years ago, men outnumbered women “significantly.” Today the numbers are 1:1. “It’s very exciting to see so many women interested in STEM. We’ve observed this change and I believe we can continue to keep them engaged through our programs and constant communication and support. We’re helping to change this mindset that girls can’t do engineering, physics, or mathematics.”



**Image: Adriana Arroyo Fernández** (courtesy)

[Adriana Arroyo Fernández](#) is a full-time co-op student at [Lilly del Caribe](#) in Carolina (in the San Juan metro area). Lilly is a Big Pharma company known for producing insulin and other medicines. Arroyo Fernández is currently working at a Technical Services laboratory whose aim is to bring support to the several manufacturing areas within the company.

“We run small-scale tests that serve as a guide to help innovate and improve already existing processes,” said Arroyo Fernández. “Ever since I started doing research at my university, I realized just how much I enjoyed being inside a laboratory and working hands-on with several projects running simultaneously. Additionally, one of my professional elective courses gave me a brief overview of what exactly the pharmaceutical sector consists of, which motivated me to apply for opportunities to incorporate myself in the field. All these experiences played a role in leading me to where I stand today.”

When asked whether she encountered resistance from family members for getting into STEM, she responded, “Thankfully everyone in my family was supportive of my decision to involve

myself in the pharmaceutical sector, rather than study medicine like most of the students in my major tend to do.

“However, early on, I experienced some mixed reactions by some of my male colleagues. Today's reactions are more favorable, although sometimes I'm still met with some skepticism and am questioned about why I chose this path instead of aiming for a different, less technical career.” Arroyo Fernández said half of her department are women.

When asked about the lure of higher-paying jobs in the states, all three of the STEM leaders who remained on the island we spoke with admitted to being susceptible at times. Dra. Zenón Meléndez explained. “I absolutely love what I do. I know that all of us at the Science, Technology and Research Trust are aware of the value we bring to the students and to STEM on the island. I'm also acutely aware that I could make twice or three times as much money in the U.S.

“Fortunately for me, the rewards are why I got into STEM. Bigger salaries often come with bigger problems: bills, insurances, longer hours, little personal time, and something else not often discussed: we serve a community that is largely socioeconomically disadvantaged. It wouldn't be that way at a top university a fuera (outside the island), where many of the students come from families with money.”

“I do have my moments where I consider working a fuera, but at the moment, I'd prefer to exhaust all of my options here before considering working abroad,” explained Arroyo Fernández. “The salaries would be my biggest motivator since the cost of living here in Puerto Rico has increased significantly over the past few years. The outdated technology is also another motivator. Even so, I think it's amazing that so many students and scientists here in Puerto Rico are able to build many innovative projects from scratch, proving that we stay resilient, even when we barely have the materials to work.”

While Tosado Caceres knows she could make more in the states, there's more than “just” job satisfaction keeping her on the island. “My husband is a veterinarian. He owns his own practice. We have responsibilities to parents, a few other older relatives, and our kids. This is my home. I mentor many people on my team at work, and I tell them if they feel they can do better in the states, they should go for it. It's always an option available to them.”

## **Some issues that make the struggles of Puerto Ricans very real**

To give you an idea how the cost of living has made life for most Puerto Ricans challenging, particularly in the last 10 years:

### **Food and Utilities:**

The [Merchant Marine Act](#) (one of the many punitive edicts imposed on Puerto Rico) was enacted in 1920. The Act makes it impossible for Puerto Rico to engage in commerce with any country

besides the U.S. Despite the abundance of lush soil and an ideal climate for year-round growing, which would [greatly reduce food insecurity](#) (which 40% of the island admits to feeling), the U.S. donated 6,000 acres of land to Monsanto to grow their Frankenfood, which is grown with the use of the carcinogen glyphosate—the main ingredient in RoundUp, which is [banned in many Latin American countries](#).

As a result, [85 % of the food is “imported” from the U.S. mainland](#), and it’s marked up between [15 and 50 %](#). With the exception of five U.S. states, Puerto Rico pays more for utilities. In a few instances, it’s double.

### **Education:**

Somehow families are supposed to pay between \$3,500 and \$7,000 annually for college tuition (public vs. private) for each child of theirs. And if kids can get scholarships, Pell grants and/or student loans to pay for college, even receive a Master’s, they can look forward to earning between \$7.25 and \$25.00 an hour for jobs that would start at \$25 and continue rising in the states.

### **Automobiles:**

As a result of the [Jones Act](#) (that granted all Puerto Ricans U.S. citizenship so they could fight in World War I), the cost to buy a new car is \$12,000 higher than in the states. For example, a 2022 Toyota Rav4 [XLE starts at \\$27,995](#) on the mainland. That same vehicle is [\\$41,325 in Puerto Rico](#). As a result, it’s not uncommon to see car loans extended to eight years.

### **Taking to the Streets in Protest:**

Protests have become all too common in Puerto Rico as the economy makes it nearly impossible for people to stay above water. In 2017, many of the students attending the University of Puerto Rico [protested the steep rise in tuition](#) costs.

Scandals, fraud and corruption within the government are business as usual here. In 2019, only two and a half years into his first term as governor, Ricardo “Ricky” Rosselló Nevares found himself at the center of a scandal of his own doing. It involved leaked chat messages between him and members of his administration, of him using vulgarities against women and gays, as well as mocking victims of Hurricane Maria, the category 4 storm responsible for taking the lives of 4,645 people.

It was a watershed moment in Puerto Rico’s history when thousands took to the streets of San Juan demanding his resignation. After two weeks of protests, the disgraced governor agreed to step down. Outside Fortaleza (the Governor’s mansion) chants of “Ricky Renuncia” (“Ricky resign”) were replaced with “Ricky, te botamos!” (“Ricky, we threw you out!”). It was the first time a governor had been ousted without impeachment proceedings. In other words, initiated by the people.

During the summer of 2021, the island's largest truck drivers' union went on strike. Because they hadn't seen a [raise for the last 13 years](#), they were left with no other option. The strike had dire consequences: For three days, there were no deliveries of food, water, medicines, and gas.

Currently, the island is dealing with a massive teachers' strike. Close to [20,000 strong, many firefighters and police officers](#) have joined them as they too fight for two important issues:

1. No raise in over ten years
2. Diverting pensions to help pay off the [\\$70 billion debt the island owes the U.S.](#)

This diversion of pensions has resulted in a loss of 75 % of the civil servants' retirement money. Current civil servant salaries range between \$13 and \$22.00 per hour. Governor Pedro Pierluisi has agreed to a *temporary* raise of \$1,000 a month for all civil servants.

Shirley Ocasio De Leon of Utuado, teaches elementary school in Arecibo. As she explains things, "I am 53 years old. I have been a teacher for 21 years. I joined my fellow teachers in protest because overnight, our pensions were reduced from \$2,200 to \$1,000 a month. They're also no longer lifetime pensions, as they've been reduced to just ten years. So, what happens after that? Am I homeless?"

"I have a master's in education. My salary is hardly reflective of my schooling and experience. I am considering quitting, but then what? I am so disappointed. This government is deceitful, and it continues to fall prey to big corporate interests. I fear for the future of Puerto Rico's students. We teachers aren't the only victims in all of this. I love my country, but the future of Puerto Rico is bleak."

## **The Future of STEM in Puerto Rico Hangs in the Balance**

With half of Puerto Ricans living on the mainland, the [Department of Education began shutting down schools](#) in 2007. To date, the island has experienced 673 public school closures, which comprises 44% of the total number of schools there.

While it's terrific that investments have made it possible for everyone—particularly women—to pursue jobs in science, technology, engineering, and mathematics, if the population can't support the maintenance of the programs, the future feels tenuous at best.

As to whether Puerto Ricans want to be independent, thus reuniting fully with Latin America, it's difficult to quantify this. Indeed, the past three plebiscites have indicated many on the island prefer statehood, but is it really a fair question to pose to people who've been colonized for over 500 years?

What is the future of STEM in Puerto Rico? It's difficult to say. On the one hand there is a good amount of money funding STEM curricula. This has proven invaluable for students who would otherwise have had to either attend college in the states, or study something else because the teaching materials were very outdated. On the other hand, once they have graduated and are looking for jobs in their respective fields, they will be faced with a dilemma.

While job prospects are in their favor, making a salary that is commensurate with their education won't happen. And while many Puerto Ricans end up moving to the states, where salaries are considerably higher, this hasn't always proved the best solution either. Leaving friends and family is not something anyone should be forced to do.

Although the population continues to shrink year over year, there is a feeling, almost a non-verbal commitment, among those who have remained that says they're here for the long haul. Regardless of what comes down the pike, we will all continue to protest what is wrong and unjust, and proudly fly the flag of Puerto Rico.

This was originally published by [Latin America Business Stories \(LABS\)](#) and is republished with permission.