



CIENCIA PUERTO RICO 2017 – 2017 STRATEGIC PLAN



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WHO WE ARE

Ciencia Puerto Rico (CienciaPR) is a global community of scientists¹, students, educators and allies who believe that science can empower individuals with the knowledge, capacity, and agency to improve their lives and society. We leverage our rich and diverse community to fuel solutions that democratize science, and transform science education and career training. By making science more engaging and culturally relevant, our goal is to enable people to become critical thinkers and problem solvers. While we focus on Puerto Rico and its diaspora, we believe our strategy can serve as a model to other communities that are similarly underrepresented or disengaged from science.

Mission

To democratize science and transform science education by engaging and empowering a diverse global community of scientists, students, educators and allies.

Vision

A society where individuals are empowered by science to think critically, solve problems, and be agents of change in their communities.

Values

- **Community:** Our work and priorities will always be guided by the needs and feedback of our global community of scientists, students, educators and allies—our most valuable asset. We will empower the members of our community by increasing their visibility, facilitating connections, and supporting their development as professionals and leaders.
- **Collaboration:** The whole is greater than the simple sum of its parts. We will foster collaboration among members of our community and collaborate inside and outside the organization to amplify our impact, and maximize our shared knowledge and value.
- **Impact:** Good intentions alone do not change lives. To make sure all of our initiatives, programs, and activities achieve their intended objectives and help transform how people learn and relate to science, they will be regularly evaluated, guided by best practices and expert advice, and based on evidence. We are, after all, scientists.
- **Equity and Access:** Every person deserves to enjoy the excitement of science and reap its benefits. Making our programs, initiatives, and resources inclusive and accessible to everyone is at the foundation of what we do.
- **Cultural Relevance:** Science is more meaningful and teaching is more effective when presented in ways that are relevant to a person’s culture, context, and reality. We are committed to providing culturally and socially relevant educational experiences for all of our audiences.

¹ By scientist we mean any professional who uses science for the creation of new knowledge or who applies science to solve problems or develop new technologies. Our members encompass all areas of science, technology, engineering and math (STEM).

- **Integrity:** We are an independent, non-partisan, not-for-profit organization. We are committed to the highest ethical standards and are transparent in our intentions, actions, and communications.

A NEW STRATEGIC DIRECTION

Over the past ten years, we at CienciaPR have harnessed the power of our community to create social impact in Puerto Rico by improving scientific literacy, increasing access to role models, and creating culturally relevant science education resources. Today, Puerto Rico is in a crisis that threatens its educational, social, and economic institutions and infrastructures, and which has been further aggravated by the impact of Hurricane Maria in September 2017. At this critical juncture and after a year-long strategic planning process, CienciaPR is set to engage its global community of scientists, students, and educators, to address the country's recent challenges and leverage science to power Puerto Rico's long-term recovery.



Over the next 10 years, CienciaPR will focus on transforming science education by engaging its community to bring discovery and experimentation—the process of science—to the classroom in a way that is culturally and socially relevant, conveys the excitement of science, and provides role models Puerto Rican students can identify with.

Rationale

Science empowers people to be critical thinkers and problem solvers; to be resilient, self-confident and self-sustaining; and to see the world as explorers and innovators. A good science education prepares citizens to pursue careers at the bedrock of economic and societal progress, to make important contributions to knowledge and civilization, and to make informed decisions for themselves and their communities. We believe that our community of scientists, students and educators can help us transform science education, so that all students in Puerto Rico can experience the excitement of science and derive its benefits.

The Challenge

Science education in Puerto Rico is failing. In 2016, only 4 in 10 eight grade public school students were proficient in science² and Puerto Rico is among the 10 worst performers in international science tests (64 of 70), with 97.9% of students exhibiting low abilities interpreting information and working on complex problems³. In both science and math, the highest drop in the academic performance of Puerto Rican students is observed in middle school⁴. The current economic crisis afflicting Puerto Rico—the worst in its history and aggravated by the devastation caused by

² Department of Education, Results from META-PR 2015-2016 Test http://www.de.gobierno.pr/files/PPT_RESULTADOS_METAPR_2016.pdf

³ OECD, 2015 PISA Tests <https://www.oecd.org/pisa/pisa-2015-results-in-focus-ESP.pdf> ⁴ See footnote 2.

Hurricane Maria—further threatens an already fragile education system. Thus, transforming science education in Puerto Rico at the school level, and specifically during middle school, is a matter of high urgency.

In Puerto Rico, as in many countries, science is mainly taught passively, through textbooks, and without engaging students in the process of inquiry and discovery. The way science is taught is often disconnected from the social and cultural milieu of the students and they lack scientific role models they can identify with. Moreover, the vast majority of science teachers have no experience with scientific research, which makes it difficult to incorporate experiments, project-based learning, and research into the classroom.

Our Solution

Over the next 10 years, CienciaPR will seek to transform science education, by bringing together scientists with middle school educators and students to co-create science education resources and experiences that:

- **are based on discovery and experimentation;**
- **provide culturally and socially relevant educational experiences;**
- **foster problem-solving and critical thinking skills;**
- **convey the excitement of science;**
- **and provide role models and examples to follow.**

The key piece of CienciaPR's new focus is our community of more than 8,300 members—educators, students, and professionals who are experts in virtually all areas of science, technology, engineering, and math. We will nurture, train and empower this unique and mighty resource to help us develop science education resources and experiences that model how science is done in culturally relevant ways. That is to create resources that communicate and illustrate science in ways that are pertinent to the culture, lives, communities, and reality of Puerto Rican middle school students.

By engaging and connecting science experts with educators and students, our strategy will provide middle school students with culturally-similar and relevant role models they can identify with. Our strategy will also provide educators with the opportunity to interact with scientists can be resources for the classroom and who can provide training and mentoring, thus facilitating the development of the educators' own research and critical thinking skills. In addition, our strategy will provide scientists with opportunities for career development and for learning critical professional skills, in areas like teaching, effective communication, and leadership.

In the context of Puerto Rico post-Maria, we believe that empowering middle school students with scientific, critical thinking, and problem-solving skills will enable them to not only be resilient, self-confident and self-sustaining, and to see the world as explorers and innovators, but to become the agents of change that their communities need in this moment of crisis.

Our long-term goal is to have validated approaches that can be scaled and widely implemented in public schools, not only to improve science proficiency and critical thinking skills among middle school children, but to mitigate educational disparities, and in the end, to foster a culture of scientific and critical thinking in Puerto Rico.

While focused on Puerto Rico, our strategy offers an innovative approach to address a universal challenge: how to make science education more engaging, relevant to the social and cultural context of students, inquiry-based, and ultimately, more effective. Our strategy can be a model to other communities that are similarly underrepresented or disengaged from science. Moreover, our strategy offers a model to promote the civic engagement of scientists beyond research and academia to make socially impactful contributions.

STRATEGIC GOALS

Strategic Goal #1: Improve students' proficiency, critical thinking, and attitudes toward science by bringing the process of science into the middle school classroom in a culturally relevant way

Scientists are uniquely positioned to share their skills and knowledge about the process of science with educators and students. By connecting the people doing science (scientists) with people teaching and learning science (educators and students) we want to bridge a significant gap in science education: teaching science the way it is done – based on inquiry and problem solving.

Strategies

- Engage and involve scientists and educators within and outside the CienciaPR community in the development of educational strategies and initiatives, and to serve as mentors, role models, content creators, and advisors.
- Leverage the CienciaPR web portal and community to ensure broad dissemination of program offerings, resources developed, outcomes, and best practices.
- Train teachers to facilitate the incorporation of experiments and inquiry-based learning into the classroom, and to make lessons more relevant to students' lives.
- Train scientists in scientific teaching and effective communication so that they participate in the co-creation of science education resources and experiences and also train teachers.
- Engage families in the educational program to ensure home support and continuity.
- Evaluate the implementation and effect of programs to continually refine and improve them.

Strategic Goal #2: Foster a strong, engaged, proactive, and dynamic CienciaPR community

CienciaPR's most important asset is its global community of scientists, educators, students and professionals who through their knowledge and commitment want to contribute to democratizing science and transforming science education and career training, in Puerto Rico and beyond. To achieve Strategic Goal #1 and fulfill our organization's mission and vision, we must find ways to better engage, activate, empower, and serve members of the CienciaPR community.

Strategies

- Regularly survey CienciaPR members regarding our community, services and opportunities and establish mechanisms to measure community engagement and participation.
- Form alliances with scientific, student, and civic/community organizations and leaders to facilitate that members of CienciaPR establish social impact projects.
- Work with experts in networks, community-building and community-management, and career development to create programs, strategies, and trainings that benefit the CienciaPR community.
- Leverage existing CienciaPR professional development, science communication, and leadership programs to recruit and train participants to contribute to our science education efforts.
- Develop and identify tools, strategies and best practices to facilitate that members of the CienciaPR community, no matter where they are located, can contribute to existing CienciaPR initiatives and programs or create their own social impact projects.
- Revamp CienciaPR's volunteer program to facilitate that existing and new volunteers can contribute to our initiatives and programs to add value to their own careers and to the organization.
- Hire a staff member focused on engaging the CienciaPR community, and to help evaluate and identify strategies that promote engagement.

Strategic Goal #3: Grow our infrastructure, human and financial resources to make CienciaPR a sustainable organization

To achieve our new strategic goals, fulfill our organization's mission and vision, and better serve our community CienciaPR needs to have the organizational, human resources and financial capabilities to be a sustainable and thriving non-profit entity.

Strategies

- Work with the Board of Directors, key members of the CienciaPR community and strategic collaborators to identify, diversify and secure new sources of funding and development strategies.
- Work and collaborate with leaders and experts in non-profit best practices and strategies to ensure organizational sustainability.
- Continue to transition from a predominantly volunteer-run organization into a predominantly staff-run organization with robust volunteer programs.
- Work with communications experts to develop a communication and branding strategy to increase the visibility, recognition and influence of the organization.
- Engage civic and community leaders to insert CienciaPR's work into the broader context of society.
- Foster a culture of teamwork and productivity in which all members of the staff, volunteers, boards members and collaborators feel appreciated and valued.

STRATEGIC PLAN IMPLEMENTATION

We have developed a ten-year plan to implement these ambitious strategic goals. We are committed to working with our Board of Directors, staff, advisors, and members to review our implementation plan and set yearly performance targets. Below we present our objectives for the first two years, including some which we have already begun putting in place as demonstration of our commitment to our new strategic direction.

- By 2017, we will:
 - Seek input from the community regarding ways in which CienciaPR might propel and sustain their outreach and professional goals.
 - *Held focus groups with 16 teachers over the summer of 2017.*
 - *A community online survey held from August 14 – September 7, 2017 received feedback from 983 individuals.*
 - Expand CienciaPR’s Board of Directors to have between 9 and 13 diverse, committed, and internationally-recognized leaders in science, education and civic society and hire at least one new staff member in Puerto Rico to help with the implementation of the new strategic direction.
 - *New Board of Directors initiated on October, 2017.*
 - *In July 2017 hired Dr. Gretchen Díaz-Muñoz as Director of Science Education Programs and Community Partnerships.*
 - Establish a group of advisors and collaborators who are experts in science education to assist in the development of a science education pilot project in Puerto Rico.
 - *Currently holding meetings and interviews with science education and outreach experts.*
 - *Our new Board of Directors includes several nationally and internationally recognized education experts.*
- By 2018, launch a science education pilot project that trains and connects at least 50 teachers with 25 scientists to co-create and develop more effective science education lessons and impacts at least 2,500 middle school students.
- By 2020, have refined and validated the design, assessment instruments, and trainings of our program to transform science education lessons.
- From 2021 to 2026, launch a large-scale project to test the effectiveness of our strategy and impact ~7,500 students, 100 teachers, and 200 scientists.
- By 2027, demonstrate program effectiveness through significant increases in academic achievement, attitudes, and enthusiasm for science among middle school students and prepare to expand the program into a larger number of schools.

BUILDING UPON PAST SUCCESS

Over the past decade, CienciaPR has established the [expertise and track record](#) that serve as a strong foundation for our new strategic direction and give us the capacity to execute our ambitious goals. We have successfully engaged and trained scientists, students, and teachers, and created culturally relevant education resources and experiences that improve students

attitudes and interests towards science and self-confidence in their science skills. Our efforts over the last decade have garnered multiple recognitions, including being named a [Bright Spot for Hispanic STEM Education by the White House in 2015](#).

Engaging scientists in science communication and outreach

CienciaPR's ability to galvanize, engage, and train scientists has been a cornerstone of our success. By providing our rich and diverse community with programs, connections, tools and skills, we have broken new ground in the participation of scientists in communication and outreach to make science accessible and relevant in Puerto Rico. Since 2006, more than 450 scientists have participated in our programs and initiatives to democratize science.

- [Media collaborations](#): Since 2006, CienciaPR has helped publish 610 popular science stories, written by 64 scientists, in El Nuevo Día—Puerto Rico's highest circulation newspaper—and 11 other outlets in Puerto Rico, the U.S. and Spain. For comparison, a [study](#) that analyzed articles published in El Nuevo Día found that before 2006 none of them had been written by science experts.
- [Podcasts](#): In 2008, CienciaPR launched [Radiocápsulas CienciaPR](#), the first Spanish-language science podcast in Puerto Rico, which highlighted important concepts and discoveries in a culturally-relevant way. In 2014, we launched [Mirada Científica](#), a long-format interview and storytelling podcast exploring science in Puerto Rico. Both podcasts have been broadcasted through radio stations in Puerto Rico.
- [¡Ciencia Boricua! Book](#): In 2011, CienciaPR published the first anthology of popular essays about science and Puerto Rico, featuring 61 essays written by 23 scientists.
- [Blogs CienciaPR](#): In 2013, we established the CienciaPR blogs network to allow members and collaborators to write about a variety of topics, from the intersection of biology and design, to the significant contributions of Puerto Rican and Latina women in science and technology. Almost 600 entries have been published to date.
- [Monthly stories](#): The CienciaPR website features monthly stories highlighting the life, work, and careers of accomplished members of our community. To date, CienciaPR has published 76 stories, written by 19 authors
- [Ciencia Boricua talks](#): During our 10th anniversary, CienciaPR hosted a series of public science talks to celebrate and increase the visibility of Puerto Rican science and scientists. A total of 13 talks were attended by 489 participants, including teachers who were provided continuing education certificates.

Training and advancing the career development of scientists

To empower scientists and further their career development, CienciaPR has created a variety of training opportunities, with a particular focus on science communication and outreach.

- [Student Symposia](#): In 2011, 2013, and 2016 we hosted professional development symposia, with the participation of 260 undergraduate and graduate students and 15 professional scientists as speakers and panelists.

- *Workshops*: In 2012 CienciaPR began offering science communication workshops, emphasizing the role that scientists can play in making science accessible and culturally relevant. More than 400 students have participated in workshops at universities and national conferences. As part of a yearly workshop offered at the University of Puerto Rico, Mayagüez, 40 summer students have published CienciaPR blog posts about their research experiences.
- *Yale Ciencia Academy*: In 2015, in collaboration with Yale University, we established the Yale Ciencia Academy (YCA), a career development program for PhD students from underrepresented backgrounds in the biomedical and behavioral sciences. To date, 74 graduate students from 36 institutions in Puerto Rico and the U.S. have participated in the program. Over 65 professionals have participated as panelists and facilitators for more than 50 online conversations and workshops. In 2016, as a requirement of the program to develop students' communication and leadership skills, 34 YCA fellows completed 28 outreach projects, including creating teaching lessons for middle school.

Developing culturally relevant science education resources and experiences

Since 2011, CienciaPR has successfully completed 3 projects to make science relevant to Puerto Rican students and present them with role models. These projects have directly impacted 220 students from 120 schools and 51 municipalities in Puerto Rico.

- *Ciencia Boricua Project*: Using the ¡Ciencia Boricua! book as its cornerstone and in collaboration with a low income urban school, in 2012 CienciaPR implemented a pilot study that showed that making science relevant to the cultural context of students has a positive effect on their attitudes toward science. Fifty-seven elementary and middle school students participated in the project, along with 4 teachers and 8 scientists who volunteered as role models. The students wrote and produced 32 podcasts, 32 essays and 15 art projects in which they shared what they had learned about science during their participation.
- *Ciencia a tu Alrededor videos*: In 2014, CienciaPR produced a [series of educational videos](#) about space exploration and astronomy. The videos feature Puerto Rican scientific role models working in these fields and explaining science concepts. Accompanying teachers' guides are aligned with the Puerto Rico Department of Education and the Next Generation Science Standards.
- *Seeds of Success*: In 2015, we launched [Seeds of Success](#), the first program in Puerto Rico to empower middle school girls to pursue science, technology, engineering and math (STEM) careers and provide them with research, critical thinking, and leadership skills through interactions with role models. A total of 162 girls from 119 schools in 51 municipalities participated in the semester-long program. Sixty women in science participated as volunteers, role models and mentors for the girls. As part of the program, girls conducted 99 outreach projects to share the importance of science with their communities, impacting 10,500 people. An evaluation showed that 92% of girls were more confident in STEM skills, 96% interested in STEM careers after the program.

Empowering and training teachers in culturally relevant science education

Our community has a sizeable number of educators—over 500—looking to enhance their teaching of science. All of our web content, including stories about Puerto Rican scientists and about the importance of science for Puerto Rican lives, is available free of charge. Over the years we have developed workshops to help teachers use these materials in the classroom. In the process we have demonstrated our ability to recruit and train teachers.

- *Online catalog*: CienciaPR offers a [dedicated area on its website](#) for science educators who are interested in accessing culturally relevant science education resources and in professional development opportunities to improve their science teaching. These more than 1,000 resources include news articles, podcasts, videos, blogs, and scientists' profiles.
- *Workshops*: Since 2011, CienciaPR has offered 6 workshops to 430 teachers, to train them on how to use our resources to make science pertinent to the culture and context of their students in the classroom. These teachers represent 60 schools in 23 Puerto Rican municipalities. By training them we estimate we have impacted over 12,000 students.

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