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# Cultivating Education without Frontiers [1]

Submitted by Greetchen Díaz-Muñoz [2] on 3 September 2013 - 12:00am

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Science Teacher, Elba Sepúlveda, in front of Fermilab

On the “Cerro las Mesas” in Mayagüez, future Puerto Rican scientists, mathematicians and engineers nurture their dreams of discovery. The “croemitas”, as people refer to the students of the Residential Center of Educational Opportunities of Mayagüez (**CROEM** [4], spanish acronym) obtain a first class high school education. Among CROEM’s excellent educators is the Physics teacher Elba M. Sepúlveda Cabassa.

**Planting the seed**

Elba discovered her interest in science and technology long before her passion for teaching. Like most girls, she asked for dolls as gifts. However, instead of trying to feed the dolls or take them for a stroll, she broke them apart and then assembled them back together. Later, much to the surprise of her parents, Elba asked for a toy race track. At first, they didn’t like the idea, but eventually, her parents realized that she had a special interest in understanding how certain objects and machines worked. Thereafter, she always had the support of her family, especially that of her maternal grandmother who was the most "alcahueta" or “spoiler in chief” of all.

Over time, Elba’s interest in science matured. She confesses that she always admired Albert Einstein [5]. "Einstein did not fully know the extent of what he had achieved," she said. Elba, who was born in San Germán and raised in Mayagüez, is proudly a product of the Puerto Rican public school system. She graduated from Hostos High School before beginning her Bachelor of Science in Theoretical Physics at the University of Puerto Rico at Mayagüez [6], when she was just 16 years old.

While in college, Elba completed credits in Education, English, and Mathematics. Although Elba had intended to pursue a career as an engineer, she discovered that through Physics Education she could integrate the concepts she had always been so passionate about: Science, Technology, Engineering and Mathematics (**STEM**). Shortly after graduating, she was hired by the Department of Education of Puerto Rico [7] (DE) as a Physics, Technology, and Astronomy teacher at CROEM. During her more than 20 years of work at this science and math specialized school, Elba has taught courses on Scientific Research, Atmospheric Research, Robotics, Electricity, Introduction to computing, Astronomy, Mathematics, and Energy Use in Transportation.

**Cultivating: “Physics Online” is born**

It is said that what determines the quality of a child's education is the quality of the teacher. Elba takes this saying very seriously. All of the knowledge she has passed on to her students was not only obtained from her college education. Elba has completed multiple professional certificates and has been dedicated to extend her reach beyond the classroom.

While working with the DEPR on an online course project, Elba created "**Physics Online** [8]", an educational resource to explain the basic concepts and principles of physics specifically designed for Latin American students. The site receives more than 200,000 visitors a month from all over the world. The primary motivation for this initiative was the realization of the low quantity and quality of resources for Spanish-speaking students.

**Prof. Elba Sepúlveda teaching about work and kinetic energy**

All of this was not enough for Elba. In 2007, she went back to school and completed a Master's degree in Science Education at the Interamerican University of San Germán. And then, who could stop her? In May of this year, Elba proceeded to earn her doctoral degree in Teaching and Curriculum Development at the same university. During her PhD studies, she completed courses by distance learning online and a concentration in Educational Leadership.

**The harvest**

Elba's efforts to provide a highest quality education have led to many educational achievements, including a Resident Teacher appointment at the Arecibo Observatory [9]. As if this was not enough, the website "Physics Online" was recognized by the Innovative Educators Forum of Microsoft [10] as a top 10 innovative project integrating technology in Latin America, and was ranked 30th in the world forum. The tough workload as an innovative educator was not enough to prevent Elba from achieving one of her greatest dreams: the opportunity to work as a researcher.

For two consecutive years, Elba was sele  e Fermi National Laboratory (Fermilab) [11]. Work [12]at Fermilab is focused on “areas that are at the forefront of physics [13] and that try to explain the origins of the Universe.  Elba worked specifically on the Cosmic “frontier”, an area that focuses on using the cosmos as a laboratory to investigate the fundamental laws of physics. During her first year, she helped select the stars that would be used as guides in studies done in the Victor M. Blanco telescope [14] at Cerro Tololo, Chile *(read our story about Victor Blanco, the first Puerto Rican astronomer* [15]*)*. During her second year, she developed curriculum activities that would be used around the globe on the topics of expansion of the universe, dark matter and dark energy.

For Elba, this opportunity has been a life changing opportunity. "Being part of a scientific community reminded me the basic way we all learn: by building something and then testing to see if it works," she says. For any person, especially a woman with a family, having to leave home for a long time is difficult. However, Elba says that without the support of her husband and son, her dream would have never been possible. The experience has also allowed her to take her teaching in the Physical Sciences to the next level .

In her course on Energy Use for Transportation, Elba and her students, with the support of their

community, the DEPR, and parents,  built a solar car that earned them a chance to represent Puerto Rico at the Dell Winston School Solar Challenge [16]. The **CROEM Solar Team** was born from this effort and was the culmination of a dream that had seemed almost impossible.

Elba's students have been the biggest beneficiaries of her work. A good teacher inspires students to achieve their dreams and she is as proud of their accomplishments as if they were her own. With pride, Elba tells us that many of her students have been chosen in excellent universities and internship programs in prestigious institutions such as NASA, the Lawrence Berkeley National Laboratory, MIT, Harvard, and the University of Colorado, where they are collaborating on projects that have a global impact. For her, this is definitely her best achievement.

**Her work never ends**

Besides her teaching career, in recent years Elba has developed new interests. Her son Efraín, an engineer, has followed in her footsteps and, like her, also likes "embelecos" [inventive schemes]. They have started a joint adventure into Computer Science and are developing a company for creating websites and technology support. Meanwhile, Elba continues her innovative projects in the classroom. The focus of her work and passion continues to be as a top-notch educator that inspires her students to work hard toward their goals.

If you want to know more about this extraordinary science teacher, visit her profile [17] on www.cienciapr.org [18] and learn more about "Physics Online [8]".

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