Latina professors find an interdisciplinary way to teach about microbiology, hurricanes, colonialism and politics [1]

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Rosa E. Carrasquillo

History Department **Latin America & Latino Studies**

Professor

Ph.D., University of Connecticut

Fields: Latin America; Afro-Caribbean History; History of Latino/as in the United States; Gender History

Madeline Vargas

Biology Department

Professor

Ph.D., University of Connecticut, Storrs

Fields: Microbiology

By: Dr. Wilson Gonzalez-Espada, Ciencia Puerto Rico

At first look, history and microbiology may seem disciplines with nothing in common. However, two Latina faculty members at the College of the Holy Cross, in Worcester MA, vehemently shattered the perceived boundaries between these disciplines to provide their students with a unique and long-lasting learning experience.

Looking for new intellectual models after the devastation of Hurricane María, Dr. Rosa E. Carrasquillo, Professor of History in Caribbean and Latin America, and Dr. Madeline Vargas, Professor of Microbiology, employed a novel Interdisciplinary Teaching & Learning (ITL) approach in their respective course design.

Drs. Carrasquillo and Vargas were aware that the education research literature strongly supports ITL in various ways, such as in helping students recognizing biases, thinking critically, tolerating ambiguity, and acknowledging ethical concerns. Real world problems are complicated, and no single discipline can figure them all out on its own.

In a normal semester, both professors would teach independently in their respective disciplines. However, during the Spring 2019 semester, however, Dr. Vargas designed a new course named *Microbiology of a Hurricane* for non-science majors in order to collaborate with Dr. Carrasquillo's modified course on *America's Colony: Puerto Rico since 1898*. During six interdisciplinary sessions, both groups of students met together and explored readings that intersected microbiology and colonialism.

In the first few sessions at the beginning of the semester, students obtained basic information about Hurricane María, the formation of hurricanes and global warming, as well as their intersection with economic and historical circumstances. All the while, students were developing an expertise in history or microbiology within their respective courses.

In later joint sessions, students were asked to work in small mixed groups, critically analyzing articles in tropical medicine published in the 1920s. During these meetings, microbiology students shared their expertise with history students and vice versa, producing synthetic reports that were submitted by the end of the class period. These workshops were designed to help students think in an integrated way.

“From a historical perspective, I saw a great opportunity to work with materials that were produced by the School of Tropical Medicine in Puerto Rico. I had some experience before with Dr. Ashford Bailey and his campaign against anemia. But this time, I had the honor to work with a real scientist.” said Dr. Carrasquillo.

Students applied this approach in a final podcast assignment based on an article chosen by the group. “The podcast format adapts well to multiple perspectives and disciplines. It’s a contemporary genre that appeals to many students. In addition, since our approach did not involve team teaching, we needed a final, integrated assignment that could take place outside of the classroom,” observed Dr. Vargas.

Finding articles that examined the intersection of history and microbiology proved to be quite a task. “The challenge was to focus on articles that discussed infectious diseases, particularly those associated with hurricanes in Puerto Rico. For example, we found an article about the increased incidence of typhoid fever after Hurricane San Felipe in 1928, which coincided with the historical moment that Dr. Carrasquillo was teaching,” Dr. Vargas remarked.

“Another challenge was conceptual. Although there are so many interdisciplinary programs, we couldn’t find a model that linked the humanities and the sciences and kept the integrity of each discipline in a way that is content intensive. We had to first convince our colleagues and administrators that this could be done,” added Dr. Carrasquillo.

How did Drs. Carrasquillo and Vargas’ “experiment” on implementing ITL turn out? Although early on students felt hesitant about the interdisciplinary meetings, by the end of the semester they embraced them, understanding that collaboration between disciplines enhanced their perspective of historical events. Some students even asked for additional joint meetings.

ITL was a success in this case because students learned actively, by discussing, analyzing and developing quality scripts. This process of learning by doing is much more powerful than passively listening to lectures, especially when looking at events through the paradigms of both the natural sciences and the humanities.

As an extension of their ITL implementation, in May 2019 Drs. Vargas and Carrasquillo traveled with a group of 11 students to Puerto Rico to apply what they learned, by getting a first-hand look at the lasting impacts of Hurricane María in the contexts of microbiology, health, history and colonial politics.

Dr. Carrasquillo mentioned that: “The trip was a great success. We focused on sharing with grassroot organizations of northeastern Puerto Rico, so that we observed not only the devastation caused by María, but also how Puerto Ricans are rebuilding their lives.” Dr. Vargas added that she wanted her students to see first-hand that the long-lasting effects of the hurricane extended from the material world to the microbiological and mental health of the population.

The student-created podcasts and the scripts will be available to everyone through a collaboration with Ciencia Puerto Rico, a nonprofit organization that promotes science, education, and research in the island. Podcasts and scripts can be accessed here:

CIENCIA PUERTO RICO PODCASTS PAGE: https://www.cienciapr.org/en/podcasts/radiocapsulas-cienciapr [2]

HISTORY/MICROBIOLOGY PODCAST 1 - THE 1915 DENGUE EPIDEMIC IN PORTO RICO: https://www.cienciapr.org/en/podcasts/radiocapsulas-cienciapr/historymicrobiology-podcast-1-1915-dengue-epidemic-porto-rico [3]

HISTORY AND MICROBIOLOGY PODCAST 2 - PROSTITUTION AND COMMUNITY SYPHILIS IN PORTO RICO 1919: https://www.cienciapr.org/en/podcasts/radiocapsulas-cienciapr/history-and-microbiology-podcast-2-prostitution-and-community [4]

HISTORY/MICROBIOLOGY PODCAST 3 – TYPHOID FEVER IN A RURAL VILLAGE OF PORTO RICO DUE TO A SURFACE WELL: https://www.cienciapr.org/en/podcasts/radiocapsulas-cienciapr/historymicrobiology-podcast-3-typhoid-fever-rural-village-porto [5]

The author is Professor of Physics and Science Education at Morehead State University in Kentucky, and is a member of Ciencia Puerto Rico (www.cienciapr.org [6]).

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