Three months before anyone had heard the words “coronavirus” or “Covid-19”, three freshmen at Miami Beach Senior High School began a science fair project to test bacteria count and underlying health hazards of riding the Miami Metrorail. They evaluated common touched surfaces, like benches, seatbacks, handrails, and elevator buttons. What they found were high bacterial levels, including E. Coli and antibiotic-resistant Staphylococcus. Essentially, enteric organisms (which are bacteria originating from the intestines and feces) were being transferred to everyday surfaces and exposing passengers to these organisms. They advocated in their research paper vigorous soap-and-water hand washing and hand sanitizers before and after riding the Metrorail.

 They entered their project in the national eCybermission 2020 Science Competition that was included in their school’s participation in the Miami Dade Schools District SECME [Science, Engineering, Communication, Math Enrichment] Science Olympiad held in February.

 The Beach High student scientists - Noah Karp Cohen, Harrison DeLisle and Leo Oliveira - were named First Place winners in the State of Florida, and among top three in the southeast region of the United States. The students have won $2,000 each for the state and regional wins, and a $5,000 STEM-in-Action grant to repeat their study after the heightened awareness of hand hygiene due to the coronavirus. They plan to launch an educational/marketing campaign in the fall with the start of school.

But the best is yet to come this Friday as the team presents their findings in a conference and competes with 19 other national finalists for top recognition in a public vote conducted by the U.S. Army Educational Outreach Program’s eCybermission Competition. The web-based scient, technology, engineering and math [STEM] program run by the U.S. Army and administered by the National Science Teaching Association is designed to cultivate student interest in STEM by encouraging students in grades 6 to 9 to develop solutions to real-world problems in their communities.

“The grant is significant because it allows the students to continue their research specifically in COVID-19,” said Dr. Carol Karp, an ophthalmologist at Bascom Palmer Eye Institute and a professor at University of Miami’s Miller School of Medicine, who was the team advisor on the student’s project. “They will get $200 for every COVID-19 test; get money for their educational campaign and to give out free hand sanitizer.”

The team’s project was titled “The Microbiome of the Miami Metrorail. They performed microbiological evaluation of common touch surfaces of three Miami-Dade County Metrorail stations and three passenger train cars. They rode the rails and took sample swabs; placed them in vials; carefully labelled them and brought them to the microbiology lab at the University of Miami where medical researchers guided the three 15-year-olds on scientific procedure so the students could do their experiment safely and effectively. In addition to Dr. Karp, the students were mentored by Dr. Darleen Miller, the head of the microbiology laboratory at the University of Miami’s Ann Bates Leach Hospital.

“In light of recent world events regarding the coronavirus, the students’ work is very timely in raising the awareness and educating our community about the microbiological environment that exists all around us and how it can impact us all,” said Daniel Delgado, science and robotics teacher and SECME Coordinator at Miami Beach Senior High School. “The project was very well done, thorough, and I was very impressed with its detail when it was entered in the national competition.”

 Noah and Harrison have been doing science projects since middle school. Both have a strong interest in microbiology. Leo was eager to join them and do a microbiologically based project. “Although we have done some experiments in the past, we wanted to take this project a step further to challenge ourselves and learn more advanced techniques of how to identify bacteria and their sensitivities,” said Noah, the designated team leader. “In addition, we wanted to do a project that would help and protect the health of our community.”

They want to reach out to County Commissioners to discuss their findings and alert the community, the Metrorail users, and the Metrorail officials to take steps to keep our community safe. In addition to education of passengers, steps could be taken such as placing hand sanitizer dispensers in Metrorail stations and increasing cleaning schedules. “We suspected that the Miami Metrorail would have microbes on commonly touched surfaces, but we were surprised by the huge volume of organisms, and in particular the high prevalence of enteric organisms (which are bacteria originating from the intestines and feces) which are dangerous to passengers, especially to children, elderly, or immune-compromised individuals,” reads their report. About 1.5 million Miami Dade residents use the Metrorail every month.

The team would like to present their findings to Miami Dade County Public School Board and Miami Beach City Commissioners in order to prevent the spread of germs at schools. As teenagers always share phones, lunches, books at their school, it is a highly contagious atmosphere. In the future, they hope to like extend their campaign to school buses, on public transportation used by students of Miami Beach Senior High (trolley and Freebee), and employ a targeted mobile campaign to students phones.