Duke Desarrolla Women’s STEM Empowerment

On May 20, 2018, we arrived at the Instituto Indígena Nuestra Señora del Socorro in San Andres Semetabaj, Guatemala to implement the Duke Desarrolla Women’s STEM Empowerment program. During the first three days of our stay, we spoke to all the girls in the program in order to organize a schedule for the program. In addition, we distributed consent forms, an initial survey regarding the attitudes toward STEM fields, a knowledge assessment to assess preliminary engineering knowledge for those enrolled in the flashlight curriculum, and to assess knowledge retained from the previous year for those who were enrolled in the flashlight curriculum last year. Most of the girls had not previously been exposed to engineering courses (other than those who took the course in 2017).

At the school, we implemented two curriculums across five different grades, with a total of seventy-nine students. We taught three of the younger grades the first curriculum, which involved teaching basic engineering concepts related to designing circuits (only two grades took this curriculum last year). This flashlight curriculum then segwayed into the human-centered design process and a design challenge, where, in groups, the students identified a light-related need in their community and designed a light source that solved their need. Some of the projects included a decorative table centerpiece with embedded LEDs as a solution to power outages in the Guatemalan household, a wearable headband with LEDs in it as a solution to the lack of light when travelling at night, and a standing flower lamp with LEDs in the center in order to work on homework at night.

The second curriculum was designed to build upon the knowledge the students gained last year from the first curriculum. The second curriculum centered on water contamination and the human-centered design process, and it included two design challenges. For the first challenge, we taught the girls how microscopes function and how they can be used to visualize water contamination. Then, we demonstrated a microscope that can be made at home out of lenses from a disposable camera, plastic tubes, and glue. The students were challenged to design a better base for the microscope that included a light source. This served to review the engineering concepts from the previous year and tie the two curriculums together. The second design challenge involved building a water purification device that uses UV radiation to kill water pathogens. We showed the students examples of three different types of purification devices that can be made out of easily-available materials such as plastic water bottles, clear tarp and frisbees. We then challenged them to improve upon one of these designs, or combine designs in order to build a better purification device for their community. Many of the groups found creative ways to combine filtration that removes large water contaminants, with UV radiation to kill biological contaminants. I have attached photos of some of the devices.
The four weeks of classes culminated into a final presentation. The fair-style presentation featured the projects from all grades and was open to community members, including Gabriela Asturias from FUNDEGUA, one of our partners and the co-founder of Duke Desarrolla. Additionally, other FUNDEGUA members and members from Fundación Paiz, another Guatemalan aid-organization, attended the presentation. The students presented their design challenges, with information on how the human-centered design process related to their project. It was clear that the students had learned a lot about how to solve community problems using the human-centered design process, which we believe they can apply to a variety of projects going forward.

Over the course of four weeks, and with the help of Duke Desarrolla and FUNDEGUA, we were able to partner with el Instituto Indígena Nuestra Señora del Socorro to successfully implement two engineering curriculums. During the fair, many of the girls mentioned that, at the beginning of the curriculum, they never thought they would be able to create something as unique, yet functional, as they did. One of the biggest goals of our program was to show the girls that they can do a lot more than they believe possible, particularly in STEM fields, which many women in Guatemala are discouraged from pursuing because of systematic discrimination against women in these fields. We aimed to empower these young women to challenge current barriers to women’s STEM education, and based on the feedback we received, we believe we were successful in doing so.

Nevertheless, our one-month stay at el Instituto Indígena Nuestra Señora del Socorro was about much more than just teaching the curriculums. Because the Institute is a boarding school, we shared most of our time with the girls we taught, and we built valuable relationships with them. They taught us about Guatemala and the wide array of places they come from; they opened up about their families, their hobbies, their passions, and their aspirations. They also asked us about our lives, and we were always happy to share. We saw them engage in the extra-curricular activities that they passionately engage in at the school. Seeing them dance, act, sing, go to church, and play sports demonstrated that the experience at the Institute goes way beyond academics. The close personal relationships that we established with the girls made the Institute feel like home for the month, and they also helped us get through to them in the classroom.

Allison James, Duke 2020