Empowering Guatemalan Youth in STEM
By Rachel Mundaden, Trinity ‘22

For my Independent Grant Project, I worked with a school in San Andres de Semetabaj in Guatemala to teach an interactive flashlight engineering curriculum and a water sanitation and health sanitation curriculum to indigenous youth.

For the 4 weeks that me and my project partner were in Guatemala, we spent 5 hours every day at the school where we taught 41 students. We would teach each class for 2 hours each. The first class had 20 students which consisted of “grado tercero” which would be similar to 8th grade aged students here in America. The second class had 21 students which consisted of a mix of “grados primero y segundo” or 6th and 7th grade. We also had to teach all of the classes in Spanish. My project partner and I had to quickly brush up on Spanish vocabulary in order to teach effectively but we were more than capable of still teaching the curriculum. Sometimes the language barrier made it a bit difficult to maintain order in the classroom as the kids sometimes got rowdy and found it hard to concentrate on our lectures about the math behind circuitry or the water cycle. However, once we started making hands on projects, the kids were enraptured.

We conducted the water curriculum first. Within this unit, we taught the kids how to make water filters and we also taught the children about the water cycle, pollution, and processes such as precipitation, condensation, evaporation, and eutrophication. The school and our on-the-ground partner (a non-profit organization called FUNDEGUA) thought that this curriculum was very important to teach since the area in Guatemala we were teaching in places a great reliance on Lake Atitlan for water, transportation, and their overall livelihood. This lake connects many villages and unfortunately is suffering from eutrophication and pollution. In preparation for our teaching in Guatemala, we came up with a supplementary eutrophication curriculum to add to the water sanitation curriculum provided by FUNDEGUA. Because of this my project partner and I became co-authors on a curriculum that will continue to be taught to children all over Guatemala.

The second portion of the curriculum that we taught was surrounding the flashlight engineering curriculum. With this curriculum, we taught them about the math behind circuitry and how to build circuits. We taught them how to use a soldering iron to solder wires together and to connect pieces to the breadboard. This was the kids favorite part! They absolutely loved getting a chance to feel like engineers and to handle equipment such as the soldering iron while wearing the safety glasses. As soon as they got their circuit to work with the switch and they saw the lights turn on, their eyes lit up as well. They were ecstatic to see that they
could do something as cool as making a circuit from scratch. After we helped them to build the circuit, we helped them to also design their own type of flashlight that would solve a specific need or issue in their community. This was the Human Centered Design aspect. They identified an issue in their community where people needed light (such as family members walking to the market in the dark needing a flashlight to see where they are going) and they used that need to design a specific prototype. The group that worked on tackling the issue in the super market made a design where they made a basket that could carry groceries but also had a light on the front so they could see where they were walking when walking to the grocery store. Another group came up with a headlamp idea so that they can do things in the dark while having their hands free. The kids really demonstrated their creativity with this curriculum as no group had a design that looked anything like that of another group.

For the last day, my project partner and I came up with an Engineering Olympics day filled with friendly competition through building small crafts. Some of the events were to build the tallest tower with only 5 sheets of paper, to build a boat out of tinfoil that can hold the most coins, to build a catapult that can launch a paper ball the furthest, and to make a light bulb light up with a homemade potato battery. The kids absolutely loved using their creativity in a competition form as well as continuing with learning how to build things with every day objects.

At the end of the program they had a science fair where they got to present their projects to the entire school and the teachers. It was wonderful to see how every singly flashlight had a different design and a different idea behind it.

Before and after we started the program, we had the students take surveys provided by FUNDEGUA and it was heartwarming to see the responses of students change from “not interested in pursuing a career in STEM” and “not sure about future” to becoming “interested in a career in STEM.”

This entire trip was a real learning experience for the kids as well as an amazing experience for myself. It was personally inspiring to see how captivated the kids were with activities where they could become engineers. These kids may be young but they care about their community tremendously. They all really loved the program and I think they really enjoyed a chance to use their creativity to create something useful to their communities and their peers. The children we taught do not come from the most affluent of neighborhoods, yet they still absolutely love to go to school and they have such big dreams and aspirations for their futures. They may not have much, but they have their determination and their passion for learning and creating. These kids really inspired me during this summer and I wish the best for these students in their academic journey.