

HOLY CROSS SCHOOL STEM CAMP VOLUNTEER

Makhanda, South Africa

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Introduction

While volunteering as a STEM Camp instructor at the Holy Cross School in Makhanda/Grahamstown, South Africa; I worked with another volunteer teaching students in 4th through 7th grade about structures. I taught them basic structural engineering concepts and completed fun projects with the students such as building newspaper bridges and balsa wood towers.

PHOTOS: Students working on the newspaper bridge activity (left) and balsa wood tower activity (right).



Context

This was the first year that a STEM Camp was conducted at the Holy Cross School and the purpose of the camp was to expose students to science and engineering. At the Holy Cross School, the core of the curriculum is English, reading, writing, and math. The students do not have much exposure to STEM and this camp was designed to allow students to explore engineering, structures, science, and robotics.



Junior Engineering



Structures



Science



Robotics

Project Overview

As a Structures instructor I had a five-day lesson plan to teach the students about structures:

- Day 1: Taught students about types of bridges and allowed them to build their own newspaper bridges.
- Day 2: Taught students about material properties, material connections, and structural concepts; and allowed students to conduct material tests on the balsa wood and wood glue.
- Day 3: Taught students design concepts, played a game of structures Jeopardy, and allowed the students to sketch their tower designs.
- Day 4: Gave the students time to construct their balsa wood towers.
- Day 5: Tested the structural integrity of the students' balsa wood towers in a simulated earthquake.

Day 1: Newspaper Bridges

On the first day of the STEM camp, we taught the students about different types of bridges and common information about structural engineering. We then gave the students a worksheet to practice what they had just learned. Finally, we gave them three sheets of newspaper and one foot of tape and instructed them to work in groups to build a bridge that would span a six-inch gap. We also load-tested the bridges by adding as much weight to them as we could before the newspaper bridges collapsed.



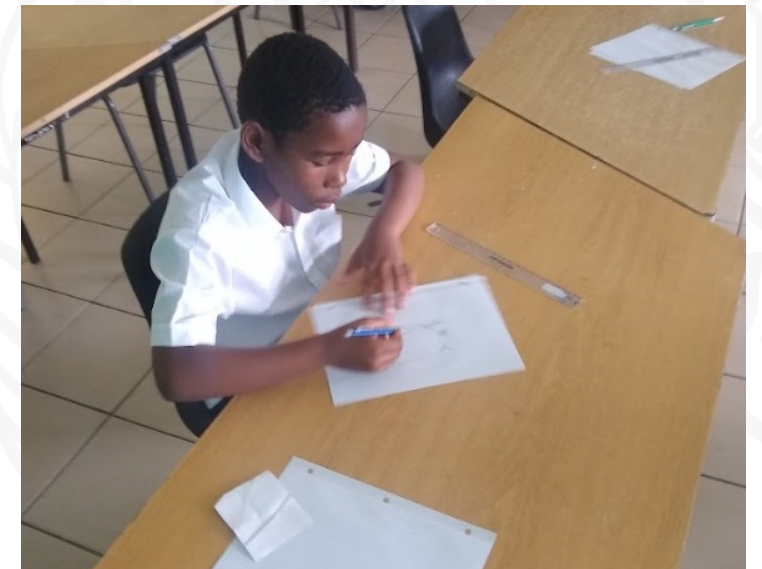
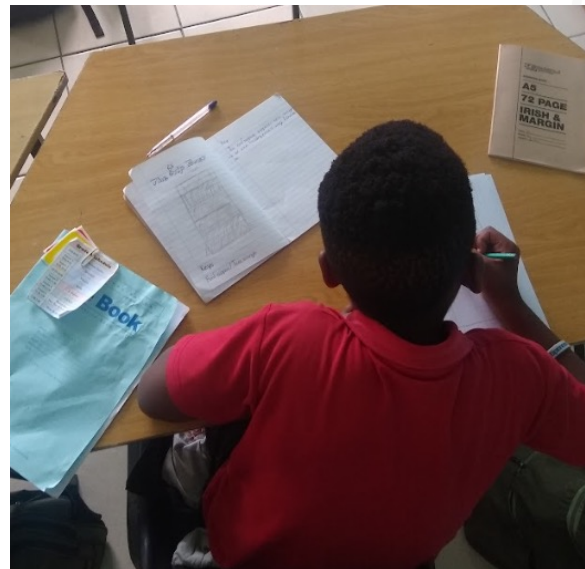
Day 2: Material Testing

On the second day of camp, we taught the students about different types of materials such as wood, concrete, and steel. We also showed them videos of the University at Buffalo seismic design team which builds larger scale balsa wood towers. Then we conducted material testing and recorded the amount of force it takes to break balsa wood and wood glue. Additionally, we showed the students different connections, or different ways to glue the pieces of balsa wood together.



Day 3: Jeopardy and Sketching Towers

On day three, we started by explaining some common structural design ideas that the students would be able to include in their own tower designs. Then we played a game of Jeopardy to reinforce some of the ideas we had taught the students earlier in the week. Finally, we gave the students time to sketch out their balsa wood tower designs while we encouraged them to use some of the concepts we had taught in their designs.



Day 4: Constructing Towers

On the fourth day, we explained the rules and requirements for the balsa wood towers and then gave the students the rest of the period to work in teams and construct their balsa wood towers.



Day 5: Earthquake Simulation

For the first half of the period on day five, we gave the students time to finish constructing their towers. Then we placed each tower on a shake table and shook the towers in a simulated earthquake to see which towers could withstand the “earthquake.”



Impacts

Personal Impacts

- This experience exposed me to a new culture where I learned about how students from different parts of the world interact with and respect instructors. This is something I can bring back to my own educational experiences in the United States.
- I saw how people in other parts of the world live, which gave me an appreciation for how students can overcome adversity to pursue their education.

Community Impacts

- This project impacted the Holy Cross School students by exposing them to STEM fields and giving them the opportunity to explore different areas of STEM.
- This camp also gave the teachers at the Holy Cross School ideas related to STEM to include in their curriculum.