

# SUMMER CAMP: MOTIVATING STUDENTS

*For Advanced Personalized Learning*



*Submitted in partial fulfillment of the requirements of the Franklin W. Olin  
College Grand Challenge Scholars Program by Andrea Cuadra in the Spring of  
2013*

## **START Summer Camp**

I live at an intersection of the American and the Nicaraguan cultures, because I was born and raised in Nicaragua but go to college and will soon start working in the US. While the expectations at my college are to obtain a summer internship, expectations at home are to spend summers with family. In the winter of 2010, I bridged the cultural expectations of these two worlds by creating my own company in Nicaragua. I encouraged one of my cousins, then a first-year at Stanford, to join me as co-founder. With mutual interests in education, engineering, crafts, sports, science and sustainability and with a timeline that included only one summer, we decided to start a summer camp for middle schoolers. We decided that the theme of our summer camp would be sustainability, because it could be linked to our main interests and would encourage an environmentally conscious mindset for our campers, who we hope one day will turn out to be leaders in Nicaragua.

Our vision was to run a two-week program for 12 middle school students with the overarching theme of environmental awareness. During the spring before that summer, we established a set of activities for every day of the camp. A typical day would include a range of activities like discussing global warming, playing basketball, making ice cream, building solar-powered toys, and contributing a new step to a collaborative Rube Goldberg machine made out of reused objects. We planned and organized every day in our camp, tested and prototyped various project ideas, and prepared the electrical components we would bring to Nicaragua from the US. In the summer, we launched two two-week sessions. Eight campers signed up for the first session, and we reached capacity at twelve for the second session. Every day, the campers came excited to enjoy the camp's engaging activities and left exhausted and satisfied from a day full of learning and fun.

In hindsight, we prepared well and followed through consistently with our plans, but as is typical in any venture, obstacles were unavoidable. For example, in the first session a camper frequently refused to participate in some group activities and caused other problems. However, we found he thrived in the engineering-oriented activities. We created leadership roles for him in electronics projects, which engaged him more and had a cascading positive effect on his behavior. Another obstacle was that our campers were very hyperactive and unable to concentrate before starting sit-down projects. We discovered that it was due to the sugary snacks they were having beforehand, so we started placing our athletic activities after the snacks. In this way, what we did well was not only in preparation and execution but more importantly in reiteration—Our second session ran a lot more fluidly than the first one due to all the lessons and adjustments we made along the way. We saw each challenge as an opportunity and responded quickly and proactively. Overall, we successfully founded a venture that was altruistic (by including public- and humanitarian-oriented components) and profitable.

Starting a venture from scratch allowed me to learn about my strengths in planning and executing open-ended projects and showed me that the opportunities available to me are endless. I will use this experience as a springboard for others. In the future, I hope to use the knowledge, skills, and experiences I gained from this

project and from my engineering education in an engineering environment to build more innovative, education-centered ventures that incorporate altruistic aspects.

## **Execution**

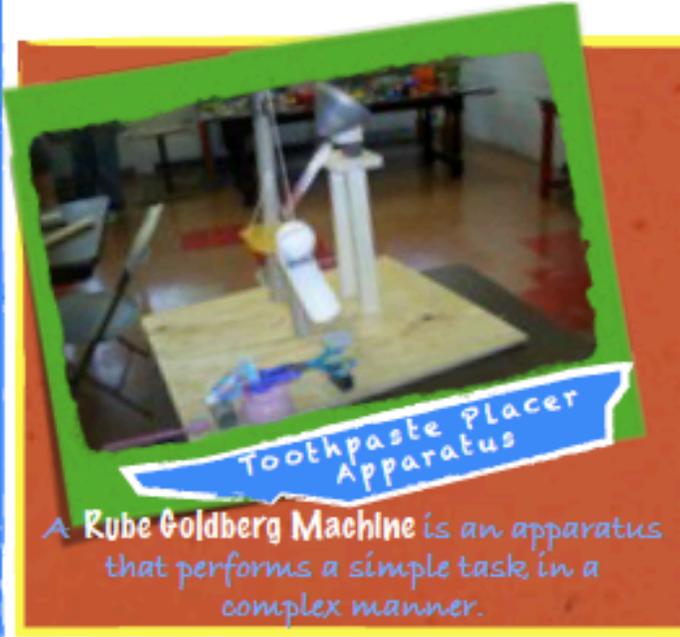
START Summer Camp was a two-week summer program for fifth through seventh grade students. It was a time for campers to create projects that would spark an interest in sustainability. The projects, which were the main focus of our program, included activities such as planting and nurturing a plant, putting together solar-powered toys, creating a house powered by a windmill, and more. There were also outdoor components and sustainability-related food experiments to complement the campers' experiences.

These are worksheets for some of the activities we planned:

START SUMMER CAMP PROJECTS

# RUBE GOLDBERG MACHINE

Make your own over-engineered machine by REUSING old stuff!



A Rube Goldberg Machine is an apparatus that performs a simple task in a complex manner.

## MATERIALS

Use any old stuff you find that you would have otherwise thrown away. Boxes, pieces of broken toys or toilet paper rolls could be useful.

**Reuse!**



## PROCEDURE

**Step 1:** Decide what simple task you want your apparatus to perform.

**Step 2:** Use your creativity to design a machine with at least four steps that performs

your desired task.  
**Step 3:** Use the materials you have to create your machine.

**Step 4:** Test your machine to make sure it works correctly.

Figure 1: Instruction sheet for Rube Goldberg machine made for our summer camp.

START SUMMER CAMP PROJECTS

# GREEN SUPER HERO

Make your own super hero that fights for a **SUSTAINABLE** world!



## MATERIALS

Decorating materials  
Wiggly eyes  
Thread and needle  
330 ohm Resistor  
2 1.5V Batteries  
Duct Tape  
1 LED  
Feltro  
Lana  
Wire



## PROCEDURE

### Step 1:

Connect the short wire of the LED to the negative side of the battery and the long one to the positive.

### Step 2:

To prevent your led from burning, add a resistor between the

positive side and your LED. Secure the connection with electric tape.

### Step 3:

Cut the circuit and put it inside your super hero, placing each end on each hand.

### Step 4:

Use your creativity to decorate your super hero.

What do you think will happen when the hero puts his hands together?  
Why does this happen?



Figure 2: Instruction sheet for Green Super Hero made for our summer camp.

START SUMMER CAMP PROJECTS

# WIGGLY PETS

Does super GREEN man need a super GREEN pet to aid him in his mission?



## MATERIALS

Decorating materials  
Wiggly eyes  
Thread and needle  
330 ohm Resistor  
2 1.5V Batteries  
Easter Egg  
Duct Tape  
Motor  
Feltro  
Cotton  
Wire



## PROCEDURE

### Step 1:

Connect the short wire of the motor to the negative (black) side of the battery and the long one to the positive (red).

### Step 2:

To make your pet vibrate, add an asymmetric object to

your motor. The vibration will make your pet move around.

### Step 3:

cut the circuit and put it inside your pet, one end on its mouth and the other on its food.

### Step 4:

Grab your easter egg and decorating materials and create any pet you want.

Can you think of other ways of connecting the wires?



Figure 3: Instruction sheet for super hero's Wiggle Pets. These were vibrating robots.

# RENEWABLE ENERGY

want to make your own house powered by RENEWABLE man energy?



## PROCEDURE

**Step 1:** Design and build your house using the popsicle sticks and glue.

### Water Wheel

**Step 2:** Glue the servo blade to the foam, and let it dry.

**Step 3:** Make holes on the foam to insert the spoons. Make sure they are small enough for the spoons to fit in tight.

**Step 4:** Cover the ends of the spoons with glue and insert them in the hole.

### Windmill

**Step 2:** Glue the Popsicle sticks together so that there is a blade every 120 degrees (or 3 blades evenly spaced).

**Step 3:** Attach the Popsicle stick blades to the servo blade.

**Step 4:** Decorate as you please.

## MATERIALS

**HOUSE:**  
Popsicle sticks

**WINDMILL:**  
Popsicle sticks  
Hot Glue  
Servo Blade

**WATER WHEEL:**  
8 spoons  
Circular foam  
Glue  
Servo Blade



Figure 4: Instruction sheet for house powered by renewable energy made for our summer camp.

## **Interdisciplinary Learning**

Olin has having three pillars: engineering (including math and science), entrepreneurship, and humanities. For START Summer Camp, I integrated learning experiences from across the disciplines encompassed by Olin's pillars. For example, in order to create an alternative-energy generator, I used a technique I learned in Computing and Craft to hack a mini-servo motor. We then incorporated the engineering component with a humanities component by having campers use art principles and their creativity to design a beautiful home in which they would install a windmill or a water wheel with the hacked motor. We then introduced the entrepreneurial aspect by leading a debriefing discussion in which we encouraged our campers to think of ways they could make a sustainability-centered business that had positive outcomes in the community. As we explained that in many countries when homeowners generate more electricity than they consume, they get compensated for being environmentally conscious and sharing, we could see our campers' eyes brighten as they raised their hands to eagerly share ideas. In this way, students took away many lessons with this simplistic example of how a type of renewable energy works and how it can be used to trigger change and productivity.

Before, I would undermine the value of one component over the other. For example, I might have seen making a website look good less important than making it work well. However, through my experiences at Olin, in the workforce, and in other community activities my approach has changed. For example, this winter, I lead a group of students from the three colleges, Babson, Wellesley, and Olin, who were consulting for a sustainability startup in Boston. Students from each college approach the problem from different angles. Wellesley students were critical thinkers and attached a lot of significance to surveys sent out throughout the program. Babson students used led focus groups and used various business techniques to organize and add significance to their information. Olin students used a more technical, design-oriented way of understanding users and stakeholders to create wireframes for new website features. When put together, the different approached completed each other and added substantial value to the quality of our recommendations in the end. Now, I see that making a website look well might have not been what interested me the most, but it is surely a key component in making it successful. By integrating methods, information, and perspectives, we are able to come up with more solid solutions to current world problems.

## Entrepreneurial Experience

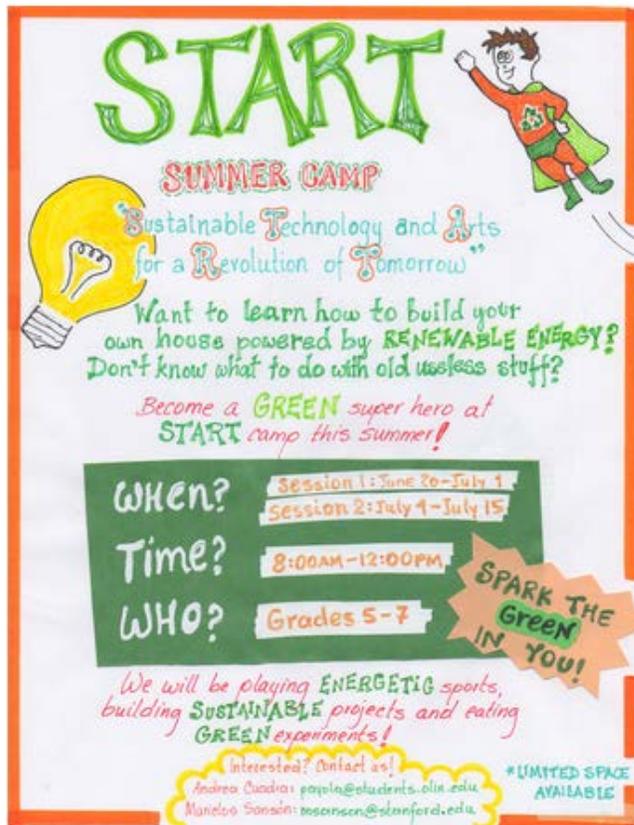


Figure 5: One of the flyers we distributed in schools and stores around Managua.

START was a profitable venture built from scratch. We went through an entire product cycle including iteration within the project activities and the camp itself (we ran two sessions.) Additionally, we encouraged entrepreneurial thinking in our debriefing exercises in order to encourage campers to make positive change. Founding START Summer camp and Olin's curriculum have made me actively seek the endless opportunities available by identifying areas of opportunities and using my skills and experiences to pursue ideas.

### *Business model:*

Each camper paid \$160 per session. We had a total of 20 campers.

$$\$160 \times 20 = \$3,200 \text{ in revenue}$$

We were able to obtain sponsorship from several companies in Nicaragua (for instance, a cell-phone carrier provided a rock-climbing wall for the last day in each session, and a computer distributor donated many boxes and other “waste” materials for many of the activities), and spent \$1,600 in operation expenses and materials like art supplies, robotics kits, snack ingredients, and electronics out of pocket.

$$\$3,200 - \$1,600 = \$1,600 \text{ in profits}$$

A big lesson we learned from managing financials is the importance of the hidden costs. For example, we were running a summer camp for children but we still needed to buy toilet paper to put in the bathroom, pay for the air conditioning we used, and pay for the gas we used to go purchase materials. These were components that we didn't include when planning our budget, but in the end, accounted for a large portion of our costs. I learned that I was good at being conservative when planning and leaving room for the "fuzz" of unexpected expenses, but I also realized that there is a lot more to financials than we had expected. Having left room for "fuzz" gave us peace of mind when we feared that we would not get enough campers to sign up, or when parents weren't paying on time. Also, what we were scared of was losing money as opposed to in the future when the fear will be not making money to feed our families. When running a business there are many risks, and it is important to minimize the risk with what one can control, like having a good financial model based on informed decisions.

## Global Awareness

Our camp was focused on sustainability to incite an interest for global awareness in our campers'. Each activity had a sustainability component that in the end was tied down to a topic related to being environmentally conscious. For example, one of our activities was to build a Rube Goldberg machine, but one that was themed around reusing materials. Here, we brought up the causes and consequences of creating waste and how we can try and minimize the amount of waste we produce to avoid creating more landfills. In our concluding ceremony, the campers showed the Rube Goldberg machine in action to their families and explained that they had used waste instead of new materials with the health of their planet in mind. At Olin, like in our summer camp, I have learned to analyze my actions and identify the implications of various behaviors that can help or harm the environment.



Figure 6: My co-founder and four campers working on our environmentally conscious Rube Goldberg machine.

## Service Learning

I have extended the lessons from my summer camp to outreach in Boston. For example, I have participated as an assistant staff member in an Artbotics program at the South End Technology Center in Back Bay. The Artbotics program's projects, like many of our summer camp projects, integrate engineering and art. For instance, in one of the Artbotics sessions, I helped students design and code artistic patterns to be transmitted to a drawing robot that would draw the patterns on physical paper.

Additionally, I am currently volunteering with Learn 2 Teach, Teach 2 Learn, which seeks to engage the creative possibilities of Science, Technology, Engineering, and Math (STEM) to catalyze cultural change. This program reaches out to students across socio-economic backgrounds in order to establish relationships across communities. With Learn 2 Teach, Teach 2 Learn, I am trying to use my experiences to develop curriculum that will get students excited about STEM and about teaching it.

I learned and became passionate about these types of experiences through the mentorship I have received from my professors at Olin. Now, whenever I need to decide what to work on, I think about how my work can be used to help others. In the image below, for example, I encourage students to determine a purpose for their activity. Instead of just making a project that is clever and interesting, I provide an example in which they can use the framework to make something useful for people without access to electricity in their homes, like a bike-powered phone charger. I realized that projects with social meaning are more fulfilling for me. In the future, I hope to continue making a difference by contributing to education and outreach projects.

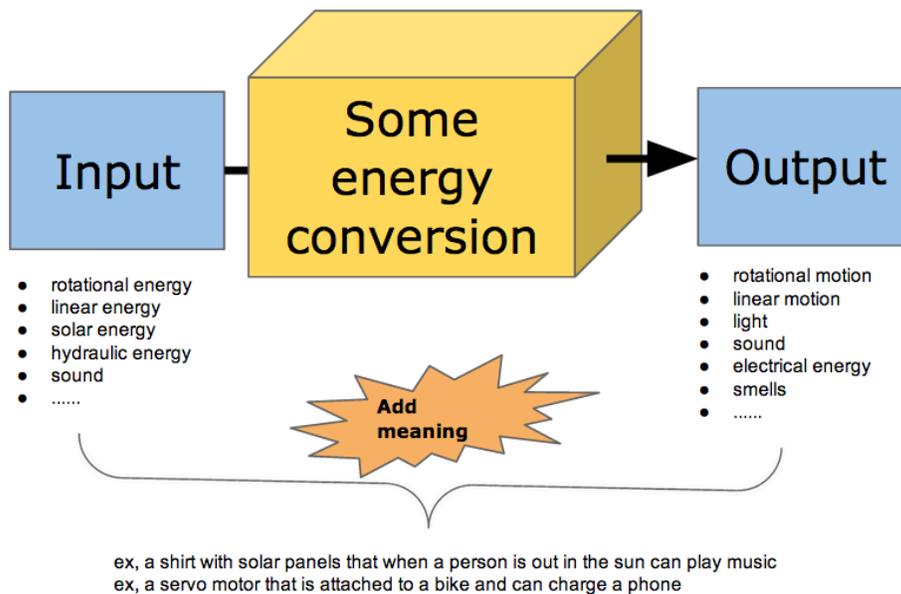


Figure 7: Graphic I developed to serve as a framework for a project in the Alternative Energy module of Learn 2 Teach, Teach 2 Learn.