

The Machinery and Madness of Creating a Summer Robotics Camp

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## THE MACHINERY AND MADNESS OF CREATING A SUMMER ROBOTICS CAMP

This paper addresses the intrigue of Teaching/Coaching during a three-day Summer Robotics Camp. As the Eaglebots embarked upon the mission to help students throughout the San Francisco Bay Area develop a passion for robotics (STEM) that will eventually translate into real world skills, numerous challenges kept the planning mix constantly changing.

The duration of the summer camp was three days; targeting students from grades K-12. This was a huge goal. How do we manage nearly 100 students? How do we keep them busy for three days? How do we keep them from getting bored? How do we address the attention span of a student in Kindergarten with that of one in middle school or high school? How do we keep students from getting off task, roaming the campus and getting into mischief? Where are we going to put all of these critters? OH MY GOODNESS (OMG). Who is going to help?

As we began our advertisement for the camp we started with the idea that we would address middle and high school students. As parents called to sign-up their children they immediately requested that younger siblings be allowed to attend. I quickly bogged down in “quicksand” as my attitude is “all things are possible, and we Will make this a workable challenge.” OMG! A positive attitude alone was not enough to hammer out the

nuts and bolts of a viable program. Madness dominated my fears, and survival mode kicked in.

My first schedule was for a three class rotation, using three classrooms and the courtyard for testing the Lego vehicles. Wow! One week of sign-ups and that idea went out the window. More kids signing-up for the camp required an additional classroom. Another challenge; it was summer time so how was I to get in contact with a teacher to ask permission to use their classroom? After three days of phone calls the teacher was contacted and gave us permission to use her classroom if we promised not to make a mess and everything was put back when we were finished. Madness! We'll be putting 25 students in the room with laptops, robots to program, extension cords and surge boards everywhere...and the promise not to mess up her room... "I'll deal with that later." Wow! We have survived so far.

Just as the problem of getting another room to use was resolved, my email was blasted with numerous requests and my telephone would not stop ringing. Parents caught on quickly, they began signing up their children, neighbor children, and visiting relatives from as far away as Wisconsin. Could this surge of interest have been perpetuated by the fee of \$10.00 per student for a three day summer camp? Madness! I reminded myself that our initial goal was to survey the interests of families for Robotics in the Bay Area. I thought, "OK, now we need two more rooms". We were able to secure an empty room and I used the "friendship" card to get another classroom—my friend felt so sorry for me she said she would help. In a matter of two to three weeks, our concept for accommodating 20 to 30 students and the court yard grew to an average of 93 students per day; four classrooms

and the court yard. I thought, OK I'll deal with the mess of clean-up later. Survival mode in full force!

The schedule for a three class rotation changed to a five class rotation. Hum...five classes...curriculum...hum are you kidding? Survival slipped to desperation as I realized we needed more help. Thinking, thinking...well...I called parents back that wanted to include their younger children and said, "We would be happy to accommodate your family but to do so we need your help. You will need to volunteer to help in one of the classrooms." To my surprise they said that they would be happy to help, but many confessed they didn't know anything about Robots or Computer Programming. Madness! I'll deal with that later.

Members of the Eaglebots Club had agreed to help and/or teach the class in their respective assigned classrooms. Great! All is fine. NOT SO! Some members quietly came to me and said they had other obligations and could not help. Madness! I'll deal with that later. Scary thoughts kept seeping into my brain. What are you going to do with ALL OF THOSE KIDS? Survival mode...I'll figure that out somehow.

Time to adjust the schedule had arrived. The five rotation schedule included:

- Building, programming, NXT's
- Lego Techniques-Simple Machines-Physics: Building a Roller Costar and other theme park rides.
- Building a LegoBot; Writing a computer program, and down loading it to the CBC and running task trials.
- Building a Lego vehicle that is durable enough to travel down a ramp, jump from one ramp to another and travel the greatest distance.
- Room for students in K-3. Activities at their interest and academic level.

For students in grades K-3 we provided constantly changing activities that addressed STEM concepts. They loved the aero-dynamics of flying their airplanes. They used K'Nex kits to build machines, were introduced to Geometry, built a Robot, and practiced beginning

math skills by measuring bubbles and bubble splatters. We had wonderful volunteers to help with this group; however, the lead volunteer was resistant to any mechanical construction. But we got through it! Her mind set was, “They are too young to be doing robotics.”

In room U-19, students learned concepts in Physics. They used Lego Techniques Kits to build Simple Machines. They also created theme park rides; a Roller Coaster and a Ferris Wheel. At another station students challenged the “law of gravity” by designing a marble run and testing their hypothesis. Finally, in this room of “creative thinking,” students built robotic insects that could move forward, backwards, and run in circles.

In room U-17, students were introduced to Mindstorms NXT Kits. They built and used basic C language to program their robots. Students worked in teams of two or three. It was an interesting attempt at collaboration.

In room U-16, students were allowed to fill their plastic tubs with Lego pieces. The only limitation to their creativity was that they would return all pieces to the correct files or container. Gender did not play a role in the scramble for parts, particularly in the vehicle-building competition. The vehicle was required to run down a ramp and travel the greatest distance.

In room U-15, students were involved in the “guts” of the summer camp goals and objectives. Retired NASA engineer, Terry Grant, taught students from fourth grade through high school how to write a computer program, download it to the CBC, and run task trials. I no longer wondered if Mr. Grant aspired to become a teacher for fourth graders—something about wiggling too much, talking too much, and not staying focused.

On the third and final day, students achieved their final goals and received

certificates for successfully writing a computer program and downloading the program to a CBC. However, students received the greatest reward by being actively involved/exposed to the creative and productive side of building skills in Science, Technology, Engineering and Math (STEM).

During the busy 3-day camp, students showed interest and delight in actively participating in the engineering, construction and programming of autonomous robots. The use of cutting edge technology, hardware, and software; required skill acquisition while also creating intrinsic rewards. We were able to observe these behaviors throughout the workshop. Additionally, these activities inspired a natural path for some of the students to practice in leadership roles as they developed their skills.

Club members served as mentors in the fields of engineering, and computer programming. They also guided students throughout the technological process. Most importantly, the introduction to STEM concepts through robotics allowed younger students to discover their excitement for technology in an entertaining and non-threatening environment. As respectful citizens, students used higher caliber thinking skills, and effective decision-making skills. During this time, the Eaglebots were able to strengthen their leadership skills, become better communicators, and practice social justice, and equality; all while sharing academic skills in Science, Technology, Engineering, and Math (STEM).