

Final Report

**Anaheim Independencia Family Resource Center
(Summer Youth Program)**

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The Anaheim Independencia Family Resource Center is a branch of the Community Action Partnership of Orange County in the city of Anaheim that offers free services and amenities to the local community. These services are targeted at all age groups, and include after-school youth programs, senior fitness and social programs, distribution of government sponsored meals, access to amenities such as a gym and computer lab and case management of economically struggling families, among others.

My contribution to the center was a summer computer science class, taught as part of a larger, seven week long summer youth program organized by Victoria Escobedo. It was fantastic that this year's youth program was able to include a computer science component, as many of the families served by the center may not have access to technology at home, whether due to income level or simple lack of space; to wit, many of the apartments in the area house multiple families. This lack of access to technology means that many youth in the area are unaware of the opportunities available in the computer sciences. My hope is that, in some small way, my programming class has helped contribute to a more equitable education for the community's boys and girls.

Every Tuesday afternoon, I worked with the students participating in the free summer program in the center's computer lab. As the subject expert, I was responsible for both designing and delivering the course curriculum. Each weekly lesson consisted of four components: a brief introduction to the topic of the day, an "unplugged" (i.e., off the computer) activity that challenged the students to think logically, hands-on time with the computers and a review session where prizes were handed out to kids for answering questions about what they'd learned that day.

In addition to the time I spent at the center working directly with the youth to teach the curriculum I also contributed multiple hours a week to researching and writing lesson plans, gathering the necessary materials for each lesson, building customized web pages for particular lessons and writing the review questions for each lesson. Although this time didn't involve direct interaction with the community members served by the center I still had to carefully consider the community, vis-a-vis the unique characteristics of my student audience.

During the final few weeks of the program I was also able to secure time with my employer's 3D printer, which allowed me to manufacture souvenirs for my students in the form of 2-inch, plastic "microchips", each with a student's name engraved upon it. The students were excited to receive this and I hope they'll be a reminder of the things they accomplished during the program.

It was important to me that the students received more than basic lessons in computer use. My pedagogical objectives were twofold: to instruct the youth in the logic and computing skills necessary to start programming and to spark further interest in the pursuit of computer science. I began my approach to satisfying these goals with rather traditional coursework: an introduction to the internet via the TCP/IP protocol and HTML. This was, by and large, an abysmal failure. A few of the students were genuinely excited to see their names appear - almost as if by magic - on a web page they had programmed, but the majority were quickly bored with the complexities and subtleties of markup language.

With this newfound, hard won knowledge I adapted my approach. The second week of the course I took advantage of the resources available on the Hour of Code website (Code.org). The Hour of Code is a nationwide initiative designed to introduce kids to programming through browser-based games. These games use “blocks” of code that have to be arranged in the correct sequence to execute some command. The block-based approach to programming abstracted away the complexity of writing code directly, enabling many more of the kids to enjoy themselves. By the end of the class session, though, students were growing restless. I definitely couldn’t rely on Hour of Code for the entire Summer!

I noticed that the most popular Hour of Code exercise among the students was a tutorial on re-creating the Flappy Bird game. The students enjoyed seeing the code blocks interact to create a playable program and laughter quickly erupted as they began experimenting with different code blocks to alter gameplay. I decided this was a promising path and wrote up my own tutorial. Using MIT’s Scratch platform - which has an almost identical block-based structure as the Hour of Code exercises - I walked the students through creating their own “maze escape” game. This was the class session I’m most proud of, and the key to its success was simple: the students drew their own mazes. Letting the students create something, in this case a maze, then showing them how programming rules could be applied to allow interaction with their creations was the golden ticket I had been searching for.

The fun the students had creating their maze games was echoed in other exercises we did, including one on CAD software and another on circuit design with Arduino boards. It’s become apparent to me since then that young kids are very excited about self-expression, and that this is something much of the current computer science curriculum targeted at youth regrettably overlooks. This is an insight I hope I have the opportunity to explore in greater detail at some point in the future.

I gained a great deal of personal confidence from this course. I'm much more comfortable working with kids now than I was at the beginning of the summer. I'd even say my general comfort level being in front of a large group has improved, as well. The time spent organizing and preparing each class has also been a fantastic boon to my project management abilities. I feel that I've genuinely grown as an individual from my time volunteering with Anaheim Independencia.

Victoria and her colleagues were fantastic to work with. Despite the center's limited resources, Victoria always made sure to ask if there was anything I needed and on the occasions I did need her assistance she was always quick to respond to my emails. I also had fantastic fellow-volunteers helping me each day in the lab, without whom I would have been figuratively, and very probably literally, in over my head with the kids! I can't stress enough to future volunteers the importance of finding a partner that wants you to work *with* them, rather than *for* them, to achieve a common service goal.

For any future students of Dr. Tao's who are considering teaching a youth course for their volunteer hours, let me first encourage you to do so. It's an incredibly rewarding experience to see a child's eyes light up with excitement in response to a topic you've introduced them to. Second, I would highly recommend you be flexible with your curriculum. Begin with something safe and sure, such as the Hour of Code, and pay attention to which games your students most gravitate towards, then use that knowledge to push your curriculum in a particular direction.

Speaking more in terms of nuts-and-bolts details: make each week stand-alone - that is, don't build a lesson that relies on (too much) knowledge from last week's. Even if you have perfectly consistent attendance (you won't) the students will struggle to remember specifics of last week's course, leading to wasted time relearning old material rather than exploring something new. At this age, the goal isn't to provide a complete seminar in programming concepts, but to simply create enthusiasm for the subject and leave students with enough knowledge to continue learning elsewhere.

These were lessons I had to learn the hard way, and sadly I think I lost a few kids early on because of it. I am very proud of what my students were able to accomplish, though, and I'm confident that many, possibly even most, of them will be entering the new school year with a new enthusiasm for programming. I learned from Victoria that many of the schools in the district have after-school programs sponsored by organizations like Girls Who Code. My hope is

that, when prompted by teachers or parents to attend these sorts of programs, my students will be enthused to do so.

While I can't predict my students' futures, I can happily report that Victoria was very happy with the course outcome. The idea to include computer science education in the summer youth program was Victoria's, and I'm honored to have been a part of realizing her vision. Her formal evaluation of my performance consisted of high marks and the observation that I, "adapted well and remained optimistic throughout unpredicted changes." I'm glad to hear as much, because there were certainly moments I felt particularly not optimistic.

Despite the challenges and setbacks, though, I'm very happy with what I was able to accomplish. I sincerely believe I've stoked the first flicker of passion for computing in some of my students. I've grown a great deal as an individual, a project organizer and a public speaker. I'm leaving with great insights into computer science education. Best of all, though, I had the chance to share something I'm passionate about and help Victoria serve an underprivileged community in the process. This is an experience I hope I get to replicate some day.