

Summer 2009 Ceti Team Report

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Teaching

Our experiences teaching in China confirmed what we had been told prior to our leaving. Project based classes work best. The students really crave the opportunity to use their knowledge (which is extremely extensive for a high school student in any country) creatively, in an open environment. Design projects in particular were very successful. Allowing the students to come up with solutions to problems with some constraints kept them engaged while not being too difficult or tedious. These projects really should be planned out ahead of time and the materials for the projects should be in hand well before you actually plan to have the students do the project. If the project requires any sort of special materials or equipment you might be better off packing it with you from the U.S. than trying to find it once you are in China. Finding materials and tools to use for projects in a country that you are learning about can be the most challenging aspect of teaching a class on the science of engineering. Even if the materials are accessible somewhere in the city where you are staying you have to know how to find it. How do you say in Chinese, for example, "I'm looking for Sodium Alginate, and do you know where I could find some?"

Jeffry Disko

Taught two projects based on food. One project used fruit to explore basic ideas behind the function of batteries, the other utilized chocolate to examine solidification processes. Each project took between two and three hours to complete depending on what the students wanted to do. I would start the project by providing the students with a little bit of background information on the topic (no more than about thirty minutes worth), and then have them use the things I had explained to answer questions, or produce some result. For example, for the fruit battery project I would explain the basic ideas behind a battery, then place in front of them a pile of materials and tools (random citrus fruits, different kinds of nails, spare change, different kinds of wire, paper clips, aluminum foil, toothpicks, wire pliers, multimeter) and ask them to make a battery. We would start simply, I would ask them to produce a voltage. The challenge was to strike a happy medium between giving them enough guidance to maintain their interest and giving them so much guidance that I ended up making the battery for them. I found that the simplest way to strike that balance was to start with big questions and then work my way down to details, but make sure I was always asking questions rather than making statements. The next largest challenge was to get the students to be methodical about their testing. At least as important as the science I was introducing to them was the scientific method. Make a hypotheses, test it, analyze the results, repeat. I encouraged

them to write down what they were doing and why they were doing it, to follow through on their plan, and then to try a new experiment that changed only one thing. Despite the uncertainty with which the hands-on part of this project usually started, by the end, the students would generally appreciate that slowing down and being methodical in their testing produced some good results.



The second project I did utilized chocolate to give the students some hands on experience with solidification processes, including phase transitions, precipitates, and grain growth. I began by explaining the solidification process and by providing the students with some background information on chocolate. I then asked the students to come up with an experiment they could perform to characterize at least three different chocolate phases and to produce chocolate samples with different grain sizes. With varying degrees of guidance they would then melt the chocolate down and use their new found knowledge to control its solidification based on the experiments they intended to perform. The following day, after the chocolate had had time to set we

would analyze all of the samples and try to explain why their experiments either did or did not achieve the desired results.

The largest problem I faced was with obtaining materials and equipment to do interesting projects with. The problem wasn't even availability of the items, there wasn't a thing I needed that I couldn't get in China; the problem was simply trying to find things. I took a lot of time to build up the Chinese vocabulary necessary to ask for the things I needed, and even then I would often find that people didn't know what I was talking about due to my incorrect vocabulary and/or pronunciation. Eventually I would always find what I needed, or at least would find something that would work, but it took a lot of hours spent wandering around talking to people---which in the end was a terrific learning opportunity for me!

Connie Lu

Taught a class centered on environmental engineering. Taught the basics of water testing and treatment, and did experiments to test water in local areas that the kids knew of and could show us. Very interactive with kids to find out exactly what was in the water



they were drinking, not drinking, and water from other places in the world. Water testing materials were borrowed from an MIT group who makes field water testing kits. Also did basic biology experiments. Used detergent to separate DNA from cells for students to see. Explained how this process worked and allowed the students to figure out most of

what was supposed to happen ahead of time. Taught macro-level environment engineering as well, without an emphasis on experimentation, but with more emphasis on problem solving. Encouraged them to use basic principles they had already learned and were taught in the class to solve problems relevant to China, the US, and developing countries. These ranged from climate control to ecosystem preservation. Class as a whole allowed the students to independently solve real problems along side doing planned experiments.

James White

Taught a small design engineering class. Borrowed hobby kits with motors and computerized power boards from the Mechanical Engineering department. This bag of supplies was moderately heavy, and it was trouble sometimes once souvenirs got added to the equation. Kids generally had a different project every day. In each project they



would have to identify the problem (sometimes I let them decide on a goal or competition themselves). Next, I would list the materials they could use. This nearly always included motors and the smartboards. Sometimes it also included sensors, stock materials, trash materials, and adhesives, all of which were easily purchased around China. After this I stressed the fact

that in the design process you must plan and generate ideas. They had to turn in a sketch to me with materials listed before I would let them start building. After this they would have some amount of time to build depending on the complexity of the problem. Then at the end we would either have a demonstration or a competition. I found that the students worked harder with competition. Afterward, they would assess the problems with their creations and on occasion makes revisions and retest.

Schools

Kunming: Yunnan Nationalities High School

Internet Access: NO

Apartment: YES

Meals: NO

We taught at Yunnan Nationalities High School. ...or tried anyhow. We arrived in Kunming a day before our teaching stint was set to begin. We were ready to start teaching, excited to learn who our students would be, to learn how much time we would have with them, excited to get started. You might imagine our disappointment when found out that although the teachers and school administration were very excited and

happy to have us as guests we would not be allowed to teach much in regular classes. We had arrived just a week and half before the “*gaokao*” (a universal college entrance exam that all high school students must take and do well on in order to go to college) and because of this the teachers and administration did not want to cut into the students' time by adding too many of our classes into their schedule. It was explained to us that we would be allowed to hold an “english corner” (a common practice in Chinese high schools wherein native English speakers go to some public place on school grounds and students are allowed to come and go as the please to practice their English) in the evenings.

We kind of resigned ourselves to the situation for the following two days, explored the local area and held our first English corner. Finally, three days after our initial conversation with the school administration, we learned that we would be given an office and be allowed to hold something akin to office hours every evening. The idea was that our presence would be advertised to the students and any student with the time and the curiosity could come to us. We pretty much stuck to this system for the remainder of our time in Kunming, although we definitely did not keep our office hours limited, we would hold these



sessions as long as students kept coming.

Although certainly not the experience we had planned for, or even hoped for, things worked out fairly well. Because the students were allowed to come to us, to come and go as they pleased, the only students who came were the ones who wanted to be there so we didn't have to worry about common classroom disruptions, or lack of interest. Students wanted to learn and we wanted to teach and it was a great time because of it. Also, our class sizes were generally fairly small, I don't think we ever had more than about eight students per teacher at one time. Something that should be considered when contacting schools is the date of the *gaokao*. It is generally held sometime in June and studying for it will take up most of a high school student's time. We recommend that teaching dates be established in late may or early July. If teaching dates are established in May a CETI team will probably end up teaching something similar to office hours because the students would still be taking their regular classes; there would probably be a higher attendance of those office hours, or they would be held with more frequency because the *gaokao* would not be looming so close. Personally, I think this system works quite well with what we do. If, on the other hand, teaching dates are established

in July a CETI team will be holding a program much more like summer camp. By this time the students are on summer vacation and will have no classes. This almost guarantees that a team will have more time with the students.

Getting Around

Getting around in Kunming is fairly easy if you know where you are going. The city is small enough that you can walk to just about all of the places you need to go (like places to buy food or school supplies) and there are many very good resources within a mile and half of the school. To the South is a street of shops that sell electronic equipment, supplies and tools. At the end of the block is a giant, westernized general store called Carrefour (think wall mart). About two blocks to the North of the school is a large internet cafe which is invaluable because the school does not provide you with internet access. About three blocks to the south of the school is a Bank of China. Finally, surrounding the school are clothing shops, fruit stands, restaurants, hardware stores, cell phone vendors, and much, much more. You can find pretty much anything you want after only a short walk.

The bus system is extensive and reliable but can be extremely frustrating if you don't read Chinese characters. The bus system is best used by looking up where you are going ahead of time and mapping out exactly which buses to take. Write it down, double check it, write it down again in case you lose the first paper, and read what you wrote often. Otherwise you'll probably end up waiting at the wrong stop wondering why bus 54, or was it 56 hasn't made an appearance in the last half hour.

The easiest way to get around in Kunming is by taxi cab. There are a lot of cabs, the traffic isn't nearly as bad in Kunming as in some other Chinese cities and they are much more comfortable than the buses. Just make sure you only use taxi's which a "Taxi" sign on the top and a meter in the front. The meter only turns on if the driver pulls down this lever that sets up on top of the dash so make sure they do that before letting them take you anywhere. We had no problems with drivers in Kunming so don't worry about it too much. The problem with cabs is that you need to be able to either tell the driver the address of the place you want to go in Chinese, or write it down for them in characters. If you know somebody at the place where you are going you can also call them on a cell phone and hand the phone to the driver, the two of them will work out how to get you where you need to go.

Weishan, Shandong Province

Internet Access: YES (an extremely air conditioned computer lab in the grade two building)

Apartment: YES

Meals: YES

We set up a job at this school very last minute through connections one of our group member's family had to the administrators. Because of this, our teaching experience was probably quite a bit different from what groups in the future, who could potentially plan better with the school, might have. We stayed at the school for about a week. During that time we were wined and dined by the administration, shown all over the surrounding area, taken to see the Chinese classroom in action, and were given the chance to lead three night time sessions, one for each grade (high schools in China consist of three grades). The number of students in each session ranged from probably about forty, to over one hundred so we really had to scramble to come up with things to do sometime. In the larger groups we ended up talking about U.S. culture and answering questions quite a bit. This situation generally ended up degenerating into an "English corner". Degenerate is really the wrong word though, its connotation is far too negative, in actuality our night time sessions went really well and the students probably got as much out of those as the students at other schools got out of our science experiments.

Unfortunately, this school was a second opportunity to encounter the effects of the *gaokao*. The students at this high school were set to take the *gaokao* about a week after we were scheduled to leave, this was a contributing factor in our very limited number of night time sessions. So, again, scheduling is very important. Try to schedule your time at a school either well before the *gaokao*, or after the *gaokao* as a summer session.

Getting Around

Getting around in Weishan is relatively simple, mostly because there isn't really anything to get around to. Weishan is a village by Chinese standards with a population of only about 100,000 people. During our time at the high school the foreign English teacher (a guy from Florida) acted as our guide. The high school itself is a few miles from the town proper but can easily be walked to, or if you would rather ride, stationed at both school entrances during most of the day are small swarms of people on electric tricycles who will take you to town for a mere four RMB. Getting supplies in Weishan is as easy as in any Chinese town or city, maybe even easier than some of the big cities because there isn't so much ground to cover. Near the center of town is a large Wall Mart like shopping mall which is surrounding by the familiar hardware stores and junk shops which are real gold mines for science experiment or engineering design project supplies.

Guangzhou: Middle School attached to Sun-Yat-Sen University

Internet Access: NO

Apartment: YES

Meals: LUNCH ONLY



Teaching in Guangzhou was a real trip compared to the other schools. For once we had a steady class of students for a solid four hours every weekday for two weeks. We had about forty students and as is typical in summer school camps in any country, some of them wanted to be there and some really didn't. We spent most of the time trying to do projects so that the students could apply their knowledge creatively. Also, they weren't interested in our lectures, partly because they were young teenagers on summer break, partly because they couldn't really understand technical English very well. Coming up with good projects for two weeks at a time was difficult at times, especially because it wasn't always easy to procure the materials we thought we would need or want for a particular project. Most days would be split into two parts. One

part would be a class wide project, assignment or competition like an egg drop, building cardboard four bar linkages, thinking about American and Chinese culture, etc. In the other part of class we would split the class into three sections, one for each of us teachers. Then each of us would start our group of students on some project pertaining to our interests or major. This system worked pretty well because just about when the students would get bored with one project we would move on to the next, but the projects also had enough time allocated to be interesting.

Getting Around

Getting around in Guangzhou is as easy as it gets in China. Guangzhou has an extensive bus system and subway. Most things of interest are accessible after only a short walk from a subway station. Taxis are not as convenient to use as in Kunming because the traffic in Guangzhou is much worse. Near the school is a large Wall Mart like

shopping mall, plenty of hardware stores and junk shops, and a huge chunk of the city devoted entirely to the sale of fabric and clothing tags. Because of this, finding supplies for projects is pretty easy at this school, even on short notice.

Travel

Shandong

Traveled mainly with the relatives of one of our members, Connie Lu. They assisted us in getting to our school and to spots where we wanted to sight see. A highlight was staying in the ocean side city of Qingdao for 2 nights. We found an amazing hostel there, ate some delicious seafood, walked along the beaches, and scuba dived. An easy city to get around, Qingdao is geared towards both foreign and domestic vacationers, so you won't have any trouble getting anything you need there.

Places to Stay

YHA Qingdao Old Observatory International Youth Hostel-Qingdao

21 GuanXiang 2nd Rd., Qingdao

Telephone: +86 (532) 8282-2626

Fax: + 86 (532) 8282-2266

Address in Chinese

青岛奥博维特国际青年旅馆, 青岛市观象二路 21 号
观象山公园内, 中国山东省青岛市

A cheap hostel located in an old observatory within walking distance of the beach and downtown Qing Dao. Free internet, nice rooms, cafe on the roof, fun atmosphere and lots of guests hanging out in the evenings.

Guangzhou Waste Water Treatment Plant

Using Connie's family connections we were invited to stay at and tour a water treatment plant in Guangzhou for several days. We practiced our Chinese, learned more about how state-owned operations are conducted, and got to see many state-of-the-art water treatment processes. Many of the processes developed originated from US companies, so it is interesting to see the mix of Chinese and American equipment everywhere.

Sichuan

Sichuan is truly unique. The big cities, besides local elements of Sichuan culture and food specialties, are similar to other big cities in China. However, outside the cities is very different. We visited the Leshan Giant Buddha, which is a very, very, very, very, very large Buddha. Most memorably, we climbed Mt. Emei to see the eclipse. And by climbed, I mean we started at the bottom, and then hiked for 41 km to the summit which we reached 1.5 days later, the night before the eclipse. When it finally happened, it was foggy outside, but it did get dark and then light again over the course of 5 minutes, which was pretty cool on top of one of the most beautiful mountains in China. Waterfalls line the entire climb, and small stores and vendors can be found about every 15 minutes of hiking. No need to bring food or drink, it can all be purchased on the way, as well as accommodation. I highly recommend climbing this mountain. It could change your life.

Places to Stay

Dreams Travel International Youth Hostel-Cheng Du

242# Chengdu Wuhouci Road, China 610041 (Opposite of Wuhou Temple)

Tel: (+8628)-85570315 Fax: (+8628)-85570321

Address in Chinese

梦之旅国际青年旅馆介绍

成都市武侯祠大街 242 号(成都著名的武侯祠旁, 南郊公园正对面)

A well run hostel in the Tibetan quarter of Cheng Du. BBQ, bar and hanging out on patio. Cheap internet and a cafe as well as an in house travel agency service.

Mongolia

We arrived in Inner Mongolia on a train from Huhehaote, and immediately went to the UB Guest House where we arranged a tour to the Gobi Desert (reserve ahead of time!). Connie wasn't feeling well, so they let us delay the trip a day, and then we continued to spend 7 days in the Gobi desert. This trip is not so much for the faint of heart. Lots and lots of desert, with amazing things to see and climb anywhere you want to stop. However, bring vegetables if you want them, because you won't find any in the places you will be staying. You will mostly sleep in nomadic families guest gers. They eat mostly animal products and fried bread. It's a harsh trip, but definitely worth the sand dunes, desert oasis, Mongolian wrestling, animals, gers, food, and fun.

Places to Stay

Anda's Guest House- Huhehaote (Inner Mongolia)

No.78 Northern Hulun, Qiaokao Xijie, Hohhot (Saihan District)

Tel: 86 15947519807, 133

A guest house run by local inner Mongolians with really good food, nice rooms, and is run by an extremely helpful and patient family.

The U.B. Guest House- Ulaan Baatar Mongolia

E-mail: ubguest@hotmail.com, ubguest@yahoo.com

Telephone: 00-976-11-311037

Cell phone: 00-976-91199859

Faximile: 00-976-11-325555

A serious operation in a serious country. They are really a tour agency with beds so if you are only looking for a place to stay you will probably have better luck going somewhere else. But if you want to take a tour of Mongolia, this is the place to go.

Beijing

Beijing is the capital and it shows. The subway is clean and efficient, the buses are pretty, the streets are clean. It takes about half a day to walk from one end of Beijing to the other. The food is great at any price and the people are pretty friendly. In my experience, the most rewarding and pleasurable thing to do in Beijing is to wander around aimlessly. Get lost in the Hu Tongs, rest on a stoop and make some new friends.

Places to Stay

Leo Hostel/Shang Lin Hostel-Beijing

Guang Ju Yuan, 52, Da Zha Lan Xi Jie, Qianmen, Beijing, Xianwu District

Tel: 010 63033318

Address in Chinese

中国北京前门大栅栏西街 52 号，广聚园宾馆

A well run place just south of Tian an men square with lots of interesting people both staying and working there.

Communication

Cell phones are extremely useful in coordinating group movement and in providing individual members the freedom to wander off on their own without leaving their group members in the dark. They are also invaluable resources for getting around in China because you can always call the person or place you are looking for to get directions, either for yourself, or for the taxi driver you want to drive you there.

Tips

- As soon as you arrive at the hostel or hotel where you are staying remember to take their card so that you can use it to ask for directions back.
- You can climb Emei mountain in Sichuan province in one day (most accounts we heard said it took two) if you hustle and don't carry a heavy pack (which you don't need because the mountain is loaded with amenities)
- Visit the Simatai portion of the Great Wall in China--highly recommended because it isn't as busy as the other sections, has not been "restored", and offers some great views.