Summary

Participating students on Research Trip to Guatemala organize themselves in seven teams according to the project of their choosing. Their assignment after the trip was to write a project report. This document serves as general introduction to their individual reports.

On February 2008, Professor Ken Pickar, the Caltech Y and E/ME105 team started to plan the second research trip to rural Guatemala, in search for ground truth to inform Product Design for the Developing World (Emerging Communities) students. Four cohorts of students have enrolled in this class since 2005 with the purpose of learning to design for the needs of the two billion, at the bottom of the pyramid, the World’s poor.

On April 2008, students signed up through the Caltech Y, to take part on this research trip, 14 students were selected and began to squeeze an orientation curriculum specially tailored for them, into their already tight Caltech schedule. Our partners in Guatemala, both Fundacion Solar, a local NGO and Landivar University, a private catholic university also selected their students, 6 the former, 7 the latter. With 27 students and a wealth of lessons learned from first trip held during September 2007, 2008 research experience required a new level of programming and organizing. Teaming up with the Caltech Y proved to be a win-win situation for both programs.

Students immersing in Maya culture in selected friendly sites in rural Guatemala have enriched E/ME105 curriculum. With long lasting community partnerships, sites have been selected with a criteria considering on: existence of appropriate technology examples, ongoing income generating activities, organized community groups, presence of partnering NGO’s, reasonable roads and a minimum of communication facilities.

Pasajquim, 2008 research site

With the support of Fundacion Solar, Pasajquim, a 99% Maya village in the municipality of San Juan La Laguna, district of Sololá was selected for the 2008 research trip and visited in a pre trip in May. This pre trip was design to evaluate potential projects and strengthen ties with our partners in Guatemala, which included a meeting with Landivar students and professors as well as meeting with Pasajquim authorities, leaders, project participants and potential home-stay families. Difficulties arose to select an adequate time line for the trip due to differences in academic schedules of Caltech and Landivar and rainy patterns in the Guatemalan Highlands. Even if in the middle of the Guatemalan rainy season, a two-week stay was defined form June 30th to July 12.

The necessary contextualization for the product design process has proven to be accomplished by students visiting rural impoverish communities and learning directly with the people about
their needs, dreams and current abilities and problems found in the road to leave poverty behind. This second research trip was designed to last two weeks (instead of 2007 trip of one week) and to stay in one single village, which served well to develop 6 projects, each reached different level of accomplishment and development.

Pasajquim welcomed us on the afternoon of July 1st, with 15 families ready to host students, teachers and mentors. For the next 8 days, every day teams meet at the different work sites for their projects and for some hours each day, most all participants worked with the larger community project, the drip irrigation systems. Every afternoon professor Pickar called up for working sessions were every team presented project accomplished tasks, lessons learned and questions. Some teams had the opportunity to conduct formal field research through interviews and family visits. Every student had the opportunity to interact with their home stay families during every meal and the every day after dinnertime. Students helped cooking, played with the children, engaged in conversation with the different members of their families, visited their corn fields when invited, planted flower gardens when it was the case, celebrated birthdays and special events when these came handy.

Other than offer Caltech students with a challenging experiential learning experience, E/ME105 has a central goal: to contribute with one of the Millennium Development Goals established by the United Nations, to reduce the world’s poverty bringing at least half of the people living under the burden of extreme poverty to a better level of opportunity by the year 2020. Students have been working on designing tools that can improve income generation opportunities as a means to contribute to change our world into a better place for all. They have become aware of the interconnection between their lives and the lives of the thousands that live their lives in subsistence mode. Students have been touched by the fact that these people, even with great effort and hard work, fall short of making their dreams come true. Some of them noticed the many inhabited new homes or one bedroom structures belonging to people that traveling North, to the United States, have found better wages for their labor, which translated in their ability to build better homes for them upon their future return.

Many Guatemalan business as well as global corporations take advantage of the cheap minimum wage in Guatemala, which is around $1.00/hour per agricultural labor, pre-industrial labor or office clerks. More specialized workers e.g. construction masters, electricians, community organizers or project coordinators may have wages of around $2.00/hour. An end of the month paycheck is a foreign concept. Most poor rural people live their lives on a day-to-day basis with very little or no cash income. The base of a normal Maya family subsistence is corn, which they plant in family plots (a family of 8 would plant and harvest around 1800 pound a year) and eat in different ways, especially in big stacks of tortilla with every meal. In Pasajquim, people gather some fruit and eatable greens in the surrounding communal or private land. Some families still know or have recently learned the crafts and arts of their ancestors: foot looms, embroidery or basket weaving. Some have become engaged in new activities e.g. commerce with small corner stores with few basic groceries and junk food, horticulture, or honey production. Some few have small coffee plantations and most do seasonal work for a couple of local larger coffee growers. There is evidence of remittances from migrant workers in the US in the many new and empty homes we saw built in at least 30% of the lots.
Marketing a new Corn Sheller, the first E/ME105 selling product:

During this 2008 research E/ME105 experience, Fast Maiz team came up with a new iteration of the corn sheller developed by winning team Mas Maiz in 2006 cohort. This new prototype gave E/ME105 its first selling product. Team members with the local group of women were able to produce a number of pre-fabrication prototypes of the Mas Maiz corn sheller. Extensive use and testing with the Pasajquim women’s group “Early Risers” underlined week design elements and scratching of kernels. A new prototype Fast Maiz was design and developed with successful results. Testing Fast Maiz prototype proved better performance compared with Mas Maiz design. The first 17 pre fabrication prototypes made their way to the Santa Clara regional market early morning, on Saturday July 5th. Public presentation was done with appropriate local Mayer’s permission in pre-designated area, were students presented other prototypes as well. A selling table was arranged with a one meter round low edge flat basket (locally woven) and two wooden empty tomato boxes. In such stand one of the students started calling potential clients, showing how corn shellers worked and inviting everyone to try it. This marketing method proved successful with the sales of all corn shellers in a matter of 1 1/2 hours at Q5.00 each (US$0.70). The proceedings of this first sale experience constitute the seed money for this young enterprise. This is the first E/ME105 income generating activity in the hand of poor local partners.

The “Early Risers” women group is committed and exited about this income generating activity, which will continue to grow with initial support of E/ME105 through committed student participation, supported by E/ME105 local coordinator and Fundacion Solar Micro-business Program.

The Projects

During the pre trip, two community groups and some families from Pasajquim, pre selected by our local NGO partner Fundacion Solar were visited to size their level of interest and commitment to become E/ME105 research partners. We presented them the following projects: improve wood burning stove, accessories for dry composting latrines, pedal charger, corn sheller and Fundacion Solar’s requested, drip irrigation system for two community groups. Combined with these activities, Professor Pickar had a deep interest to understand the export business constrains and opportunities in Guatemala. A group of beekeepers, Apiflor Association, in Pasajquim asked Professor Pickar for support to develop their honey business and improve their tools.

Unlike the 2007 first research trip, which did not have one single prototype to be deployed, for this second trip, professor Ken Pickar and his team pulled up all E/ME105 past projects, as well as received one new project from each of our two partners in Guatemala (drip irrigation and vegetable carrier). With this pool of projects a selection process was conducted and seven projects were selected, four to be re visited, three of them entirely new experiences:
-Pedal charger
-Corn Sheller
-Efficient stove
-Latrine seat
-Export business/ Honey production
-Drip Irrigation (Fundacion Solar)
-MayaPac vegetable carrier (Landivar University)

Challenges were huge for the different projects since some of the prototypes had not yet been fully developed and others needed pre fabrication testing. Students signed up for the project of their choosing. Some three weeks prior to departure teams were formed with project leaders and team leaders. Action items were defined for teams to accomplish, materials and tools were prepared, bought and gathered.

To test the performance of the two drip irrigation systems we will need to wait for the rainy season to come to an end in October/November. Both groups are exited to see the effect of new irrigation system on crops, both for the extra time for cultivation as well as for the timely water supply the systems offer. Some incomplete numbers on productivity for both the gardens, both in earnings/savings per family and yield of crops have been collected by agricultural technician form Fundacion Solar.

Deployment of stove, pedal charger and separating seat for latrines encountered problems of various kind which will need further work, analysis and follow up with help of partners, students and local coordinator. For every project there was an agreement signed both by research partners and students. The stove needs work for smoke management and testing, the pedal charger was declared no workable due to poor testing and lack of proper measurement and the latrine seat needs a new prototype.

The export business team found an interesting opportunity in local honey production to further a plan to understand its possibilities and constraints. Organized by Landivar University professors, students also had the opportunity to visit a vegetable packaging plant in a rural area close to Guatemala City. This is a packing company operated by Maya Pac; a subsidiary of Pennsylvania based Hanover Corporation. The plant works 24/7 all year round processing vegetables and fruits (crop from individual peasants) with 3 shifts of mostly Maya labor paid less than minimum wage. Contracted peasant received seed or seedlings, pesticides and fertilizers and packing boxes. Production management is organized through “distribution points” through out Guatemala. MayaPac is the major processing plant in Central America.

Also with Landivar partners’ help students were introduced to a different approach to income generating opportunity by a much smaller operation, mostly for women in crafting designer jewelry and small accessories. Funded by United Nations Fund for Development, this experience seeks economic sustainability by adding modern and constant design elements to their production, increasingly elevating their production and selling stands.
Maya splendor, ancient and modern

The trip gave additional opportunities to students to enjoy Maya Culture: Ancestral Musica Aj ensemble came to Pasajquim municipal building and gave a wonderful presentation with local instruments and sounds bringing forth millennia of musical development. The two day trip to Tikal, depicted Maya splendor and power as well as its many mysteries throughout centuries of human activity and history during IV-XIII AD: the use of space, stone buildings and inscriptions, monuments, glyphs, ceramics, silver and jade jewelry, paintings, agricultural practices, dress and ceremonial gatherings and festivities.

Every aspect of this 2008 research experience: experiential learning, development of ideas and prototyping, co-creation opportunities and immersion in Maya culture showed a higher level of accomplishment and a deepened understanding of development issues and global societies. This second trip was a more complete experience, and once again a life changing experience for most students. Even though there are loose ends and room for improvement, during our last wrap up session, 31 out of 34 participants (27 students and 7 guides) gave it an 8/10 grading!!!! (10 max).

Critical thinking: challenges for improvement

From the 2008 Student Perception Survey, done after the trip to Pasajquim, the following serves to bring light to the need of better project preparation for deployment of prototypes. One of the purposes of the questionnaires is to gather material to learn from the process itself and improve by applied lessons learned. Students gave feedback regarding problems they found when performing and delivering their work in Pasajquim: “local partners did not understand the big picture”; “The processes needed simplification to make maintenance easy and manufacturing inexpensive”; “We lacked cultural knowledge”; “We had inadequate preparation” “We were not able to address the cost problem”; “We deploy prototypes without sufficient testing: e.g. “we build a stove we believe is much more efficient however we were not able to test it due to safety concerns”; “We deployed pedal charger in non-working conditions for electricity production”; “We designed products without local feedback: the seat for the Dray Composting Latrine had the wrong measurements”; “We arrived not knowing project parameters (e.g. for irrigation: flow rate, pipe size, only mentors had intimate knowledge of system”; “We accepted help from students from other project and they had non-adapted training”; “Challenges of local manufacture e.g. with wheel chair specifications”; “Requirements than men garden run only on overflow water”; “Difficulty of maintaining irrigation systems using locally available materials (need to use locally available materials for system construction)” “Need to work on the projects during bad weather (frequent rain)” “We found technical assistance for organic agriculture lacking; insects were compromising crops in women’s garden; terraces were not build properly in men’s garden”; “In general there was lack of organization, material supply and punctuality”