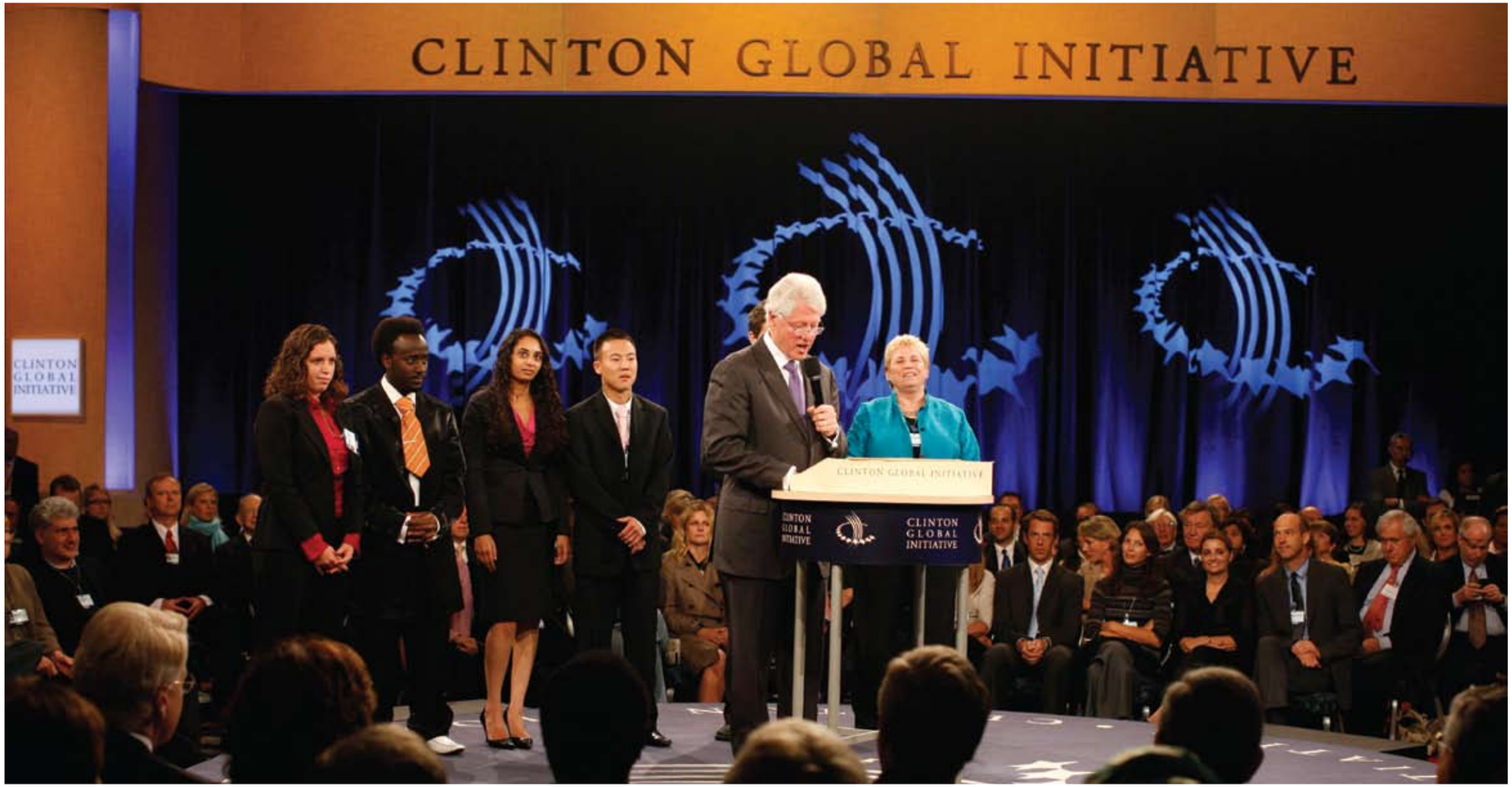

Tricia Compas (far left, standing on podium) is honored with other students by former President Bill Clinton for efforts to improve world communities
(Photo courtesy of Clinton Global Initiative)

REAL SIMPLE MAKES A REAL DIFFERENCE

CAL POLY TURNS IDEAS INTO ACTION

BY GALEN RICARD

IMAGINE A CONSUMER who has no money, no cheap energy, no clean water or other basic resources. A consumer who doesn't need labor-saving or time-saving devices. A consumer who represents the majority of the world's population.

The consumer is real: 90 percent of the 6.5 billion people on the planet can't afford the basic products and services that a small fraction of the world takes for granted; nearly half of those have no regular access to food, shelter or similar necessities. Finding solutions for this "other 90 percent" needs to be just as real. And, for a growing movement of designers, engineers and other innovators, that means real simple.

One of the first products reflecting this new direction at Cal Poly was recently honored by the Clinton Global Initiative University. **Tricia Compas (CEEN)** received an award for her thesis project on the Polytech Waterbag, a simple water treatment device for disaster zones. Compas was among 44 national recipients of student grants to support innovative, high-impact commitments to improve communities and lives throughout the world.

The 10-liter water bag was developed under the guidance of Civil and Environmental Engineering Professor Tryg Lundquist, along with a multidisciplinary team of students, advisors and organizations. The simple, low-tech product is a breakthrough for disaster relief zones, where clean drinking water is the No. 1 challenge. While the 2005 tsunami killed 140,000 people directly, another 85,000 died from disease and other delayed afflictions, according to the World Health Organization.

"The water bag is 20 times more compact than the rigid plastic jugs typically used in relief work, costs 90 percent less than standard hand-pump water filters, and it can be deployed quickly over wide areas to produce clean water," said Compas.

"With tens of millions of people affected by floods and other water-related disasters each year, there is a huge potential for the device to save lives," she said.

Improving lives with just such simple innovations is the premise of Appropriate Technology for Impoverished Communities. The three-module class series, introduced last fall by Physics Professor Peter Schwartz and Honors Program Director Sema Alpteken, challenges students to come up with innovative technological solutions to the age-old problems of poverty. The multidisciplinary class promotes design as a major tool of social good.

And the students get it.

The interdisciplinary nature of the course was evident in its initial launch, which involved faculty from seven disciplines, as well as guest lecturers from UC Davis, MIT and the private sector.

"The problems of world poverty are too big for any single approach or solution," Schwartz said. "Students from all backgrounds have something to offer."

While engineering often leads the technical aspects of the design, other disciplines bring valuable skills and perspectives.

Business, for instance.

Designing appropriate technology is only part of the equation, said Schwartz. "Business permeates everything we do. We've got to communicate in a way that will be understood by the team, the customer, investors, partners and other stakeholders."

Just as the class forces a rethinking of design, it also puts business in a new light.

It's what Cal Poly accounting instructor Kate Lancaster calls "business unusual."

"In this class, students represent many disciplines and learn to examine problems through various lenses and to converse with each other to identify solutions that consider the social, environmental and economic consequences," said Lancaster.

From the beginning, the business side of the project "was a real eye-opener" and catalyst, said Compas. Early funding came when the water bag concept won first place in the Innovation Quest 2007 competition.

"That was before I was involved with the project," noted Compas, "but ENVE students Dan Frost and Steve Barr and project advisor Tryg Lundquist used the award winnings to help

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fund my thesis to turn the Polytech Waterbag into reality."

Compas gained an international perspective at a young age, growing up in Seoul, South Korea, where her father worked as a nuclear engineering consultant. Living in another part of the world, she saw conditions that were not what she was used to. "It was always on my mind: 'How come some are living this way?'"

Attending the three-day Clinton Global Initiative Annual Meeting in New York in September was a humbling and inspiring experience for Compas. She had the opportunity to hear talks by President Bill Clinton, President-elect Barack Obama, John McCain, Bono, Lance Armstrong, Al Gore, Tom Brokaw, Madeleine Albright and Muhammad Yunus, among many others.

"My entire experience at Cal Poly has really changed my view of the world," said Compas. "In my five years here I have had the opportunity to travel to Thailand three times working on improving drinking water, to travel to Alabama to help post-Katrina disaster victims rebuild their homes, and now the water bag is opening more doors."

"Tricia was already an accomplished student and had co-founded the campus chapter of Engineers Without Borders early in her student career," said Lundquist. "The award from

ATTENDING THE THREE-DAY CLINTON GLOBAL INITIATIVE CONFERENCE IN NEW YORK ... WAS A HUMBLING AND INSPIRING EXPERIENCE FOR COMPAS

the Clinton Global Initiative will only further her professional and public service interest in improving world conditions."

"We expect the Polytech Waterbag to be only one of many life-changing appropriate technology inventions to come out of Cal Poly over the next few years," said Schwartz.

"The global initiative's message is the same we're hearing in the appropriate technology class," said Compas, "It was summed up beautifully by former President Clinton at the award presentation. He said, simply, 'Turn your ideas into action.'"

It is clear to those who have seen the work of Compas and her team that Cal Poly is among a vanguard of universities who are turning that message into action.

That message also is being lived by other members of the Cal Poly family. **Shana Ogren (CRD '07)**, daughter of Cal Poly Vice President of Advancement Sandra Ogren, is currently in Malawi working with the Peace Corps on a library project. Toni Maraviglia, daughter of Cal Poly Admissions Director James Maraviglia, is headed to Kenya in December to coordinate a bridge program for 8th grade students.

"I feel privileged to be a part of this work," said Compas. "It's very fulfilling, both personally and professionally." □

APPROPRIATE TECHNOLOGY DESIGNS FROM CAL POLY ARE REVOLUTIONIZING THE WORLD

A bicycle-powered water pump, developed through Cal Poly's Appropriate Technology for Impoverished Communities course, is a way for Malawian farmers to supplement the area's unreliable rains and create the potential to grow crops during the dry season. *(Photo by Lori Atwater)*

BICYCLE-POWERED WATER PUMP TO WATER CROPS

Malawi, in southeast Africa, struggles to feed its people. Most of the population consists of farmers with two acres of land or less who grow food only during the rainy season, which is usually short or irregular. Each year, rural Malawians run out of food well before the next harvest. This period is aptly and sadly named the "hunger season." The Cal Poly project team is working on a way for the farmers to water their crops when the rain is insufficient and to create the potential to grow crops during the dry season.

The solution: A bicycle-powered pump that draws water from small streams and rivers near the land. The simple design works by suspending the rear wheel of a bicycle off the ground and using friction between that spinning wheel and a smaller wheel connected to a device that pumps the water. Bicycles are common in Malawi. And transportability is key – not only because fields are often situated some distance from the farmers' homes, but also for the business opportunities it creates. One member of a community can purchase the pump device to irrigate his own field as well as generate additional income by providing the service to other farmers in the area.

Student Team: Lori Atwater, general engineering; Kaitlin Chandler, social sciences; Adam Garelli, mechanical engineering; Devon Henry, liberal arts; Bridget Hill, earth science; Blayne Morgan, environmental engineering; Kendra Rowley, civil engineering; Grace Wetmore, animal science. Faculty Advisors: Rod Hoadley, industrial and manufacturing engineering; Dianne Long, political science. □

SOLAR DRYER BRINGS OUT THE ENTREPRENEUR

Once the fruit capital of the Soviet Union, Armenia lost much of its fruit production and marketing capability when beset with severe and prolonged energy shortages after the Soviet era's demise in 1991. Energy costs remain a significant challenge today. The solar dryer project introduced by Cal Poly Food Science Professor Hany Khalil in 1994 is a zero-energy technology that is bringing new economic opportunities for Armenia's rural areas.

The solar dryer's construction is simple, using local bricks, metal and glass. "When you have a lot of people unemployed, automation is not necessarily your best option because there's a need to put people to work," noted Khalil.

Focusing on dried tomato as a basic product, the solar dryer project has quadrupled many Armenian farmers' income, which is the fundamental goal of the project. "By drying the tomato, they're using the entire crop. The farmers have something with high value on the international market and can store it all year," said Khalil. "They can take it to the market when market conditions are best, not when the spoilage of the product dictates."

According to Khalil, this brings out the entrepreneur in every farmer. They begin to explore drying different commodities on their own, forming co-ops and entertaining value-added variations – such as taking the dried tomato and adding oil, spices and garlic and putting it in a jar. Success breeds success. Not only does it spread farmer to farmer but organization to organization. More funding agencies get involved and multiply that success. The solar dryers can now be found throughout the Armenian countryside.

Solar-dried tomatoes are bringing new economic opportunities to Armenia's rural areas. *(Photo by Hany Khalil)*

Khalil is executive director of the California State University Consortium for International Development, which taps the expertise of all five CSU agricultural campuses: Cal Poly, Chico, Fresno, Humboldt and Pomona. "Our purpose is to provide a core of expertise that helps advance prosperity across the globe through appropriate technology, economic efficiency and sustainability practices," he said. □

A simple stabilizer for adobe bricks could make all the difference for a village in East Africa. Pictured: Student team and volunteers, including team leader Grace Chen (front left) and faculty advisor Craig Baltimore (far left). *(Photo by Galen Ricard)*

A BETTER ADOBE BRICK

In rural East Africa, when it rains, bricks melt. The region's dry season, so ideal for baking the natural adobe bricks used in construction, is followed by a rainy season that can wash away structures not protected by roofs. And in this poor region, there are always those who have run out of time or money for roofs before the rains begin. It's a cycle of futility that the project is working to change by finding a simple stabilizer for the bricks themselves.

Cement is too costly, so this Cal Poly team is developing an adobe brick mix that uses lime to minimize the amount of cement needed. At the same time, they are designing a process that is geared for local construction workers with no previous experience making proper mixes. The tools: a pitcher to measure the proper amount of water, trays to mix the ingredient, stones to crush clots, a window screen to sift the soil to collect local clay, and a ramming press to make the bricks.

Student Team (ARCE): Grace Chen, graduate student, Nichole Brandt and Anthony Palmas. Advisors: Craig Baltimore and James Mwangi. □