Rebirth of a Nation

Afghan engineers find a bright spot in the shadows of war.
The war in Afghanistan has drawn attention to the woeful state of that country’s infrastructure and education system. And while Afghans’ political, religious, and ethnic puzzles defy imported solutions, outside help in training the engineers they desperately need is welcome and workable, as our cover story reports. M. Saleh Keshawarz led the way in 2002. The University of Hartford, where he is a professor of civil and environmental engineering, has provided graduate-level instruction to 20 faculty members at Herat University. Other U.S. and Afghan engineering schools began collaborating a few years later, with World Bank funding. Japanese educators, meanwhile, have restored ties with Kabul University begun in the 1970s and provide graduate training to its engineering faculty – just a fraction of the hundreds of Afghan grad students in Japan. As a relatively low-cost method of winning hearts and minds, these efforts would seem to be a prime example of worthwhile international assistance – a no-brainer.

Among hazardous foreign interventions, few compare with the challenge accepted by chemical engineer Marcelo Kós and his inspection team in Syria. Destroying an arsenal of chemical weapons and moving lethal toxins through a country engulfed in civil war – what could possibly go wrong? “It’s been very stressful,” Kós tells writer Tom Grose in our Up Close feature. But if his agency, the Organization for the Prohibition of Chemical Weapons, is successful, it will have crossed a singular horror off the long list of present Middle East dangers.

Elsewhere in the February Prism, you’ll enjoy Mary Lord’s eye-opening piece on the many ways engineering educators stimulate imagination in their students. Yes, Virginia, creativity can be taught.

Flip this issue over and explore what’s on tap – literally – in Indianapolis, home to the Indy 500, numerous craft breweries, and the 2014 ASEE Conference and Exposition. We hope to see you there.

**MARK MATTHEWS**

m.matthews@asee.org
Depending on your source, the 12-year American-led nation-building experiment in Afghanistan is at best a fragile work in progress and at worst a bloody, costly failure. But an attractive beige and white edifice in the ancient northwestern city of Herat offers a hint that this troubled, underdeveloped land may yet prosper after 35 years of internal strife and outside intervention. It’s the new engineering school at Herat University, a rebuilt 74-acre oasis of relative tranquillity in a region still plagued by insurgent violence. Inside modern labs and classrooms built around a soaring, skylit atrium, 900 students are enrolled in civil engineering, architectural engineering, and mechatronics courses revamped and streamlined by University of Hartford professors, who also provided master’s-level training to many of the school’s 20 engineering faculty.

The Hartford-Herat collaboration is an important engineering component of efforts by universities in the United States, Asia, and Europe – with millions of dollars from national aid agencies and the World Bank – to expand and modernize higher education in Afghanistan. Starting with a 2006 partnership among Nangarhar University, San Diego State, and Rotary International, the World Bank’s effort reached 12 universities by 2010.
Overall, strides made in Afghan higher education have been considerable, given that two-thirds of the nation’s population is illiterate and girls were barred from school under the Taliban. Since 2001, when U.S. forces invaded following the September 11 attacks, student enrollment has multiplied 12-fold, from 8,000 to 100,000. Girls’ postsecondary enrollment has gone from zero to some 19,000; women now make up 16 percent of total faculty. And more than 65 private institutions of higher education have been licensed by the Ministry of Education.

Engineering, essential to development and to human well-being in so many ways, from roads and electricity to water and sanitation, is one of the leading pursuits, along with English, computer science, and business.

Some 400 miles east of Herat, Kabul University’s engineering program — the nation’s first — is being restored and sustained with help from Japan’s Nagoya Institute of Technology, the Tokyo University of Agriculture and Technology, the Japanese government, and other donors. Ten of the school’s engineering faculty are studying for graduate or postgraduate degrees at the two Japanese universities. Other Afghan universities that have seen significant investment in engineering programs are Nangarhar, Balkh, and Kabul Polytechnic.

Herat’s revival owes much to the persistence of a Hartford professor of civil and environmental engineering, M. Saleh Keshawarz, who has been active in efforts to rebuild the country in his role as a relief agency, Coordination of Humanitarian Assistance, with funding from the nation’s interim government, a local relief agency, and other donors. Ten of the school’s engineering faculty are studying for graduate or postgraduate degrees at the two Japanese universities. Other Afghan universities that have seen significant investment in engineering programs are Nangarhar, Balkh, and Kabul Polytechnic.

Keshawarz, 60, a 1978 graduate of Kabul University who has been active in the country’s reconstruction, to help to fix the program, Keshawarz reworked Herat’s five-year degree into a four-year one, in part by stripping away a requirement for six months of on-the-job training. Herat offers three majors: civil engineering, architectural engineering, and mechatronics. This last was Alnajjar’s idea. While there was a need to graduate both mechanical and electrical engineers, Herat wasn’t ready to support two new programs. Mechatronics combines the main aspects of both majors into one, Alnajjar explains. “Both the ministry and the university liked that it saved lots of money,” Edna B. Naseri is head of the mechatronics department, which now has 35 students, including seven women. The first of them, in 2004, will graduate this spring. Naseri is optimistic that his department will grow. “I think we will have more students when our graduates go into the market and get jobs,” he says.

The Hartford team also realized that since most of the engineering faculty at Herat had only bachelor’s degrees, there was a big need for them to obtain master’s degrees. Distance learning was not an option because there were no Internet connections back then. With the help of Beth Richards, a rhetoric and writing instructor who also constructed English writing courses for Hartford engineering students, the academics put together a SHEP proposal aimed at covering the costs of retraining Herat’s faculty.

In the meantime, Washington State University obtained a large USAID grant to help support higher education in general in Afghanistan. Keshawarz successfully approached Washington State for a $220,000 subcontract — awarded in February 2007 — to bring two Herat engineering teachers to Hartford for their master’s. In January 2008, the World Bank gave a $1.3 million, three-year SHEP contract to Hartford. That was enough to bring 17 more teachers, including three women, to Hartford in three tranches to earn M.A.’s. (One of them, however, ended up going to the Asian Institute of Technology in Bangkok because he couldn’t get a U.S. visa.)

By all accounts, the Herat teachers — who each spent 18 months to two years in America — excelled at Hartford. “Because they had been teaching, they were more mature, more prepared than your usual graduate student,” Alnajjar says.

Naseri, 31, who spent two years at Hartford, says he enjoyed the courses and the high quality of teaching. He had a great and enjoyable time in Hartford, and I found the professors, students, and all my friends . . . kind and friendly.”

Female students had a harder time adjusting to life in America, Richards says. Because their culture forbids men and women from mingling in public, they couldn’t bring themselves to socialize with the male students. They also initially suffered from bad bouts of homesickness because, as unmarried women, they were very bound to their parents. Yet the women persevered. “I was astounded at how well they did,” Richards says. “Despite the homesickness and the difficulty of the curriculum.” Homaira Fayez, 26, who is now Herat’s architectural engineering department head, admits that her first semester at Hartford was difficult, but after she got used to life there, everything was “easy and joyful for me,” she says.

“Everyone at the university was nice, especially my professors.” The instructors’ added training was important to their school’s rebirth, says Herat engineering dean Mohammad Naser Moain: “It gave them an ability to teach our students at a higher level.”

Richards made two trips to Herat in 2008 to assess the state of the engineering school’s English-language programs. Engineering courses are taught in both English and Dari, so students need strong English skills. The faculty’s “English skills were quite good,” she recalls, but their students’ abilities “varied wildly.” Some had had seven years of English lessons and spoke and wrote fluidly; others could do little more than recite the alphabet. She had to quickly develop methods and materials to help the faculty deal with such a wide skill gap. Richards also got Herat’s English professors to help develop, refine, and expand the materials she had cobbled together.

Today, Herat’s engineering college is brimming with modern lab and computer equipment, and has video-conferencing capability. Once the Internet connection is more robust, it will have distance-learning facilities. Dean Moain says there are plans to expand the college beyond the current...
three disciplines, and he wants to increase the enrollment of women. But, he admits, female graduates face a tougher job market. “Because of the difficult security situation, they cannot work outside the cities, and in the cities the job markets are fuller,” he says. One reason that 35 percent of the architectural engineering students are women is that the discipline’s geared toward urban development. Another hope for big step to establish a master’s-level graduate program at the school.

Reclaiming stature

Kabul University was, in its 1970s heyday, the destination of choice for aspiring engineers from throughout Afghanistan. It drew elite students as well from neighboring India, Pakistan, Iran, and other corners of Central Asia. But a U—Japan connection began at about that time with an amateur Japanese wrestler, Kenshiro Matsumi, who briefly taught there; he later went into Japanese politics and became an early supporter of Afghan causes. But a 1978 revolution, followed by the Soviet invasion, civil war, and Taliban rule, left the campus in such ruin that in 2002, students rioted over food and power shortages. Now faculty say they are on track to reclaim the school’s position at the apex of engineering education in the region. “I am very optimistic,” says Abdul Hamid Layan, dean of engineering. “I think 2014 might be one of the better years for us.” Critical to this rebound is Japan, second only to the United States as an Afghan donor. Constitutionally barred from sending its military into combat roles abroad, Japan has focused on nonmilitary and humanitarian programs like election monitoring, infrastructure building, and especially education. In the wake of the Taliban rule, Kabul University was, in its 1970s heyday, the destination of choice for aspiring engineers from throughout Afghanistan. It drew elite students as well from neighboring India, Pakistan, Iran, and other corners of Central Asia.

One of KU’s architecture students in Nagoya is Sofia Sahab, who came to Japan two years ago. “The facilities in KU are very good these days,” she says. “But for girls, it’s not good to be at the university after dark.” In low-crime Japan, “I can study all day, and I’m sometimes in the lab overnight. There’s no time limit.” Fatema Ramin, 27, a database officer with the Afghan Ministry of Energy and Water who has just started a master’s program in civil engineering at Tokai University, is researching Japan’s extensive experience in quake-proof design to publish a new set of codes. These would be an Afghan version of ASHTO (American Association of State Highway and Transportation Officials) standards for infrastructure design — customized to her native country, part of which also sits on a geologically active zone. Fellow student Najibullah, a mining engineer who said he had dreamed of visiting Japan since childhood, is studying the properties of a sedimentary soft rock called diatomaceous mudstone. “We use it in many things, like herbicide and fungicide,” he explained. “The substance also signals the presence of oil and gas.”

If Afghanistan’s future political stability is a question mark, the rebuilding effort seems sure to provide a stable job market for engineers. “Our graduates are very busy,” says Herat dean Moain. His counterpart in Kabul, Layan, says engineering students are wooed by employers well before graduation. “Presently, there is a big need for electrical engineers,” to plan utility development and run IT systems, he says. Accordingly, engineering is one of the country’s few high-paying professions. Salaries range from $800 to $5,000 a month — jaw-dropping amounts of cash in a country where average per capita income is $570 a year and where 35 percent are unemployed. Unsurprisingly, Keshawarz says, “it’s very competitive to get into the engineering schools.” Kabul’s engineering school, for example, attracts more than 15,000 applicants a year but accepts only a few hundred.

Japanese universities, under the two-year-old Promotion and Enhancement of the Afghan Capacity for Effective Development (PEACE) program. Japan aims after five years to have subsidized master’s and Ph.D. degrees for a total of 500 Afghan civil servants and university faculty, primarily in engineering and agriculture.

Education is the most important thing — not just building something,” says Shun-ichi Nakamura, chair of Tokai University’s graduate school of engineering. For his part, Nakamura welcomes the Afghans — who come with the sense of mission of people rebuilding their country from scratch — to his otherwise routine classes. “When there are only Japanese students, they are quiet, just listening, writing what’s on the blackboard. But the Afghans ask me lots of questions. So it’s very active and amusing for me.”

Khal Mohammad Ahmadzai, who leads the Afghan Student Association in Tokyo, says, “The most important thing we want to bring back is practical experience which is applicable in Afghan society.” Changes that engineering can bring to a country are readily obvious in Afghanistan. “Compared to our neighboring countries, in the last decades our country has developed a lot in terms of education, telecommunications, infrastructure, and mining sites,” says Najibullah, an Afghan student at Tokai University. “There is no 3G [network] in surrounding countries — but we have it.”

A decade ago at KU, advanced degree holders were practically nonexistent; now nearly all of its teaching staff hold at least a master’s degree. KU plans to add a fifth department, energy engineering, to its existing architecture, civil, electrical-electronics, and mechanical engineering programs. Nagoya is re-educating KU faculty in civil engineering, electrical engineering, and information technology. The tasks include Ahmad Ramin, who just started a short language immersion program in preparation for a master’s/Ph.D. program in urban planning. Language is an issue, he says: “I don’t think I’ll be able to catch more than 30 to 40 percent of the lectures” in Japanese. English-language lectures remain the exception at Nagoya University, where he had dreamed of visiting Japan since childhood, is studying the properties of a sedimentary soft rock called diatomaceous mudstone. “We use it in many things, like herbicide and fungicide,” he explained. “The substance also signals the presence of oil and gas.”