

BACON'S REBELLION

The Op/Ed Page for Virginia's New Economy

Cultivating Creativity

The da Vinci Center at Virginia Commonwealth University is elevating product development to an interdisciplinary art. It may well be the future of American innovation.

By James A. Bacon

Seule Kabir grew up in what she describes as an "upper middle-class family" in Dhaka, the capital city of Bangladesh. Her brother moved to Blacksburg to study engineering at Virginia Tech, and she followed him to the Old Dominion. Today she is a graduate student in the Virginia Commonwealth University School of Engineering, focusing her studies on the design of medical equipment.

Despite prospects for a lucrative career designing high-tech medical equipment, Kabir is deeply moved by the poverty of her fellow Bangladeshis. Life expectancies in her home country are among the lowest in the world, and most people lack the means to pay for basic health care, much less world-class medical technology.

Thanks to the da Vinci Center for Innovation in Product Design and Development, an interdisciplinary program that combines engineering, business and design to stimulate creativity in product development, Kabir has an opportunity to make a difference to millions of poor people in Bangladesh and the developing world. In a project dubbed "Operation Simple," she and two other VCU students conceptualized an approach for manufacturing and shipping extremely low-cost surgical beds to under-

funded hospitals and clinics in Third World countries. The project has been deemed promising enough to warrant continued investment of da Vinci Center resources to develop the idea more fully in the hope that it can one day be commercialized.

A standard operating table in the United States costs \$40,000. An operating table in Bangladesh can run between \$14,000 and \$30,000 depending on whether the hospital can spring for a Western model or has to settle for a cheaper Chinese version, about \$5,000. Even at that price, most hospitals in the South Asian country can afford only one, which limits the productivity of another scarce commodity in rural clinics: trained surgeons.

The audacious goal of the three-person da Vinci Center team -- which also included business grad student Hitesh Patel and interior designer Jennifer Farris -- was to bring down the price of manufacturing and shipping an operating table down to \$500. The only way they could possibly

succeed was to approach the problem in a radically different way. The solution to a seemingly intractable challenge required creative thinking.

The premise behind the da Vinci Center, explains Russell Jamison, dean of the Engineering School, is that the most effective way to develop new products is to bring three key disciplines -- engineering, design and business -- to bear at the same time. Traditionally, the work has been compartmentalized, with each group kicking the job over the wall to the next. The product innovation cycle takes longer that way, and it's more prone to suffer from tunnel-vision thinking that inhibits big breakthroughs. By contrast, the da Vinci Center unites the disciplines of engineering, business and design from the inception of a project.

Disruptive innovation tends to come at "the intersection," to borrow a phrase from Frans Johansson, author of "The Medici Effect." When people with very different perspectives come together -- whether those perspectives are born of deeply bedded cultural assumptions or methods ingrained by academic disciplines -- they are far more likely to generate outside-the-box ideas. That insight is an or-



da Vinci team members of "Operation Simple" (from left): Hitesh Patel, Seule Kabir and Jennifer Farris.

ganizing principle at VCU, as manifested in the decision to build the new business school and engineering school buildings next door to one another and to have the faculties collaborate in developing a partially shared curriculum. The da Vinci Center takes that thinking another step forward.



Jamison

Before coming to VCU two years ago, Jamison ran a multi-disciplinary program at the University of Illinois at Urbana-Champagne that combined business and engineering. One of the exciting aspects of moving to Richmond was the opportunity to launch the interdisciplinary da Vinci Center, which combined not two but three disciplines, adding design to the mix.

The interdisciplinary ideal was the leitmotif behind locating the new business school and engineering schools side by side on the newly constructed Monroe campus. But simply placing the two schools together would not create collaboration, says Jamison. "Physical adjacency isn't enough. The schools need intellectual adjacency." Developing a shared curriculum was one way to create that adjacency. Another was creating interdisciplinary projects for students to work on. That's where the da Vinci Center came in.

Located in the engineering school, the Center runs on a "shoestring," Jamison says, supported financially and programmatically by all three schools and seven corporate sponsors in the Richmond region. In an evolution beyond the business-engineering program at the University of Illinois, da Vinci incorporates the strengths of VCU's

highly regarded school of the arts. As anyone familiar with iPod or iPhone knows, design is a critical component of successful product development, not an element to be tacked onto the end of the process.

"Operation Simple" was atypical in that it was sponsored by the da Vinci Center itself rather than a corporate sponsor. While it's possible that a corporation might adopt a solution conceived by VCU's students, the real value proposition is recruiting, Jamison says. The sponsorships run \$30,000 a year. For that investment, Philip Morris USA, MeadWestvaco, Alpha Laval, Hamilton Beach and the Commonwealth of Virginia, hope to develop a stream of students who have mastered not only their academic disciplines but the art of product development. Hiring VCU students with the kind of project experience that da Vinci provides saves tens of thousands of dollars in on-the-job training.

The program still needs tweaking, though, Jamison concedes. "We're doing everything for the first time," and there's still a lot to figure out. The Center hasn't even hired a full-time director yet. Now that the initiative has run several projects back to back, it's time to re-think and re-calibrate, Jamison says.

Don't take the pause as a sign of diminished enthusiasm, however. "Operation Simple" demonstrates the kind of creativity that the da Vinci Center can elicit from students, and it's a showcase for VCU achievements.

Kabir's team made two conceptual breakthroughs that may make it possible to achieve the outlandish goal of cutting production and distribution expenses by a factor of 10. The



first "da Vinci moment" was the discovery of a strategem employed in the furniture industry: flat pack manufacturing, in which key components are laser-cut from a sheet of material. Flat packing allows the sheets to be stacked and shipped very efficiently; the components can be easily removed and assembled on site.

The second da Vinci moment came from the discovery that the key mechanical components of the operating table -- hydraulic lifts, gimbals and pawl & ratchet hinges -- are manufactured inexpensively en masse for consumer products such as auto repair kits and lawn chairs. If those components could be adapted to the operating table, the cost of materials could be reduced to an astounding \$60!

Phase one, which delineates the concept, is complete. Phase Two will produce drawings that show precisely, among other things, how lawn chair rackets can be transformed into articulating joints for an adjustable operating table and how a hydraulic car jack can be adapted into a hand-powered lifting mechanism.

There are many other questions

to address, says Mike Troy, a consultant for Stryker Communications, a Dallas, Tex.-based designer of operating tables, who traveled to Richmond to see the VCU team's presentation. Quality control is a critical issue if people are going to be assembling the pieces on site. "You can't have the bed collapsing with patients on it!"

Troy also questions the team's notion that manufacture of the bed can be outsourced to China. "China sounds great, but you have a lot of trouble with process and quality control." And there's also the risk of outright theft of intellectual property. Mexico might make a better manufacturing platform, he suggests.

As for Seule, she would be thrilled to see the \$500 operating table become a reality. One of her life goals is to make health care affordable for more people. "I am learning about medical equipment and bone implant design and manufacturing" in her studies, she says. "I would like to make them more efficient and inexpensive."

While it would be a tremendous coup if VCU students could build on the work of Seule and her teammates and ultimately supply inexpensive operating tables to the Third World, the success of "Operation Simple" is not contingent upon commercialization -- a formidably high bar to set. As one professor told the students after their presentation, "This is not just about the table. It's about learning how to solve problems."

-- May 19, 2008

**Read more columns
by Jim Bacon at
www.baconsrebellion.com.**