

## INNOVATION

M.I.T.'S UNDERGROUND D-LAB EXPORTS  
SIMPLE SOLUTIONS TO THE THIRD WORLD.

# Low-tech with high impact

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AMY SMITH IS NOT AN easy person to track down. Even during the school year, this inventor and instructor at the Massachusetts Institute of Technology hops over to remote African towns and Latin American villages.

When she is on campus, the best bet for finding Ms. Smith is in her basement laboratory – a cluttered workshop with a long whiteboard, exotic souvenirs, and basic tools – known as D-Lab.

Unlike most of MIT, Smith's workshop is far from cutting-edge. There are no next-gen computers, no vials of polysyllabic chemicals, no fancy equipment. The space is decidedly low-tech – and that's the point. D-Lab students pinpoint practical problems in the developing countries and then brainstorm and build solutions. Because the people they are trying to help are below the poverty line, the class's inventions must be simple, effective, and most important, inexpensive.

"What people need is usually completely different from what we imag-

ine sitting here in America," says Jodie Wu, a mechanical engineering junior, whose group went on a school-sponsored trip to Tanzania over winter break. The idea for her current project – a mobile, pedal-powered corn sheller – came from a conversation with a Tanzanian bike mechanic.

The D in D-Lab stands for three things – development, design, and dissemination – and each is the theme of a different semester-long class.

The first class travels to developing countries and identifies issues that the lab can tackle during the next term. For example, in heavily deforested countries, the students found an alternative to



PHOTOS BY JOANNE CICCARELLO – STAFF

**TINKERERS:** Howard Kellog (right) and lab partner Lisa Tacoronte devise the mechanics for a bike-powered corn sheller (left) in MIT's D-Lab.

firewood.

The design class – often filled with different kids – takes on the practical engineering. Here they planned and built a charcoal-briquette maker, a metal press that can make clean-burning fuel out of agricultural waste.

"It could be corncobs in Tibet and sugarcane waste in Haiti," says Derek Brine, a teaching assistant.

The third phase takes the students' work and deploys it across the globe.

"These classes are the ones I wish I could have taken during my time here [as a student]," says Smith, herself an MIT-trained mechanical engineer.

D-Lab forces students to set aside their high-tech training. "Though it appears like a step backward in terms of technology, you are moving forward because you learn to do more with less," says Ms. Wu.

This design process takes many rounds of revision. For instance, the briquette-maker was originally a foot-long piston. After many prototypes and field tests, the models got smaller and cheaper. The final six-centimeter-long version inspired

a mantra for the D-Lab crew: "When you have to go to a tenth of the cost, reduce the material by 90 percent." Paring down certainly helped in this case – the tool, originally \$20, is now only \$2.

Smith has built her career on this style of practical solutions. In 2004, she won a MacArthur Fellowship – often called the "genius award" – for creative uses of simple technology to solve everyday problems in developing countries. Smith's early inventions grew out of her four years in Botswana, volunteering for the Peace Corps. Her electricity-free incubator – an icebox packed with phase-change pellets – keeps samples warm for 24 hours and is an integral part of inexpensive water-testing kits.

Smith's travel continues, but often with teams of students in tow. She has developed a growing, global network of community partners. Each summer, indigenous inventors from across the world come to a design summit hosted by D-Lab to exchange know-how and ideas. Clearly, D also stands for dialogue.

Within a decade, Smith has transformed this cramped basement into a wellspring of ingenious, low-cost inventions. In a sense, says engineering junior Kendra Johnson, Smith's best invention yet is the D-Lab itself.



**TODAY'S LESSON:** Amy Smith designed D-Lab to teach MIT students how to think low-tech.

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