

# Farm hand

by Zachary Jason

## LESSONS IN BOTANY, BUSINESS, AND CONSTRUCTION AT THE LYNCH SCHOOL



*Barnett, in the greenhouse adjacent to Connolly House. Photograph: Caitlin Cunningham*

In 2013, G. Michael Barnett called the Drug Enforcement Agency and local police with a proposition: He would use confiscated marijuana-growing equipment to improve Boston public high school students' STEM skills (in science, technology, engineering, and mathematics) by teaching the youths hydroponics—soilless farming. After confirming that he was indeed an associate professor of science education and technology in the Lynch School of Education (LSOE) and that his hydroponics program was already two years along, the agencies provided Barnett with lights, nutrient solutions, and other supplies.

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Barnett's lessons started in 2011 with eight teenagers as part of College Bound, LSOE's mentorship and academic enrichment program for underprivileged students. Last July, the National Science Foundation (NSF) awarded him \$1.2 million to expand his project

to thousands of urban high school students through the training of teachers in area schools.

Of College Bound, Barnett says, "We look for students who might otherwise slide through high school without knowing they can excel." He is in his Champion Hall office, where columns of lettuce and bok choy grow under blue and red LED lighting on his windowsill. Since 2011, Barnett and LSOE director of urban outreach initiatives Catherine Wong have admitted some 120 C-level students to the program's hydroponics track, virtually all from households without a college-educated parent. Throughout the academic year, the students spend every other Saturday at the 450-square-foot nursery adjacent to Connolly House on Upper Campus. They are joined by several undergraduates, Lynch School Ph.D. students, local high school science teachers, and Barnett.

New students are banded into small teams, which receive \$250 to purchase all the components of a hydroponic garden. ("Limits—that's where creativity happens," Barnett says.) They research designs online, shop at Home Depot, construct the systems (usually with PVC piping), and plant crops of their choosing, including dill, eggplant, Thai basil, and kale. Many seedlings die.

"We want our kids to fail a little," Barnett says. "Many of the students have been immersed in a system where the expectation is that they're not going to do well. We try to shift that expectation, where failure is a natural part of the process of exploring something." Every high school student who has graduated from the project is now in college; more than 65 percent have entered a STEM field.

With the 2013 grant, Barnett and his team—Wong, LSOE professor of counseling psychology David Blustein, and Elizabeth Bagnani, a lecturer in accounting at the Carroll School of Management—are developing hydroponics programs at 20 Boston public schools. Solar panels and windmills are included in the grant, as are supplies for aquaponics (to convert fish waste into plant nutrients).

The students, Barnett says, will “tackle many problems for the first time. What angles do we need to drill for the water to flow right? How can we use LED lighting cost-effectively? What does the power distribution curve of the solar panel look like over time? . . . It’s a great way of getting students to ask questions that they can answer.” As their crops mature, current students meet with farmers in the region to learn pricing strategies, advertise on Facebook, and run a produce stand at a farmers market in Boston.

Basic STEM education was not Barnett’s first calling. In 1999, he was a fourth-year Ph.D. student in astrophysics at Indiana University, when he was asked to teach local fifth graders about the moon. He enjoyed the challenge of presenting the science without “reducing the content,” and switched to a program in instructional systems technology with a concentration in science education. He joined the Lynch School in 2003.

Starting in March, Barnett will help College Bound students farm a 5,000-square-foot greenhouse in suburban Weston. The goal is to grow enough produce to provide fruits and vegetables to 500 low-income households.

*Read more by Zachary Jason*

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