PROFILE: DIOLA BAGAYOKO

Failure Is Not an Option for These Minority Students

Southern University physicist Diola Bagayoko uses tough love to expand and diversify the pool of scientific talent

Sharon Daniels was a physics major at Southern University (SUBR) in her hometown of Baton Rouge, Louisiana, when she got married, had a baby, and dropped out of college. When the marriage went sour, she took a job in Houston, Texas. But 2 years later she was back in Baton Rouge, where she learned that her former professor, Diola Bagayoko, wanted to see her.

When Daniels showed up at his office, Bagayoko gave her a scolding. "If you're thinking you'll take care of your kid right now and finish your degree later, you are putting yourself in quicksand," Bagayoko told her. He asked Daniels to think about her high school friends, few of whom were doing well. Then he turned on the charm. "You have the talent and the intellect needed to do this," he said. Her 3.0-plus grade point average made her a good candidate for financial aid, he added, and her coursework was recent enough that it would still count toward her degree.

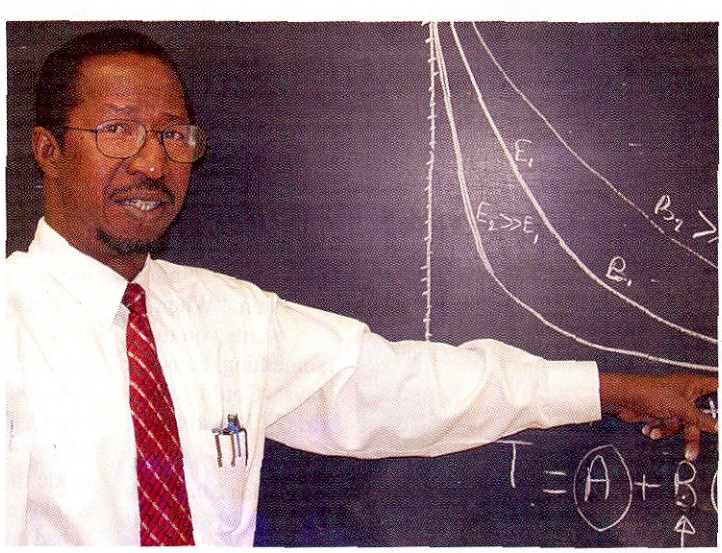
The sales pitch worked, and in 1992 Daniels graduated and began a career as a software programmer and technical writer. For 2 decades, Bagayoko has helped African-American students like Daniels earn science and engineering degrees from SUBR, a historically black institution where a significant percentage of students are the first in their family to attend college. And he continues to mentor them through graduate programs around the country and into scientific careers. His efforts have earned him two presidential mentoring awards and persuaded his university, a predominantly undergraduate institution, to make mentoring a factor in its tenure and promotion process.

Bagayoko, who grew up in Mali and came to the United States for graduate school, has done much of this work through the Timbuktu Academy, a program he started in 1990 with funding from the National Science Foundation (NSF) and the Defense Department's Office of Naval Research. Named after the West African university that stood on the banks of the Niger River from the 12th to the 16th centuries, the academy conducts intensive summer camps for middle and high school students to prepare them for science and engineering majors in college. It also shepherds a handful of students through undergraduate science and engineering programs at SUBR by providing them with academic advice, extra tutoring, and a solid research experience outside the classroom. Although the program is open to any student, nearly all of the applicants are from racial and ethnic groups traditionally underrepresented in science, and the majority are African-American.

Bagayoko, 57, is proud of his record. Of the 600 high school students who have attended the academy's summer programs, 80% have gone on to major in STEM (science, technology, engineering, and mathematics) disciplines at colleges around the country. Of the 150 students who have earned their bachelor's degree from SUBR with support from the academy, more than 60% have pursued advanced degrees in scientific disciplines.

Although comparisons are difficult because of the paucity of good longitudinal data, the program is one of the most effective pipelines for channeling African Americans into science and engineering careers, says Anthony Junior, manager of the Department of Navy's Historically Black Colleges and Universities program, which has funded the academy at $600,000 a year since 1993. Bagayoko's own department has reaped the rewards: On a campus that loses half of its freshman class, 90% of first-year students who choose to major in physics—nearly all of them academy scholars—earn a degree in 4 years.

Since 1995, Bagayoko has replicated the academy's mentoring model across 10 other Louisiana institutions with a grant from NSF's Louis Stokes Alliance for Minority Participation (LSAMP) program. Funding officials and colleagues familiar with Bagayoko's work say he succeeds by using time-tested ingredients for good mentoring—building students' self-confidence, involving them in research, and monitoring



Law of success. Diola Bagayoko says that learning lessons to mastery is a foolproof road to success for students.

CREDITS (TOP TO BOTTOM): MONIKA WRIGHT; Y. BHATTACHARJEE/SCIENCE

them closely—and adding in his unique blend of kindness and charisma. "Most of these practices are laid out in the literature," says A. James Hicks, NSF's program director for LSAMP. "But it takes special individuals like Diola Bagayoko to implement them."

Paying forward

Bagayoko's ever-present suit and tie belie his youthful exuberance. He uses an expressive face and a deep, distinctive voice to great effect in the classroom. There's a strong hint of French colonial Africa in his speech, which he salts with vigorous gestures. Peering over his glasses to gauge his listener's reaction, he laughs loudly and slaps his knee after making a point. Students stream in and out of his office for help with assignments, which he crams into a punishing schedule that stretches into the evening and includes weekends.

Bagayoko traces the origins of his passion to help the underserved to his teachers in Bamako, Mali's capital. One helped him skirt an age limit for entering secondary school, and another expanded his horizons with a collection of books by Victor Hugo. "The only way I could thank him was by reading them backward and forward. My capacity in French ballooned as a result," he says.

After getting a bachelor's degree in physics and chemistry in Mali, Bagayoko came to the United States to study solid state physics at Lehigh University in Bethlehem, Pennsylvania. Moving to Louisiana State University in Baton Rouge for his Ph.D., Bagayoko recalls how his dissertation adviser arranged with the school chancellor to keep the university's computing center open during holidays so that Bagayoko could have uninterrupted access to the facility. In his first year, the adviser paid for him to attend an American Physical Society conference in Chicago, Illinois, even though he didn't have anything to present. "I vowed that I'd be back at next year's conference with a presentation of my own," he says. He kept the promise.

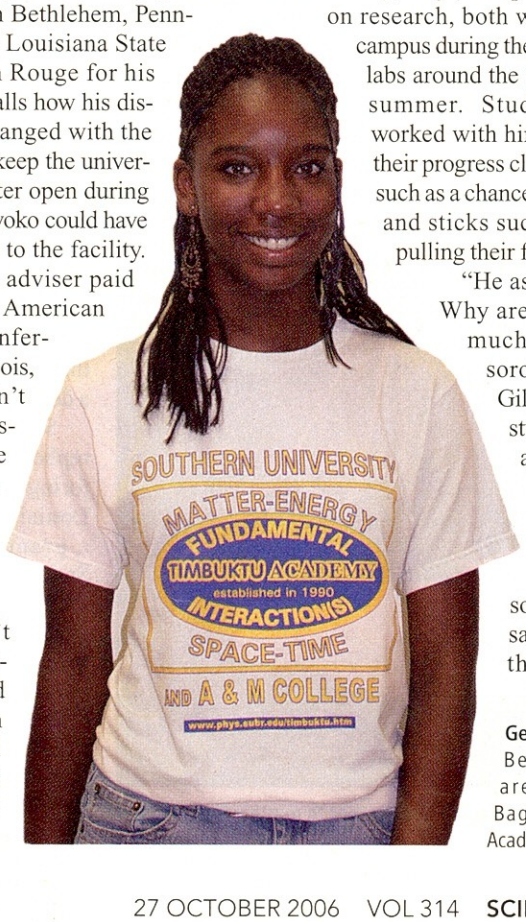
Bagayoko didn't forget those experiences when he joined the SUBR faculty in 1984. "I realized that I was the product of the good work of many people," he says. "I wanted to say thanks." At the urging of his chemist wife and fellow SUBR professor, Ella Kelley, he created a structured mentoring program based on the simple idea that an individual becomes more proficient at a task with practice.

The concept is embodied in a 1920s theory called the power law of human performance. Bagayoko uses it as a motivational tool in combination with the idea that most knowledge—particularly scientific knowledge—is acquired cumulatively. "The typical African-American student enters college with elements in his background that are unfavorable to learning—bad grammar, poor vocabulary, a poor grounding in basic math—none of which is his fault," he says. But if a professor is willing to fill those holes, "success is guaranteed."

Over the years, Bagayoko has wielded the power law like a machete to eradicate the self-doubt among many African-American students toward science. "I tell them that irrespective of what they may have heard before, there's a law out there that not only says they can do well in science but also describes how." The program also helps high school students improve their grammar and vocabulary skills, increasing their chances of attending a good college.

In mentoring undergraduates supported by the academy, Bagayoko puts great emphasis on research, both with professors on campus during the school year and in labs around the country during the summer. Students who have worked with him say he monitors their progress closely, using carrots such as a chance for extra coaching and sticks such as the threat of pulling their financial aid.

"He asks questions like: Why are you spending so much time with your sorority?" says Zelda Gills, one of his earlier students who is now a scientist at the U.S. Nuclear Regulatory Commission. "When he wants you to do something, he never says: 'Could you do this?' It's always: 'You will do this.' He can be very stern, but you know that it's for your own good."



Generation 2.0. Zephra Bell and her mother are both graduates of Bagayoko's Timbuktu Academy.

CREDIT: D. BAGAYOKO

Better things to do

The 34-year-old building where SUBR's physics department is located bears a tired look. Several lights in the hallways and bathrooms are burnt out, and some of the water fountains don't work. But neither the threadbare conditions nor the oppressive August heat stop Bagayoko from delivering his message to the incoming class of academy and LSAMP scholars.

His assistant distributes a handout describing the power law, his gospel. "One thing it tells you is that if you are studying a lesson and cannot understand it, it probably means there is some critical background material that you may not have," he booms. "Go see a faculty member to find out what it is."

The 1-hour lecture includes suggestions on how to behave outside the classroom, including avoiding fights. "I won't fight, not because I can't, but because I have sound judgment," he counsels them. "When I get into a situation like that, I say to myself, 'This person probably doesn't manipulate Maxwell's equations as well as I do. I have better things to do, like developing new theories or building new devices.'"

Bagayoko then rattles off the names of former academy members who, presumably, took his advice to heart. He mentions Anthony Pullen, an SUBR graduate now studying theoretical astrophysics at the California Institute of Technology in Pasadena. "A few years ago, these people were sitting in this auditorium, just like you," he says. "They delivered for themselves and their families. You can, too."

The students say they welcome the guidance. "Some of us here need to be told and retold that academic achievement is valuable," says Jonathan Dooley, a freshman who grew up in an impoverished Los Angeles, California, neighborhood. Dooley's African-American father left when he was very young, and his Hispanic mother told him in kindergarten that he would end up homeless if he didn't go to college. "Knowing that there are blacks and Hispanics out there with Ph.D.s in science means a lot to me," says Dooley.

Bagayoko's impact can extend far beyond a student's professional training. Two years ago Daniels, who has stayed in touch with Bagayoko, asked him to consider her daughter, Zephra Bell, whom she had home-schooled, for admission into the academy. He did, and Zephra made the cut: She is now 2 years away from earning a bachelor's degree in physics at SUBR. "I had no ideas about her going anywhere else," Daniels says. "She's in good hands."

–YUDHIJIT BHATTACHARJEE