UCSD mathematics professor wins Presidential Prize, funds will 'drum up' support for inner-city teaching

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UCSD MATHEMATICS PROFESSOR WINS PRESIDENTIAL PRIZE; FUNDS WILL 'DRUM UP' SUPPORT FOR INNER-CITY TEACHING

With twin goals of furthering her research in mathematics and pushing out the frontiers of education for inner-city children, Katherine Okikiolu of the University of California, San Diego, has received the Presidential Early Career Award for Scientists and Engineers (PECASE).

Okikiolu, a 32-year-old assistant professor in UCSD's mathematics department, will receive $500,000 over five years under the PECASE program. She was honored Nov. 3 in a White House ceremony.

The Presidential Award is the highest honor the U.S. government bestows upon scientists and engineers early in their careers. The scholars are recognized for "their research contributions, their promise and for their commitment to broader societal goals."

"These gifted young professionals exemplify the best of our science and technology community and will help set the scientific pace for the U.S. and the world in the years ahead," said President Clinton, in a White House statement announcing the 60 winners of the second annual PECASE.

Okikiolu, who joined the UCSD faculty in 1995, has been researching the "spectral determinant" of a drum, which is essentially the number obtained by multiplying all the individual sound pitches made from a drum note. This number helps describe the shape of the drum. Although this area is largely understood in two-dimensional drums, Okikiolu is investigating the more challenging spectral determinant problem for three-dimensional drums. In a separate project, Okikiolu is collaborating with Victor Guillemin, a mathematics professor at the Massachusetts Institute of Technology (MIT), to study linear distortions of drum notes and other types of signals. Research in this area may have implications for problems in quantum physics.

For her work aiding inner-city children, Okikiolu plans to make a series of videos depicting model teaching lessons that emphasize real-world perspectives. Designing model dwellings and bridges, constructing useful articles such as clothing and shelves, mending bicycles and painting pictures are "hands-on" activities that Okikiolu believes can acquaint children with mathematical concepts and help them grasp the significance of numbers and measurements.

"I think in order to appreciate mathematics, it helps to have a real-life situation upon which to draw," said Okikiolu, who was born in Brighton, England, and received a doctoral degree in mathematics from UCLA. "It's my impression that inner-city children have less exposure to these basic creative processes than other children."

A second aspect to her model is founded in music. Drawing from experiences at schools in London and outside Trenton, N.J., Okikiolu hopes to use music as a way to build enthusiasm within students and simultaneously educate them beyond traditional textbook and chalkboard methods.

"One can get a lot of math from music and from rhythm, harmony and sound itself," says Okikiolu. "The idea of a fraction is already within drumming because if you have four regularly spaced drum beats superimposed over three regularly spaced beats, then the arithmetic is already there.

"I'm particularly disturbed by what I consider to be inspiration being taken out of schools, projects like music, arts and crafts. We see these disappearing, so I'm trying to do a little bit to reverse that trend and integrate these activities more productively with traditional math and science lessons."

Okikiolu plans to create the video model lessons at schools in San Diego or Los Angeles. In addition to research and curriculum development, Okikiolu teaches graduate and undergraduate math courses at UCSD.

Ten governmental agencies annually nominate promising scientists and engineers for the PECASE awards. Okikiolu was one of 20 National Science Foundation (NSF)-supported researchers selected from among those working under the NSF's Faculty Early Career Development program.

Other federal agencies supporting the PECASE program are the Departments of Agriculture, Commerce, Defense, Energy, Health and Human Services, Transportation and Veterans Affairs; the Environmental Protection Agency and the National Aeronautics and Space Administration.

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