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## Strength in Numbers: Empowering others

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# Empowering others

## JUST IMAGINE! IMAGINE WHAT AN

undergraduate can achieve! Imagine what an undergraduate can become!

Just imagine! Amanda, a biology major, using statistics and databases, analyzed the relationship between diet and birth defects during a summer internship at a genetics center and presented her research at a national conference. After a year-long fellowship at the National Institutes of Health, she pursued doctoral studies of genetic associations with obesity.

Just imagine! David, a double major in computer science and mathematics, helped develop software for the science operations interface of Mars Rovers at the Jet Propulsion Laboratory in California. In part because of this research, he was awarded a National Science Foundation Fellowship to study computer graphics in a doctoral program at Columbia University.

Just imagine! Diana, a double major in computer science and Spanish, was an intern at Lawrence Livermore and Los Alamos National Laboratories. After completing a master's degree, she returned to Los Alamos to work in the International Space and Response Division — and to run her own Web design company.

Just imagine! Lena, a biology major, interned with the Cardiac Mechanics Research Group at the University of California-San Diego. Her work on optimization of large-scale computations in electrophysiology helped to change the direction of the group's research. She is now attending medical school.

Just imagine! Frank, a double major in physics and mathematics, completed two internships at the Jet Propulsion Laboratory (JPL). He developed software to access images of specific moving objects from JPL's extensive observational archive. The breakthrough resulted in the naming of an asteroid in his honor. Since completing his Ph.D., Frank

has done research at the Johns Hopkins University Applied Physics Laboratory.

These stories of undergraduates I have taught and mentored bring a rush of memories: encouraging, reassuring and sometimes prodding those who do not know their own capabilities; contacting scientists to ask that they mentor the students; sharing their joy at obtaining positions; helping them gain funding; arranging presentations on their research; encouraging them to network with others; celebrating their acceptances for post-graduate opportunities; and hearing stories of exciting work that would not have been possible without their internships and their education.

Small liberal arts colleges such as Furman and my institution, Wofford College, foster this kind of mentoring between faculty and students. The education that Wofford has provided these students is in a revolutionary new academic discipline, computational science, which is at the intersection of computer science, mathematics and the traditional sciences.

Much important scientific research today involves computation as well as theory and experiment. Realizing this, I have had the joy of being present at the formation of one of the first undergraduate programs in this field (Wofford's Emphasis in Computational Science). I have helped others develop programs, written educational materials for such programs, and collaborated with others to advance education in this new area.

Collaboration has been most rewarding with my husband, George Shiflet, chair of the biology department at Wofford. Little did we know when we sat together in calculus class at Furman that we were forming a career path as well as a close relationship!

Sharing a passion for learning and for helping others to learn, George and I wrote the first textbook designed specifically for an introductory course in computational science and engineering.



*Introduction to Computational Science: Modeling and Simulation for the Sciences* was published in 2006 by Princeton University Press.

As partners and colleagues, we have experienced the excitement of learning new things, making connections among disciplines that have often been too isolated, helping others develop their own computational science programs and, in particular, empowering undergraduates to participate in a revolutionary new field — and imagining what they can achieve.

— ANGELA BUZZETT SHIFLET

*The author earned her doctorate from Vanderbilt University. She is the Larry H. McCalla Professor of Mathematics and Computer Science at Wofford.*