



MALGORZATA DUBIEL: Using humour, puzzles and Homer (Simpson) to make advanced mathematical concepts accessible to the rest of us

# THE 3M AWARDS: OUR BEST TEACHERS

**Part of an elite community of great university educators, these 10 professors lead the way as they challenge and inspire their students**

BY KEN MACQUEEN & MARTIN PATRIQUIN

TA Loeffler, a professor of human kinetics at Memorial University of Newfoundland—and a world-class mountaineer—knows every student has her own Everest to conquer. “Go for it! Go big!” she scrawled on one student’s tentative first assignment. “Funny,” the student later reflected, “how such simple words can be so powerful.”

Malgorzata Dubiel, a senior mathematics lecturer at Simon Fraser University, could offer an equation to explain the exponential impact of great teachers, but why not let a student put her gratitude into words: “My attitude toward mathematics has changed from one of loathing to one of fascination.”

Dubiel and Loeffler have reached the summit of their profession. They are two of 10 professors named this year to the 3M National Teaching Fellowship—an elite community of 228 of the country’s best university teachers. The award, now in its 23rd year, was established by 3M Canada in collaboration with the Society of Teaching and Learning in Higher Education. It was the idea of John Myser, then-president of 3M Canada, as a long-over-

due recognition of the inspirational power of great professors. *Maclean’s* became the media partner for the awards in 2006.

The award has contributed to a gradual shift in attitude as university administrators realize what students in overcrowded lecture halls have long known: that fostering and rewarding exceptional teachers contributes as much to an institution’s impact and reputation as the greatest research. This year’s winners—selected for the quality of their teaching, their leadership and contributions to pedagogy—were chosen from 52 carefully vetted nominations. The number and quality of submissions continue to rise, as adjudicators search for the elusive “wow factor” that exceeds even the 3M’s high criteria, says program coordinator Arshad Ahmad, a business professor at Concordia University, and a 3M fellow himself.

While a professor can impact thousands of students, the fellowship sees its task as influencing the very science of teaching. The fellows are about to publish a book on the benefits and perils of silence in teaching and learning. The next major project, likely wel-

comed by students weighed down by ponderous academic writing, is an exploration of narrative storytelling as a teaching tool.

The fellows will gather in Windsor this June for a meeting of the teaching and learning society. They’ll attend a retreat this November at the Fairmont Le Château Montebello in Quebec. “Projects are hatched,” Ahmad says of the meetings. “This award is about people getting together and creating a kind of ethos that is bigger than themselves.” Among the 2008 fellows:

**MALGORZATA DUBIEL,**  
**Department of Mathematics,**  
**Simon Fraser University**

Midway through a lecture in Math 190, her course in Mathematics for Elementary School Teachers, Dubiel invokes the thoughts of Homer to illustrate the leap between two- and three-dimensional shapes. While math is indeed an odyssey for many phobic students, she isn’t seeking wisdom from the ancient epic poet. Her Homer is Simpson, the cartoon guy from Springfield.

In a brief clip on the lecture hall screen, Homer falls into a 3-D world of spheres, cones and complex shapes. “What’s going on here, I’m so bulgy?” he says, looking at his transformation from flat to fat. The *Simpsons* segment is loaded with advanced concepts and

inside jokes. "Oh, there's so much I don't know about astrophysics," Homer laments. "I wish I'd read that book by the wheelchair guy." His plaintive reference to Stephen Hawking, the theoretical physicist, draws sympathetic laughter. Math is a frightening universe for many of these students, too. Lucky for them Dubiel is an exceptional guide.

Dubiel learned her love of math and problem-solving as a girl in her native Poland. Part of it came from a state-run school system that did not steer girls from the subject. The rest came from her father, an engineer and, really, a rocket scientist at a military technical academy. She was surprised, after coming to Canada in 1982, at the uninspired level of public-school math instruction. "Part of it is the confidence of people teaching it. If you don't think you're good at math yourself, you may not be sufficiently confident to teach it."

Many of those educational casualties end up in Dubiel's classes. Not only does she teach math to future teachers, she helped design FANx99, a mandatory remedial program populated by students who flamed out of high-school math. Passing FAN is a mandatory step to an undergrad degree at SFU. She defuses their defeatism with good humour, an engaging collection of math puzzles, examples of its history, personalities and its uses in daily life, including *The Simpsons*. By starting with an interesting problem, and working toward its solution, she believes students are more likely to see the relevance and, yes, beauty of the tools and structure that underpin the discipline.

Nicole Weber and Nicole Engel, both aiming at teaching careers, entered Dubiel's course with trepidation. Both struggled with math in high school. "She touches the students who are very frustrated," says Weber. "She actually made me love math," says Engel. "She took the time to show me the background, history and the reasoning and context I needed." They've come to realize that math is a skill to be earned, not a gift bestowed on a select few. "Math is hard but it's not impossible," says Engel. "It takes work."

**SOREL FRIEDMAN, English Studies, Université de Montréal**

Resplendent in a pink blazer, dangly earrings and a pair of USB key necklaces, Friedman instructs her class as a cheerleader might a sulky pep squad. "I would like to hear a lot of noise," she says. "It's very quiet, and I don't like that. I want it done fast, and with a lot of noise."

If calling for more chaos sounds like a strange command, consider the place, the class and the subject. Friedman teaches English as a second language at Université de Montréal, an institute that is decidedly more Molière than Shakespeare, and where the

**SOREL FRIEDMAN: Banishing shyness from the classroom**



**GREAT TEACHERS CAN CONTRIBUTE AS MUCH TO AN INSTITUTION'S IMPACT AS GREAT RESEARCHERS**

French language is an enduring point of pride. The students, predominantly francophone, hail from Quebec, France, Africa and elsewhere. "It's the first time I've spoken English in an English class," says 23-year-old communications student Marie-Pier Bourdreault. "I was shy, but today if you don't speak English you're in big trouble."

There are few places at the university outside Friedman's classroom where her students can freely converse in English. Her courses are three hours of exposure therapy, where students are encouraged to drop

their inhibitions and converse as loudly and unabashedly as possible, as long as it is in English. It's a style developed over 23 years at the university, and which has garnered accolades from countless students. "I learned more in Ms. Friedman's class over nine weeks than I did in all my time at CEGEP," says 23-year-old communications major Michele Demers.

Friedman's teaching style is a jumble of new and old technology; there are Web-based exercises and frequent in-class trips to CBC and NPR podcast Web pages, as well as to Friedman's own online grammar and writing resource page dubbed "MyEspace." At the same time, her students hand in written assignments on looseleaf, which are corrected with Friedman's exacting red pen.

Lectures are infrequent. As the term goes on students are forced to speak in ever larger groups—to confront their squeamishness in a comfortable setting. "The students at Université de Montréal do not live in English," Friedman explains. "For them English is a foreign language, not a second language in the sense that they might have to use it at the store or at the bank, because they don't."

Success is measurable by the adherence to her English-only mantra. In this tiny corner of the largest campus in the province, no one is speaking French.

**P. K. 'CHARI' RANGACHARI, Department of Medicine, McMaster University**

Throughout his distinguished academic career, Rangachari has railed against the idea of universities as "teaching shops," where marks are the sole criteria for success and where advanced education means narrow specialization rather than feasting on a banquet of interests. "I love to see a patchy transcript. I want the A-pluses and the C-minuses

**THIS YEAR'S BEST**

IN 1986, to recognize the importance of university teaching, the Society for Teaching and Learning in Higher Education and 3M Canada created the 3M Teaching Fellowships. Up to 10 university faculty members are recognized each year for their exceptional contributions to teaching and learning. Since 2006, Maclean's has proudly been the program's media sponsor.



This year's 3M Teaching Fellows, left to right: James Silcox, Department of Obstetrics & Gynecology, University of Western Ontario; Malgorzata Dubiel, Department of Mathematics, Simon Fraser University; Daniel Pratt, Department of Educational Studies, University of British Columbia; Katherine Frego, Department of Biology, University of New Brunswick (Saint John)

PHOTOGRAPH BY IAN BARRETT

so when a kid is bored, he tells me he is bored," he says. "We judge by this transcript, which is, as anthropologists say, a thin description."

Much of his restless, rebellious intellect seems rooted in schoolboy experiences in New Delhi. Fortunately, he is too much the gentleman to employ the teaching aids he experienced at the hands of the Irish Christian brothers at his school. While they had an impact on his education, it was often from the business end of a cane. Still, he caught their passion for history and literature. "I knew all of *Julius Caesar* by heart," he says. "Even now I can probably remember 90 per cent of it." The brothers were less enthusiastic about science, which they taught by

(emeritus) in medicine and a teacher in the honours health sciences and arts and sciences programs. Under his tutelage, a discussion on toxicology can lead a student through the works of Agatha Christie, to a meditation on the Psalms, or an introduction to the quatrains of Omar Khayyam.

"What I really hope I do with my students is open their eyes for a few glimpses of all the beauty that is there," he says. "Now, whether they find it later on is up to them, but if I don't do it I'm wasting my time."

## ONE OF THIS YEAR'S 3M'S HAS BEEN DESCRIBED AS 'MISTER CHEMICAL EDUCATOR' OF THE WORLD

reaches far beyond the small, Christian liberal arts university in Edmonton where he has taught since 1981. "I am not aware of another Canadian chemical educator who has become as well-known and respected internationally," says Hank Bestman, chair of King's natural science division. "He has been described as 'Mister Chemical Educator' of the world."

Mahaffy grew up in Eritrea in east Africa, where his father worked for a Presbyterian mission. It shaped his global view as surely as his commitment to teaching was inspired

by mentors such as his mother Arlena, who at 90 is still teaching special needs children in a small Texas school.

Teaching at a liberal arts school has its own challenges. He works with undergraduate science majors, but also those with an aversion to the subject. "My goal isn't to turn them into chemists," he says. "There are fundamentally important things about the world of molecules that everyone needs to know and many are fearful of entering that world." For them he has created Concepts of Chemistry, in which they first express the world of molecules through art, poetry or music before getting into the science and math behind the chemistry of their home and environment. Seeing the science is another key to understanding. Mahaffy co-directs the King's Centre for Visualization in Science, which creates computer-based models of magnetic fields, molecular vibration or aspects of climate change. "It's interesting to help students discover that world, which is foreign to some and scary to a lot of them," he says.

Mahaffy's nomination for a 3M fellowship included letters of support from Nobel laureate Roald Hoffmann; from Oxford's Peter Atkins, author of the world's bestselling chemistry text, and this, from an English major and former student: "Dr. Mahaffy did not dumb down chemistry for humanity students. Instead he bridged the vast chasm that seemed to separate the arts from the sciences," she said. "He rooted the periodic table in everyday life." M



P. K. 'CHARI' RANGACHARI: 'I love to see a patchy transcript. I want the A's and the C's.'

rote. Regurgitate the wrong answer, "you got whacked." It didn't quash his curious nature. "I discovered science wasn't nearly as boring as my teachers made it out to be." The result was a medical degree, and a Ph.D. in pharmacology.

He came to McMaster in 1983 as a medical researcher, only to be inspired by the potential of the group inquiry and problem-based teaching then taking hold in the faculty. McMaster encouraged Rangachari to roam across the disciplines. At 65, he is a professor

### PETER MAHAFFY, Department of Chemistry, The King's University College

With typical evangelical zeal, Peter Mahaffy headed to the U.S. last month as one of the lead scientists in a global lobby effort to have the United Nations declare 2011 the International Year of Chemistry. He sees the effort as an opportunity to raise the profile of chemistry at a time when the planet is being altered as never before by human intervention. The effort also illustrates how Mahaffy's scope



3M Teaching Fellows (continued), left to right: P. K. "Chari" Rangachari, Department of Medicine, McMaster University; Mercedes Rowinsky-Geurts, Department of Languages and Literature, Wilfrid Laurier University; Peter Mahaffy, Department of Chemistry, The King's University College; Sorel Friedman, Department of English Studies, Université de Montréal; Robert Lapp, Department of English, Mount Allison University; TA Loeffler, School of Human Kinetics and Recreation, Memorial University of Newfoundland