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HIGHER EDUCATION

Maths pioneer Alison Harcourt sees progress for women

In 1960, mathematician Alison Harcourt published a seminal paper in the field of linear programming, which created the tool for computers to do something they were uniquely good at: solving optimisation problems.

Over the decades, as computing power grew, her tool, developed with co-author Ailsa Land, was widely used in transport logistics, shift rostering and even cancer radiotherapy decisions — areas in which an optimal answer had to be selected from countless, complex alternatives.

But few knew that Harcourt, who resigned her senior lecturer post at the University of Melbourne in 1971 when she became a mother, was the AG Doig (her maiden name) who co-authored the 1960 paper titled An Automatic Method for Solving Discrete Programming Problems.

For Harcourt, once off the academic escalator it was hard to get back on. "There was no possibility to return to do any decent research," she says.

She returned to the university in 1979 as a casual tutor in statistics and, nearly 40 years later at the age of 88, is still tutoring students for six hours a week and marking their papers.

Kate Smith-Miles, who joined the University of Melbourne last year as a professor and specialises in optimisation, says she learned methods that Harcourt and Land described in the 1960 paper when she was a student.

"No one told me these were invented by two women. As a young female mathematician, if I'd known they would have been role models," she says.

Nor did Smith-Miles know until relatively recently that AG Doig was an Australian who had studied at the University of Melbourne and still taught there.

Last week she met Harcourt for the first time when she hosted a panel session at the university featuring Harcourt and two visiting female mathematicians who also have made contributions to the optimisation field.

Smith-Miles says that Harcourt and Land's method, which became known as "branch and bound", came into its own when the power of modern computers became available. But even computers aren't powerful enough to search all possible combinations of an optimisation problem, and need help. "Their method tells you where not to search," she says.

Smith-Miles looks with awe at Harcourt's achievement. Her 1960 paper has nearly 3000 citations. Smith-Miles's most cited paper has about 800. She says her career, in contrast to Harcourt's, has benefited from policies that supported women such as her to succeed in academe, which weren't there in the 1960s and 70s.

She says that today, for the most recent generation of female mathematicians there is even more support, including travel awards and childcare support when they attend the all-important academic conferences.

In contrast, when Smith-Miles's children were young she says she did not travel to conferences for about five years.

She got through. "I'm very well aware in my generation not everybody was so lucky," she says.

Toda, the University of Melbourne and Monash University both have maths positions that are available only to women, in an effort to improve gender equity.

The picture is also brighter for female doctoral students. Deakin University PhD student Kaushalya Jeewani Nallaperuma is using machine learning techniques to solve optimisation problems; she enjoys support from the Australian Postgraduate Research Intern program to link her research with industry, and is working as an intern at Aurecon. She says she finds women are welcomed into engineering careers.

In contrast, when Harcourt started her maths degree at the University of Melbourne in 1947, she was one of only two women studying the subject.

She also studied physics, but found herself at a disadvantage because nothing in her schooling had prepared her for the practical work.

"I felt the physics school, as a general thing, was very anti-women," she says.

But Harcourt found support from the maths department and, during her University of Melbourne masters degree, went to the London School of Economics, where she worked with Land, her co-author on the paper.

But she never went on to a doctorate.

"At that time there might have been one or two other people interested in linear programming. There was no mentor, no one to talk with," she says.

Harcourt looks around now and sees how opportunities for women have changed.

"They are much closer to equality," she says. But she still believes that men rise faster than women in academic life.

Harcourt went on to make other contributions, drawing attention to inadequacies in randomising the order of election candidates on ballot papers and giving evidence to a parliamentary committee in the 80s.

Today she continues to tutor students and mark their work. "In fact I have some papers sitting on the desk at the moment," she says.