President's Column

Kate Smith-Miles*

As I write this column we are in the heart of university open-day season, where we have an annual opportunity to promote mathematics to the next generation and their parents. I have given the same Open Day lecture at Monash University every year since 2009, updating only two slides: one where I provide the median starting salary for a mathematics graduate which needs a refresh upwards each year, and one where I show that 'mathematician' is consistently ranked somewhere in the top 10 jobs in the world according to the *Jobs Rated* report from CareerCast.com. This ranking is based on a survey of 200 professions, scored on criteria including income, stress levels, work environment, career outlook, etc. When I created the slides in 2009, 'mathematician' was ranked No. 1, and attained the top position again in 2014. 'Actuary' has also been a highly-rated career in these surveys. But in the last few years we have started to see some new maths-related career titles emerge at the top of the list. As shown in the table below, 'mathematician' has lately been replaced at the top with careers that previously were not mentioned: data scientist, statistician, operations research analyst.

Top ranked jobs (2014–2017) according to CareerCast.com annual survey

	2014	2015	2016	2017
1.	**Mathematician**	**Actuary**	**Data Scientist**	**Statistician**
2.	University Professor	Audiologist	**Statistician**	Medical Services Manager
3.	**Statistician**	**Mathematician**	Info Security Analyst	**Operations Research Analyst**
4.	**Actuary**	**Statistician**	Audiologist	Info Security Analyst
5.	Audiologist	Biomedical Engineer	Medical Stenographer	**Data Scientist**
6.	Dental Hygienist	**Data Scientist**	**Mathematician**	University Professor
7.	Software Engineer	Dental Hygienist	Software Engineer	**Mathematician**

The message for students and parents is a clear one — studying mathematics can lead to a range of top-ranked careers, there is a stability to this demand, and the career prospects for mathematics graduates are very strong indeed. But there is also a message for those of us who work in university mathematics departments when observing these trends. Are our mathematics graduates really competitive for lucrative jobs as data scientists, OR analysts, and statisticians? Are we teaching them a broader set of tools and techniques that industry expects they will have?

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Have they ever worked on real-world problems with real-world messy data issues? Can they program? Do they have a track record of successful collaborative team work? I have seen some universities embracing the challenge of updating their curriculum to produce the kind of graduates that industry has told the AMSI Industry Advisory Committee they seek and cannot find enough of in Australia. Other university mathematics departments are still discussing curriculum reforms. It seems timely therefore to revisit the AustMS degree accreditation process, discontinued in 2012, to see what kind of support we can offer departments as they try to simultaneously maintain traditional standards of a core mathematics degree, while ensuring graduates have a range of modern skills expected of a 21st century mathematics graduate.

In this season of trying to influence school-leavers to continue their studies of mathematics, I have also enjoyed the opportunity to communicate about the importance of mathematics at various STEM events and public lectures. Perception is everything, and our field suffers every time we lose a student who fails to receive a satisfactory answer to the common question 'why do I need to know this?'. The relevance of mathematics, and certainly its beauty, is lost on most people unfortunately. And it's not just students who struggle to see the relevance of mathematics. Sometimes we have perception issues with industry as well. I chaired a panel discussion recently at the *AMSI Optimise* event, exploring some of the barriers to industry-academic collaboration. Many mathematicians I know are doing excellent work with industry partners, on small but important problems, but often not on a scale that propels the work to the attention of the CEO and Board or makes a big splash in the media. I recently heard an executive declare that his company doesn't collaborate with Australian universities for research, seemingly unaware of several research projects with an Australian university sponsored by his company. This perception issue is exactly the kind that lies at the heart of the recent and somewhat amusing revelation that Australia's well-known reputation as the worst in the OECD for collaboration between researchers and business is based on a survey of industry only. When asked if Australian organisations collaborated with universities to develop commercial outcomes from academic research, many executives said 'no' in the OECD survey. IP Australia has argued that this is a flawed methodology and is likely to under-estimate the true collaborations. Using data from actual shared IP agreements between industry and universities paints a very different picture, with Australia ranked slightly above average in the OECD (https://www.ipaustralia.gov.au/ip-report-2017). Perception issues abound everywhere, and we must seek to ensure that the significance of our work is promoted effectively to the right audience — from executives in industry to school students, teachers and parents — when it shows the relevance and power of mathematics. This marketing effort will be time well spent.

I am looking forward to the Women in Mathematics conference in Adelaide in late September, and congratulate the WIMSIG committee for their excellent organisation and vision for what will be a special few days. The annual meeting in Sydney in December is also shaping up nicely, and I have secured the services of Adam Spencer to chair our first debate on the hopefully controversial topic: 'The traditional mathematics blackboard lecture is dead'. I will soon be contacting

Heads of departments to call for recommendations of people who would be excellent debaters, but please feel free to contact me directly if you would like to be part of one of the debate teams. Perhaps you were a debater in your school days, or perhaps you feel passionately for either the affirmative or negative side of this topic. I hope that we will be able to offer an entertaining debate that may challenge everyone to consider the pros and cons of their current teaching style, and shape our collective thoughts about best practice for teaching mathematics to various cohorts. I look forward to hearing from you if you are interested to join the debating teams, and seeing everyone else in the audience to support our debaters.

Kate Smith-Miles is a Georgina Sweet Australian Laureate Fellow, and recently commenced as a Professor of Applied Mathematics at The University of Melbourne. She was previously Head of the School of Mathematical Sciences at Monash from 2009–2014, followed by several years as inaugural Director of its interdisciplinary applied mathematics institute (MAXIMA). She is a member of the ARC College of Experts, Chair of the Advisory Board for the AMSI CHOOSEMATHS program, serves on the MATRIX Advisory Board, and is a member of the Federal Government's Knowledge Nation 100 group. Kate is a Fellow of the Australian Mathematical Society, and Fellow of Engineers Australia. She was awarded the Australian Mathematical Society Medal in 2010 and the EO Tuck Medal from ANZIAM in 2017.