Training PhD students to bridge the Academia–Industry gap

It is now well understood that the career paths of PhD students are diverse and not all PhD graduates strive for a career in academia. Even if the opposite were true, the number of PhD graduates greatly exceeds the number of currently available and projected academic positions. It is clear that the PhD as it is traditionally understood has to evolve. With the changing outcomes of the PhD has come the requirement to provide students with training that will equip them with marketable skills vital for success in real-life workplaces, extending them beyond their discipline-specific research and knowledge with skills applicable to industry, academia, government, the community and possibly entrepreneurial activities. This article describes a training module ‘From Project to Product’, which has been developed at Monash University to engage students with industry and introduce them to career pathways outside of academia.

Historically in Australia, academic and industrial career options have been seen as dichotomous pathways. The cultural divide between the two can be seen in figures, which indicate that 60% of all Australian researchers work in universities, compared with less than 30% of researchers employed in the business sector. This contrasts with other countries, where the majority of researchers are employed in the business sector: the United States (80%), Japan (70%) and Switzerland (64%). This divide is further emphasised by the Organisation for Economic Co-operation and Development (OECD) Science, Technology and Industry Scoreboard 2013 statistics on the level of collaboration between business and higher education or research institutions. These data showed that Australia was placed last of 33 countries with respect to collaboration with large firms, and second last for small to medium enterprises. In the most recent OECD Science, Technology and Industry Scoreboard 2015 Australia was not even listed. There is a clear and urgent requirement for Australian academic institutions and industry to work together to bridge this gap.

The training module ‘From Project to Product’, was developed at Monash University as a component of the Monash Doctoral Program, to prepare graduates for career options outside academia where the skills learned during a PhD such as project planning, flexibility in execution of a project, as well as problem solving, competition awareness and lateral thinking can give them a competitive advantage. The primary purpose of the module is to lead students through the steps involved in taking a basic research finding through to a translational outcome, such as a product or application that will contribute to human or animal health. The module is facilitated by two academics – Professor Paul Wood and Associate Professor Jose Garcia-Bustos – who have had extensive experience in industry, having had senior R&D roles in two of the world’s leading pharmaceutical companies, Pfizer Animal Health and GlaxoSmithKline, respectively.

The module consists of six face-to-face, two-hour sessions in which students are guided through the initial stages of product planning,
including crucial considerations required when implementing such a project. Students are also introduced to the development of key strategic documents, such as a target product profile. In the first session, Paul and Jose give an overview of their industry experience before introducing students to the training module and describing the purpose of a target product profile. Students then form teams of two to three, who work together to develop a target product profile for a product of their choice. Students are expected to collaborate in their own time outside of the face-to-face sessions and to seek guidance from the facilitators as needed. Initial drafts of the target product profiles are presented in week 4, where students obtain feedback from Paul and Jose and their peers. In the final session of the module in week 6, students pitch their product idea as a team to the remainder of the cohort, discuss the feasibility of the product in the market place and present an estimate of the funds they would need to progress their idea to the next milestone. They are advised to consider the audience as a source of venture capital and encouraged to immerse themselves in the simulation by wearing business attire during the presentation.

In addition to the guiding of students through the development of a target product profile, the module also includes a session on intellectual property fundamentals as well as interactive sessions with guest speakers from a wide variety of career backgrounds. These guest presenters tend to share the common thread of having had an initial academic career, which later evolved into careers in alternate areas, such as biotechnology, patent law, or successful entrepreneurship.

Student feedback indicates that these presentations are essential to the value of the module. When asked what students liked most about the training module, unsolicited comments included: ‘Listening to different speakers the pathways were all different’; ‘Listening to everyone’s story to how they got to where they are’; and ‘The guest lecturers – great insight into different areas of industry’.

In addition to providing feedback on guest lecturers, students have commented on what the training module has taught them with respect to industry exposure: ‘Teaches you about an aspect that you don’t really have exposure to’; and ‘The fact that I can now understand the influence of industry in product development and commercialisation’.

Overall, we believe these comments indicate that the module is serving the purpose for which it is intended. Significantly and alongside providing industrial exposure, this module requires students to focus on skills that are valued highly by employers, such as communication and presentation skills, critical thinking, teamwork and networking, all of which will be advantageous in their future careers.

As discussed at the beginning of this article the training module from Project to Product is an instructor-led activity that was developed as a way to expose students to professional pursuits outside academia, and to modestly begin to address the divide between industry and academia. Alongside modules such as this, in 2015 PhD candidates at Monash University, as well as other universities across Victoria including The University of Melbourne, RMIT and La Trobe University were invited to take part in the pilot of the new Industry Mentoring Network in Stem (IMNIS) program. Supported by the Australian Academy of Technological Science and Engineering (ATSE), and developed by a team, which includes Professor Paul Wood, Ms Ronnie Wood, Dr Tony Radford and Mr John Kirby, IMNIS aims to tackle the disconnect between academia and industry by enhancing the industry-university networks. This is achieved by linking experienced industry individuals as mentors with PhD students in the STEM discipline. The Victorian industry pilot in 2015 focused on biotechnology and was supported by AusBiotech, while a separate pilot in Western Australia focussed on energy and mineral resources with support from the Institute of Engineers. Importantly, all these initiatives aim to educate young Australian researchers in the foundation steps of their careers, exposing students to industry and opening up the potential for other career pathways. Ultimately, it is hoped that training modules such as these will play a part in bridging the academia-industry gap thus benefiting future collaborative research outcomes between academia and industry in Australia.

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References

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Biographies

Professor Paul Wood obtained his PhD from the JCSMR, ANU, in 1982. After a post-doc at The University Melbourne he joined the CSIRO Division of Animal Health as Leader of the TB diagnostic and vaccine development program, where he patented the platform TB diagnostic technology, successfully commercialised by CSL, Prionics and the Australian company, Cellestis. Paul received a number of awards for this research including the CSIRO medal, ASM Diagnostic award and in 2013 The Clunies Ross award. Paul was also the Deputy-Director of the CRC for Vaccine Technology from 1993–2000 and has published over 100 scientific papers. In 1997, he became VP/ Director, Global R&D in AH at CSL, and in 2004 joined Pfizer AH as Senior Director, ANZ Biologicals R&D. In 2008, he left Australia to become Executive Director, Global Discovery, Pfizer AH, Kalamazoo, Michigan. He led the Global Discovery team for both pharmaceutical and biological products with 200 staff and a budget of US$60 million. Paul returned to Australia in 2012 and established his own consultancy company and accepted an Adjunct Professor position at Monash University. He was also a Director of a start-up AH company Nexvet Biopharma and is one of the Directors of the IMNIS Initiative. In 2015 he was elected as a Fellow of ATSE.

Associate Professor Jose Garcia-Bustos has a long record in anti-infective research in both academia and industry, having worked in bacteriocins for his PhD thesis and in the structure of the bacterial cell wall and the mode of action of beta-lactam antibiotics while a Fulbright fellow at The Rockefeller University in New York. While at GlaxoSmithKline and its legacy companies he coordinated groups at research sites in different countries and successively led the Molecular Microbiology Group, the Drug Discovery Biology Unit and the Malaria Unit in Tres Cantos (Spain), where at different times he supervised and managed biologists and medicinal chemist’s working on drug discovery projects for antibacterials, antifungals, malaria and TB.

Associate Professor Priscilla Johanesen is Head of Teaching and Learning in the Department of Microbiology at Monash University and has 20 years experience in teaching microbiology in various modalities to undergraduate and graduate students across the disciplines of science, biomedical science and medicine in both Australia and the USA. In recognition of her dedication to teaching Priscilla was awarded the David White Excellence in Teaching Award at the Australian Society for Microbiology Annual Scientific Meeting in 2014. Priscilla’s current role has involved the development and implementation of training programs for PhD students in the Faculty of Medicine, Nursing and Health Sciences, Monash University.