

**2012 Professional Development Workshop**  
**Annual Meeting of the Australian Mathematical Society**  
**27–28 September 2012, University of Ballarat**

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The *Effective Learning, Effective Teaching in the Quantitative Disciplines* professional development workshop was held at the well-appointed Caro Convention Centre at the St Helen campus of the University of Ballarat. The workshop was held in conjunction with the 56th Annual Meeting of the AustMS.

We thank the School of Science, Information Technology & Engineering at the University of Ballarat for helping with the setup of the workshop. The workshop started on Thursday evening with dinner followed by a trivia competition. A member of the winning team said that if his Head of School knew how many differential equations he could solve, the HoS would be aghast — algebraists are not supposed to be so good at DEs!

The first plenary on Friday was given by Dr Robert Layton, a graduate of the University of Ballarat. We started each of the professional development days by showcasing a graduate and the teaching practices of the host institution. Robert's message was that he responded positively to teaching that displayed passion about research and involved active applied learning. He gave an example of a unit in game theory where he could work on problems and see clear applications. He is now working on cybercrime and is applying his knowledge of linear algebra and metric spaces. Here are his points for students, lecturers and curriculum designers:

- blind experimentation only gets you some of the distance
- understanding the application rather than relying on a 'black box' technique gets better results
- learning how algorithms work is more efficient in the long run
- learn widely — concepts from other fields will help you when you least expect it.

Jason Giri, Deputy Dean, Science and Mathematics, at the University of Ballarat, presented the second plenary. Jason described a curriculum redesign that has been successful in significantly increasing the numbers of students studying mathematics units at the University. The Department collaboratively defined the topics that were important for the student cohort and then gave the units appealing names, for example *Bits, Bytes and Algorithms* (a unit in discrete mathematics). This was a pedagogical and marketing exercise that has reaped benefits for both the Department and for the students, as many more students are now studying mathematics. Students start with a subject *On the Shoulders of Giants* that covers the history

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of mathematics in such a way as to review and teach prerequisite mathematical knowledge, as well as present an appetiser of other units in the mathematics sequence.

Dann Mallet (QUT) presented a workshop on Threshold Learning Outcomes (TLO) in the mathematical sciences. This is a project, funded by the Office of Learning and Teaching, to define minimum standards for a graduate of a mathematics degree or major. This is a difficult exercise and the group found it challenging to define these standards. The proposal is to go beyond a list of topics and instead to try to define the knowledge, skills and attributes of a mathematics graduate. It is important that the mathematics community gets involved in defining these standards as we will be the ones who will have to demonstrate to TEQSA that our degrees meet them. Dann will be seeking input and involvement from academics around the country, so make sure to be involved.

Then there were two workshops on assessment. The first was on task design. This is a hot area in mathematics education internationally as computer assessment becomes more common and commercial interests are moving into tertiary learning and teaching. If we have TLOs for a mathematics degree then we have to measure these using assessment. As such, the tasks need to be well designed so that they assess the outcomes required. Standards of achievement need to be defined in a way that is not only quantitative, but provides a qualitative statement of the outcomes. This is a challenge for mathematicians who are comfortable with their current numerical grading systems.

The second workshop was presented by Katherine Seaton (La Trobe) who gave ideas about what has worked for her university. Her department uses worksheets to guide students through the weekly learning and practice. Useful and effective techniques include marking only small parts of homework and making use of the Pearson online mathematics tasks. There was much discussion about the weighting of final examinations and other university policy requirements.

The discussions throughout the event were fruitful and good networks were established between participants. This was the last year of funding for the workshops from the ALTC. In 2013, there are good opportunities for professional development through the Delta conference (24–29 November, Kiama, NSW) and EMAC (1–4 December, Brisbane, Queensland). The Delta conference covers tertiary mathematics education and has speakers from the southern hemisphere. The conference is an excellent way to meet others and keep up to date with international trends. EMAC has a mathematics education stream and is particularly useful for those teaching service mathematics and statistics to engineering students. Both of these conferences have refereed journals for proceedings.

Visit [www.austms.org.au/ALTC+Workshop+2012](http://www.austms.org.au/ALTC+Workshop+2012) to see slides from the workshop.

The AustMS professional development unit ([www.austms.org.au/Professional+Development+Unit](http://www.austms.org.au/Professional+Development+Unit)) continues under the coordination of Katherine Seaton. Many universities are accrediting the unit as part of their Graduate Certificates and Graduate Diplomas. This is a good outcome for the Australian Mathematical Society as we now have professional development specifically targeted at the mathematical sciences.