

Broadening students' experience of maths in practice

ROWLETT, Peter <<http://orcid.org/0000-0003-1917-7458>>

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Broadening students' experience of mathematics in practice

Do we do enough to expose undergraduate students to the idea that mathematics is more than they experienced at A-level? New students are often surprised by maths that isn't simply performing techniques. They often expect to complete exercises similar to those demonstrated by staff, assessed by exams. How might we encourage students to apply mathematics in novel ways, explore topics in depth and look beyond the taught curriculum?

The National Student Survey 2017 included new questions in which students were asked to agree or disagree with the statements:

- My course has provided me with opportunities to explore ideas or concepts in depth;
- My course has provided me with opportunities to bring information and ideas together from different topics;
- My course has provided me with opportunities to apply what I have learnt.

These questions encourage us to think about whether our courses are really encouraging students to explore mathematical topics in depth through independent study, to apply mathematics in unfamiliar scenarios and to draw links between different topics. These are all areas where traditionally students struggle, yet they are part of what makes a professional mathematician work well in their chosen field. A workshop at Sheffield Hallam University aimed to explore these issues.

First, my colleague from Sheffield Hallam University, Hannah Bartholomew, and I spoke about 'Moving beyond techniques to applying maths in novel modelling scenarios'. Mathematical modelling often differs from students' expectation of what mathematics involves, and so the first year modelling module at Sheffield Hallam has been developing to try to encourage students to practise skills of modelling.

Next, Noel-Ann Bradshaw (University of Greenwich) spoke about 'Challenging students to go further than the curriculum in OR and Data Analytics'. Noel-Ann emphasised the benefits of encouraging students to learn to teach themselves technical skills around data analysis. She highlighted that this would improve self-sufficiency, independence and use of initiative alongside problem solving and specific technical skills. She also outlined the value of inviting employers to speak to students and gave an account of taking students to visit an employer.

Ewan Russell (Keele University) spoke about 'Module delivery and assessment in partnership with employers'. Ewan's module at Keele includes two projects where students must work on assignments which are set and assessed in collaboration with industrial partners. Ewan uses this to encourage students to act with greater independence and take responsibility over their work in a simulated consultancy role.

To round off the day, Michael Grove (University of Birmingham) spoke about 'Mathematical Modelling and Problem Solving: A Journey from Leeds to Birmingham!'. Michael spoke about work he had done at the University of Leeds under the National HE STEM Programme and at University of Birmingham since then. Michael's work developed modelling and problem-solving skills based

around topical activities. These included Felix Baumgartner's skydiving world record attempt (2011), the Rugby World Cup (2015) and UK energy usage (2016).

The community of people teaching mathematical sciences in UK universities was once well-served by workshops organised by the Maths, Stats and OR Network and others. As our community is now under-served in this regard, we were grateful to receive funding from an IMA Education Grant. The grant paid for catering and external speaker expenses. The workshop was free to attend and was advertised through maths departments and the **sigma** Network mailing list. The recent announcement of the IMA Higher Education Teaching and Learning Initiative conference and workshops is a most welcome development for our community in 2017/18.

Peter Rowlett CMath FIMA
Sheffield Hallam University