

Development and implementation of MathBench for Australian Universities to improve quantitative skills of science and mathematics student

Issue 2 July 2014

July Update

MathBench at the OLT Inaugural Conference

The MathBench team delivered a successful poster presentation at the recent Office for Learning and Teaching (OLT) inaugural conference held at the Dockside Convention Centre in Sydney on 10-11 June 2014 (see page 3 below). Jo-Anne Chuck and Vilma Simbag, team members, interacted with other participants who were keen to know: how this project can address the QS gap as students transition from high school to university; its possible impact on progression of student QS from first year to latter years; how the modules will be integrated in the units; how they will be evaluated; and how this project is tied up with other initiatives to improve QS. The interest that the poster generated affirms the significance of QS in science in Australian higher education.

MathBench submissions at ACSME and ISER Conference

The team has just made its submission for an ideas exchange session at the Australian Conference on Science and Mathematics Education (ACSME) to be held at the University of Sydney and University of Technology Sydney from 29 September to 01 October. If accepted, the session will provide the team with feedback from colleagues on how the contextualised MathBench modules can be integrated into different biology units in first and second years of science programmes.

Another submission has been drafted for the International Society of Educational Research (ISER) conference to be held in Turkey from 29 October to 02 November. The abstract, a product of good teamwork, focuses on the process of developing pedagogically sound online learning and teaching resources through genuine collaboration between scientists and mathematicians.

Onto the challenge of adapting and contextualising the QS modules

Thirty-two modules are being adapted and customised by the team and fifteen of these have gone through the first stage and with a few onto the second stage of the review chain. Modules under Measurement; Visualisation; Probability and Statistics; Microbiology; and Cell Processes topics have been reviewed and edited by the focus groups composed of three to four scientists and one mathematician from the team. Some modules have also been sent to members' colleagues in their respective institutions for further feedback. The edited modules will be sent for further review by the Reference Group and other scientists and mathematicians from different universities. After further revision the team aims for some of the modules to be trialled in some first year biology and other science units during the second semester.

MathBench team developing a model towards genuine collaboration

The team is taking on the challenge posed by Prof John Rice, one of our Reference Group members, during the team's first meeting. Prof Rice reminded the team that the project is not just about producing the QS modules but as important in developing a genuine collaboration between the scientists and mathematicians in the team. Being an issue that has been, time and time again, raised in science and mathematics education conferences in

Australia, the team recognises its importance. The team is in the process of developing its own framework for collaboration, looking at the components and influences impacting on the process of collaboration and reflecting on a number of published models and the experiences of individual members. To evaluate the framework it will use the social network analysis used by MathBench USA.

MathBench project: A perfect dance floor for mathematicians and scientists

Kelly Matthews in her 2011 HERDSA News article talked about the interconnectedness of science and mathematics in today's world and that 'science (is) finally learning to dance with mathematics as its partner' and for the MathBench - Australia team there is no more perfect dance floor than this project. Our team, as John Rice observed, has more scientists than mathematicians. At this early stage of the project, however, the commitment of our mathematicians to work with the different focus groups in developing and adapting the modules for Australian universities is more than enough to make up for the number. As the three members juggle from one focus group to the other, ensuring that the maths and examples are correct and relevant to the Australian context, we are positive that the project's significant contribution will not be just on improving the quantitative skills of science students through the MathBench modules but on demystifying the respective silos that scientists and mathematicians, intentionally or unintentionally, find themselves in.

Face to face meetings provided for a good jumpstart

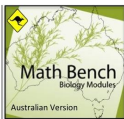
Organising face to face meetings has always proved to be challenging, particularly in a multi-university interdisciplinary project like MathBench. Although the time and resources spent on bringing the team and Reference Group members together might be costly, conducting face to face meetings was deemed important. The two face to face meetings held in February and May of this year provided a good jumpstart to the project and hence worth the cost. In those two meetings, due to the speed and spontaneity of interactions, the team was able to establish a shared understanding of the project's aims, expectations and limitations and was able to lay the 'rules of engagement' given everyone's tight schedule. The first meeting led to identification and allocation to members of the original MathBench modules that would be assessed and adapted to the Australian context and the second meeting resulted in the development of a process on how the team would draft, edit and provide feedback on each other's work before the modules are assessed by other scientists and mathematicians in partner universities.

In the second face to face meeting/workshop the project's external evaluator, Kelly Matthews, talked about quality assurance in module development while Dann Mallett, a Reference Group member, shared his thoughts as a maths academic on the original modules and how they could be adapted to Australian context.

The two meetings were followed by regular communication through emails and Basecamp among members of each focus group.

For more information on MathBench-Australia project you may contact: A/Prof Cenk Suphioglu, project leader, at cenk.suphioglu@deakin.edu.au or Ms Vilma Simbag, project manager, at vilma.simbag@deakin.edu.au

**Office for Learning and Teaching (OLT) Inaugural Conference
MathBench Poster, Dockside Convention Centre, Sydney, 10-11 June,
2014:**



Development and implementation of MathBench for Australian Universities to improve quantitative skills of science and mathematics students

Cenk Suphioglu¹, Vilma Simbag¹, Jo-Anne Chuck², Carmel Coady²,
Julie Markham², Shaun Belward³, Lesley Lliuka⁴, Prasad Chunduri⁴,
Leon Poladian⁵, Jenny Di Trapani⁶, Dianne Watters⁶,
Yvonne Hodgson⁷, Katerina Thompson⁸



Overview

There is strong agreement that the quantitative skills (QS) of many undergraduate biology students are inadequate. Access to a proven QS teaching resource provided an excellent opportunity for adaptation for Australian usage, in order to build new capacity and determine the best practice for implementation.

The Outcomes

1. Set of adapted and optimised MathBench modules for use in Australia
2. Set of science modules readily available for student use on an array of mobile devices including iPad and smartphones
3. Framework for the implementation of contextualised MathBench modules in other Australian universities
4. Evidence of effectiveness of MathBench modules in Australia
5. Series of active dissemination events to facilitate the up-take of MathBench-Australia

The Modules



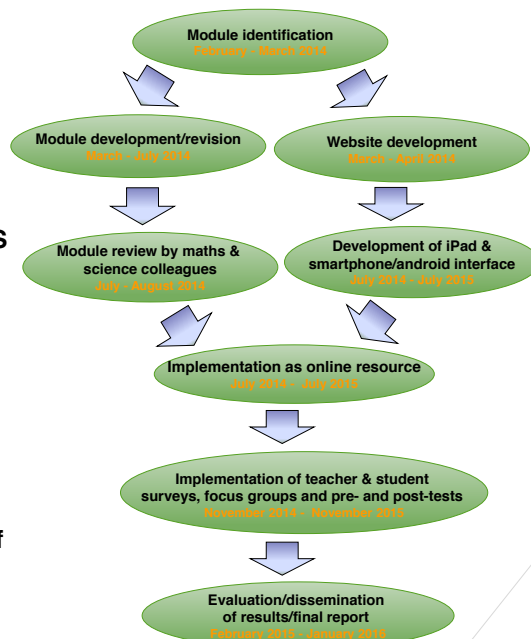
The Project

This two-year project involving mathematicians and biologists identified MathBench, a suite of online modules that have been trialled, tested and adapted across several US universities, as a potential QS learning resource for mathematics and science students.

The overall project aim is to develop, adapt and implement MathBench as an innovative online resource to improve QS of mathematics and science students at seven Australian universities.

Support for this project has been provided by the Australian Government Office for Learning and Teaching. The views in this project do not necessarily reflect the views of the Australian Government Office for Learning and Teaching.

Achieving the outcomes/Timeline



The Team



The Partners



Would you like to get involved with our MathBench project?
Please don't hesitate to contact us:
Project Leader: A/Prof Cenk Suphioglu (cenk.suphioglu@deakin.edu.au)
Project Manager: Ms Vilma Simbag (vilma.simbag@deakin.edu.au)