Facing the challenges of undergraduate mathematics education: Findings from the FYiMaths project

Deborah King

Joann Cattlin

The University of Melbourne.

Australian Government

Office for Learning & Teaching

FYiMaths Project Team

Project Team

Dr Deborah King,
Joann Cattlin,
The University of Melbourne
Professor Jo Ward,
Curtin University
A/Professor Leon Poladian,
The University of Sydney
Dr Adrian Koerber,
The University of Adelaide

Project goals

1. To **build leadership capacity** and raise the profile of individuals and teams coordinating and teaching first-year mathematics subjects/programs.
2. To **promote and support innovative approache**s to first-year learning and teaching in mathematics.
3. To develop useful mechanisms for dissemination and embedding of **outstanding practices** in first-year learning and teaching in mathematics.
4. To **develop and enhance deeper understanding and knowledge** of the learning processes in mathematics, particularly in the transition from school to university.
5. To **identify learning and teaching issues** in first-year mathematics.

Data collection and engagement

Established contact

- Every School/Department of Mathematics in Australia and built an email list.
- Interviews with 40 academics in 26 universities in Australia and one in New Zealand.
- Peak bodies such as AMSI, AustMS, ACDS and AAMT.
- Office of the Chief Scientist.

Events

- Workshops in June 2013, 2014 and 2015 at The University of Melbourne.
- Conference 2014 – *National Forum on Assumed knowledge in mathematics: its broad impact on tertiary STEM programs*.
- Joint conference *Connections and Continuity* with AAMT and ACDS.
- Presentations at conferences and seminars, including AustMS, ACSME, HERDSA, FYHE, ACDS and Heads of Maths Conference.

Findings

1. The **role of First-year Coordinators** was highly valued, but many faced significant challenges.

2. There was **strong support for a network** that could provide connections with colleagues in mathematics as well as other science, technology and engineering disciplines.

3. There were many shared **challenges** across all universities
- difficulty in dealing with student diversity
- mathematics entry requirements
- adapting to new teaching approaches.

The role of First Year Coordinators : Major findings

Significant benefits by providing oversight and coordination of FY provided broad perspective of student needs.

- The roles were **varied and complex.**
  - high managerial and administrative workloads, often with limited administrative support.
  - wide range of responsibilities requiring broad expertise.
- **None had a position description** and many roles had developed in an ad hoc way.
- **Limited positional authority** made it difficult to affect change.
- **Lack of professional development** for some of the challenges of the role.
- **Negative impact** on career prospects.

FYiMaths Network

- **National network** in contact with every School of Mathematics in Australia and The Universities of Auckland and Waikato.
- **Growing** with over 200 people on contact list and **State based groups** emerging.
- **Supporting** valuable networking and collaborations between Schools of Mathematics and Statistics.
- **Links with key organisations including** AustMS, AMSI, AAMT**,** Universities Australia, Head of Schools of Mathematics, Australian Council of Deans of Science.
- **Workshops** provide a forum for disseminating research and networking.
- **Awareness raising and advocacy** on major challenges in FY mathematics and now extending beyond this to undergraduate mathematics more generally and maths support.

Challenges in FY mathematics

Service teaching

Teaching to a wide range of disciplines, often within the same class, presents challenges in contextualising the mathematics.

Isolation

From colleagues within their Faculty, Institution and mathematics colleagues in other institutions.

Challenges in FY mathematics

Limited time for teaching innovation

High workload limits opportunity to review curriculum, teaching approaches etc.

Diversity of student background

Teaching students with a wide range of backgrounds particularly those without the assumed knowledge

Outcomes

- A **guide** to developing the role of First-Year Mathematics Coordinators in your university.
- **Website** www.fyimaths.org.au and Twitter @fyimaths
- A **community of practice** of mathematicians seeking to improve outcomes for their students.
- **Awareness raising and advocacy** put the issue of assumed knowledge entry requirements on the national agenda with Universities and peak bodies.

Future

- Annual workshops
- Building scholarship in undergraduate mathematics education research through networking
- Supporting development of state-based groups
- Continuing to build connections between mathematicians and scientists
- Continuing to develop innovative solutions to meet the challenges of teaching undergraduate mathematics