Mathematics – Mathematical Education

This course aims to give students an insight into the rationale of the teaching of mathematics in schools, covering theories of teaching and learning as well as providing practical experience.

**School/Subject Area:** School of Mathematics

**Target Audience:**Final year Mathematics undergraduates

**Staff Involved:** Lecturer and Administrator/Lecturer

**Dates**: Semesters one and two of final year

Key features

This course aims to give students an insight into the rationale of the teaching of mathematics in schools, covering theories of teaching and learning as well as providing practical experience.

While it does not give any exemption from formal teacher training, it can be useful for giving students an insight into teaching as a career and demonstrates their motivation when it comes to an application or interview for a PGDE or PGCE, enabling candidates to talk reflectively about their experiences. It is a popular module among finalists and can be taken as an alternative to the main final year project. A maximum of fifty are accepted each year with a few being turned away most years. Only a small proportion of those taking the course will end up on professional teacher training courses.

Planning

This course has been on offer since the early 1980s. Each year the staff involved meet to discuss changes, update materials and start to organise the placements. The two main staff members are on 0.75 and 0.2 contracts with the School of Mathematics and both spend, on average, a little more than one day per week during term time on this twenty credit course. (The one on 0.2 also works a 0.8 contract at the Moray House campus.)

The course

Only the top years (6 and 7) of primary schools are involved with this project, with two or three students going to each participating school. As a group, they take three one-hour classes in two different schools and are expected to cover topics “a bit outside the normal primary curriculum”. Recent themes have included:

1. introducing pupils to the mathematical concept of a parabola and showing them their application to real life, such as in the construction of a bridge;
2. stars and calendars, and the connection between the two, leading to the idea of congruence.

The experience enables the students to link the theory they have learned in lectures with the hands-on realities of classroom life, leading to an appreciation of some of the difficulties facing teachers. All local authority-run primary schools in Edinburgh are invited to participate and many schools volunteer places every year, commenting on the value of these opportunities for pupils to meet enthusiastic maths students.

Lectures are two hours per week for the first eight weeks of the session along with tutorials. Students appreciate the very different style of the lectures which are more interactive and discursive than in other maths modules and no other module entails essay-writing. Students are encouraged to develop their own opinions rather than simply ‘mugging up and reproducing’ what they have been told by lecturers.

Assessment

1. The above primary school sessions have to be researched and prepared. These are not observed by University staff but the students’ reflections are discussed on their return. Even if the students feel that their events were unsuccessful, they will gain credit as long as they have reflected well on their activities and learned from their mistakes. Assessment of this element is by a group report and an individually written three thousand word essay which, again, must link the theory they have learned with their practical experience and which accounts for 60% of the marks for this course.
2. Another important part of the course involves thinking about the communication of mathematical ideas to an adult audience. Small groups of students research a mathematical topic: they then present an assessed talk to their peers on a popular maths topic, similar in nature to a talk which might be given to the Mathematics Society. An example quoted was ‘The Birthday Paradox’ whereby, if there are 23 people in a room, there is a 50% chance that two of them will share a birthday. Another example was the maths of origami. Students are expected to come up with their own ideas, though staff will provide prompts if necessary.

This module requires students to demonstrate and develop a range of skills different from those required in the rest of their degree: writing, critical reflection, working in groups and presentation skills which show that they can engage their audience in active learning.

Resources

Apart from the staff time mentioned above and some secretarial support in arranging placements, resources are minimal and could probably be measured in the tens of pounds – for stationery required during school talks.

Evaluation

The lecturers involved seek online feedback from the students taking the module and it has been nominated for a EUSA Teaching Quality Award. Feedback is generally good and the students seem to enjoy the course. Comments include:

* “Extremely interesting course, totally different from any other maths course, great for developing skills that are not emphasised much in our degree such as presentation, debating, communicating, leadership etc.”
* “Great experience to teach in primary schools. Lots of fun.”
* “Learning about the theories of understanding helped me a lot in realising the way that I myself could best understand and take in material, which has helped me improve my studying habits.”

No official feedback is required from schools but letters of appreciation are often received by the module leaders.

Advice

* Get organised well in advance and keep good relationships with the schools.
* Respond to student feedback and consider appropriate changes.
* Don’t worry about carrying out assessment in groups: 40% of the assessment is awarded on a group basis but there have been no complaints.
* While students make up their own groups for going into schools, staff recommend that they do not just choose their friends. The lecturers have been pleased to find that groups tend to pull up their weaker members, which is an advantage to the less imaginative student.

Key contacts

[Ruth Forrester](mailto:Ruth.Forrester@ed.ac.uk), Lecturer, School of Mathematics

[Lois Rollings](mailto:L.Rollings@ed.ac.uk), Schools Liaison Administrator, School of Mathematics

<http://www.ed.ac.uk/employability/staff-information/how-employability-addressed/good-practice/cse/mathematical-education>